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ON
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THEEM-2020

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PREFACE

The objective of conference is to inspire engineers, academicians to explore, integrate and evolve in the research direction through a forum. As all of us know that Technology is always a progressive phenomenon, the research can bring the remarkable transformation to cater for the society needs. To achieve this precious goal a national conference "Trends in Engineering Excellence and Metamorphosis-2020" has been scheduled on 13, 14th January 2020 at Theem College of Engineering, Boisar providing the best avenue for the publication of research and development.

The Theem 2020 will surely facilitate the participants to present, discuss and publish their recent research results and approaches which can develops new ideas to achieve the needs of emerging industry.

Without an effective coordination and support from many individuals and institutions, it is not possible to organize such kind of facilitation center for the researchers though which they can present the genuine research work. I would like to express my hearty and sincere thanks to the speakers of invited talks and contributory paper presentations. I wish to acknowledge the time and efforts taken by the expert reviewers of the journal for carrying out review of papers. I also acknowledge to all the members of different committees and co-conveners who carried out a lot of work to make this conference, Theem2020 a grand success. I wish all participants fruitful and effective interaction at the conference.

Thanks a lot

Dr. Shah Aqueel Ahmed
Convenor, Theem 2020

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Volume 7, Issue 1 (III) : January – March 2020 Part -4

CONTENTS

Research Papers

International Journal of Advance and Innovative Research
Volume 7, Issue 1 (III): January - March, 2020 Part - 4

ISSN 2394 - 7780

A REVIEW ON BEST OPTIMAL LOCATION OF THYRISTOR CONTROL PHASE ANGLE REGULATOR (TCPAR) FACTS DEVICE FOR ENHANCING POWER SYSTEM SECURITY

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ABSTRACT
At present, the congestion of transmission lines are increases due to which different types of faults and the key concern i.e. voltage collapse may occurs which affects the steadiness of the system. Flexible AC Transmission System FACTS devices plays a imperative function in maintaining the power system stability, reducing overall loses and controlling the power flow in the system. But it is essential to investigate the optimal location of FACTS devices for their adequate operation. This paper gives a brief review of quick and flexible control of power flow in transmission lines. Special emphasis is on best optimal Location of Thyristor control phase angle regulator (TCPAR) based on real power Performance index with two different test case of IEEE bus system has been discussed.

Keywords - FACTS, IEEE Bus System, Optimal Location, Performance Index (PI), TCPAR.

I. INTRODUCTION

It is well established that in the energy markets, the transmission network system plays an important role. The congestion in the transmission network may occur due to the agreement of transaction of bulk power at various location. The transmission must be limited to avoid congestion [1]. Nevertheless, due to the high installation costs and some environment restriction, the introduction of the new transmission line in the existing network is considerably limited. in order to overcome these issues, the Flexible AC Transmission System (FACTS) is introduced, which allows the existing system to work letter [2]. The costs of these FACTS devices are very high, so it is very necessary to properly use these devices on the system. the first goal is therefore to determine the FACTS device's optimal location. In [3] IEEE-14 bus system the optimal placement of the TCPAR is examined by the line sensitivity approach method and the actual power flow performance index (PI) in "line 5" i.e. "bus 2-5". Likewise, the reduction in system failures occurs after deployment of the TCPAR module on the IEEE-14 bus system and the actual power flow of the system is improved. Similarly, in the system on which TCPAR is installed, the Ybus is also modified from that typical transmission line.

In [4], the optimal location of Thyristor control phase angle regulator (TCPAR) was determined on the basis of the actual flow performance index (PI) and examine it on the IEEE-5 bus system by sensitivity approach method. Finally, by implementation of Newton-Raphson method in programming software, power flow of system is carried out with and without TCPAR device.

Planning and maintenance of large interconnected power systems is becoming increasingly complex with the in crease in power demand, although power systems are becoming less stable. The regulatory restrictions on transmission network growth have resulted in increasing margins of stability and increased the risk of cascading outages and blackouts. Electrical utilities are force to operate the system near their limit of stability. Due to competition among utilities, the number of unplanned power exchanges is also growing with the electricity market deregulation. If these exchanges are not regulated, some lines become overloaded, leading to unstable networks.

These tribulations can be efficiently tackled using FACTS technology for controlling the power flows and voltages in the system. Exclusive of adding new lines FACTS can recover system security with voltage regulation. They can regulate power flow to alleviate congestion also. FACTS permit flexible operation of A.C. transmission systems whereby the changes in the system can be accommodated easily without stressing the system. Although power electronic devices have become solutions for many problems in all the areas of power system, the focus of this paper is on only transmission area and which line is suitable for the TCPAR device in different IEEE bus system i.e. IEEE-5 & IEEE-14 bus system is to be discussed.

II. POWER FLOW FORMULATION OF TCPAR

The main objective of controlling the voltage and phase angle is to include the correct quadrature and in-phase portion in the steady bus terminal voltage to increase or decrease its magnitude and phase angle to the specific value. The TCPAR is a device that uses thyristor switches to introduce phase-shifting transformers at various phase angles. TCPAR's main function is to monitor the power flow in the system without disrupting the stability of the system. Essentially, TCPAR change the angle of the step between the sending end and the receiving end in an appropriate range. The injection model of TCPAR is shown in Fig.1:-

ISSN 2394 - 7780

As illustrated in Fig.1. Two buses i.e. bus-i & bus-j are to be found in which line-k is located and according to which effective and reactive power formulation is to be carried out. The active power at the sending and receiving end after installation of TCPAR is given as:-

$$P_{is} = -V_i^2 K^2 G_{ij} + V_i V_j K [G_{ij} \sin 6_{ij} - B_{ij} \cos 6_{ij}] \quad (1)$$

$$P_{js} = -V_i V_j K [G_{ij} \sin 6_{ij} + B_{ij} \cos 6_{ij}] \quad (2)$$

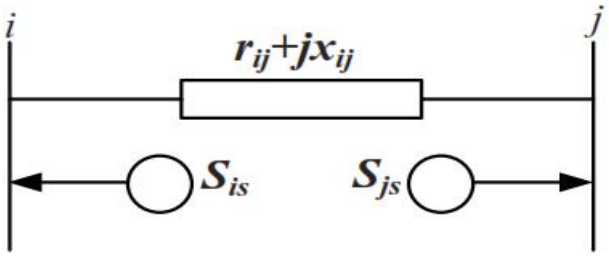

Figure.1. Injection model of TCPAR

Similarly, the reactive power at sending & receiving end after installation of TCPAR is given as:-

$$Q_{is} = {}^{i}V^2 K^2 B_{ij} + V_i V_j K [G_{ij} \sin 6_{ij} + B_{ij} \cos 6_{ij}] \quad (3)$$

$$Q_{js} = -V_i V_j K [G_{ij} \sin 6_{ij} - B_{ij} \cos 6_{ij}] \quad (4)$$

Where K= tan $

V_i & 6_{ij} are the voltage and angle at bus-i and j. G_{ij} & B_{ij} are the components of $Y_{bus.}$

Thus from equations (1) to (4) the power flow equation is given as:-

$$S_{ij} = P_{ij} + jQ_{ij} \quad (5)$$

III SOLUTION TECHNIQUE

FACTS devices belonging primarily to the power electronics family group which increase the power quality and efficiency of transmission without any endowment in the existing system structure. But it is important to investigate the best position of the FACTS devices depending on the cost point of view. The main objective of the FACTS devices being optimally positioned is as follows:

- Reduction of system losses, i.e. loss of real power, loss of reactive power.
- Total congestion relief in the process.

There are different methods to examine the FACTS devices ' Optimum Location' i.e. Genetic algorithm, sensitivity approach, factor of distribution of line outage, method of optimization of particle swarm. In this review, sensitivity approach method is been discussed.

IV. REAL POWER FLOW PERFORMANCE INDEX (PI)

The specific line's performance index (PI) depends primarily on the system's real power flow. Real power flow performance index (PI) will convey the system's adversity under normal and overloading environment.

$$PI = \sum_{m=1}^{Nl} \frac{Wm}{2n} \left(\frac{P_{lm}}{P_{lm}^{max}} \right)^{2n} \quad (6)$$

Where, Plm = Real power flow

The PI will be increased according to the system's overloading condition.

V. SENSITIVITY APPROACH METHOD

Based on the sensitivity approach process, it is possible to investigate the optimal position of the TCPAR device by measuring the sensitivity of each row in the IEEE-5 & IEEE-14 bus system slowly after installing the TCPAR device in each line of the system. Then by implementing equation (6) PI of each line is to be calculated which will be in terms of ϕ_K. The equation of sensitivity factor is given as:-

$$\propto_k^s = \frac{\partial PI}{\partial \phi_k} = \sum_{m=1}^{N_l} W_m \, P_{lm}{}^3 \left(\frac{1}{P_{lm}^{max}} \right)^4 \frac{\partial P_{lm}}{\partial \phi_k} \quad (7)$$

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The results of sensitivity factors of IEEE-5 & IEEE-14 bus system is as shown in table I & table II and the rank is depend on the most sensitivity factor.

TABLE I: LINE SENSITIVITY TABLE

LINE K	BUS i to j	ϕ	SENSITIVIY FACTOR	RANK
1	1-2	-9.8	-29.688	2
2	1-3	-9.8	-2.676	7
3	2-3	-10	**-32.59**	1
4	2-4	-10.3	-9.289	4
5	2-5	10	-7.378	5
6	3-4	11.3	-28.79	3
7	4-5	12.1	-7.024	6

(IEEE-5 BUS SYSTEM)

TABLE II: LINE SENSITIVITY TABLE

LINE K	BUS i to j	ϕ	SENSITIVIY FACTOR	RANK
1	1-2	-10	655.1	5
2	1-5	-10	-418.76	2
3	2-3	10	-267.17	4
4	2-4	9.13	-399.86	3
5	2-5	11.5	**-485.86**	1

(IEEE-14 BUS SYSTEM)

As we observed from the table I & II, It is clear that IEEE-5 bus system in "line 3" & IEEE-14 bus system in "line 5" is most sensitive line of the system. After Injecting TCPAR device in sensitive lines, the real power flow of that typical transmission line enhanced dynamically. Similarly the overall losses of the system get reduced.

VI. POWER FLOW ANALYSIS

TABLE-III: POWER FLOW WITHOUT
INJECTING TCPAR (IEEE-5 BUS SYSTEM)

Bus	**1**	**MW**	**MVA %1.0600 0.00**
Generator 1		115.14	125.9
To	2	80.18	87.2
To	3	34.96	38.6
Bus	**2**	**MW**	**MVA %1.0242 -2.94**
Generator 1		40	50
		20	22.4
		-78.78	86.9
To	3	19.67	22
To	5	53.82	63.6
Bus	**3**	**MW**	**MVA%0.9921 -3.73**
Load1		20	96.1
To	1	-33.82	71.2
To	2	-19.37	24
TO	4	33.19	37
Bus	**4**	**MW**	**MVA%0.9835 -4.22**
Load 1		50	58.3
To	2	-24.8	29.3
To	3	-33.04	37.6
To	5	7.84	8.6
Bus	**5**	**MW**	**MVA%0.9629 -5.07**
Load 1		60	72.1
To	1	-72.6	72.6
To	2	-52.24	61.3
To	4	-7.76	11.1
To	13	-6.23	6.6

ISSN 2394 - 7780

TABLE-IV: POWER FLOW AFTER INJECTING TCPAR (IEEE-5 BUS SYSTEM)

Bus	**1**	**MW**	**MVA %1.0600 0.00**
Generator 1		114.51	124.3
To	2	88.64	96.4
To	3	25.87	27.9
Bus	**2**	**MW**	**MVA %1.0208 -2.38**
Generator 1		40	50
Load 1		20	22.4
To	1	-86.94	95.4
To	3	45.74	51.2
To	4	13.42	14.8
To	5	47.78	56.4
Bus	**3**	**MW**	**MVA%1.0114 -2.75**
Load1		20	25
To	1	-25.26	28.9
To	2	-45.47	52.7
To	4	50.74	56.9
Bus	**4**	**MW**	**MVA%0.9986 -3.46**
Load 1		50	58.3
To	2	-13.28	16.5
To	3	-50.42	57.1
To	5	13.7	15.2
Bus	**5**	**MW**	**MVA%0.9660 -4.98**
Load 1		60	72.1
To	2	-46.52	54.9
To	4	-13.48	17.3

TABLE-V: POWER FLOW WITHOUT INJECTING TCPAR (IEEE-14 BUS SYSTEM)

Branch Data								
Brnch #	From Bus	To Bus	From Bus Injection P (MW)	From Bus Injection Q (MVAr)	To Bus Injection P (MW)	To Bus Injection Q (MVAr)	Loss (I^2 * Z) P (MW)	Loss (I^2 * Z) Q (MVAr)
1	1	2	156.88	-20.40	-152.59	27.68	4.298	13.12
2	1	5	75.51	3.85	-72.75	2.23	2.763	11.41
3	2	3	73.24	3.56	-70.91	1.60	2.323	9.79
4	2	4	56.13	-1.55	-54.45	3.02	1.677	5.09
5	2	5	41.52	1.17	-40.61	-2.10	0.904	2.76
6	3	4	-23.29	4.47	23.66	-4.84	0.373	0.95
7	4	5	-61.16	15.82	61.67	-14.20	0.514	1.62
8	4	7	28.07	-9.68	-28.07	11.38	0.000	1.70
9	4	9	16.08	-0.43	-16.08	1.73	0.000	1.30
10	5	6	44.09	12.47	-44.09	-8.05	0.000	4.42
11	6	11	7.35	3.56	-7.30	-3.44	0.055	0.12
12	6	12	7.79	2.50	-7.71	-2.35	0.072	0.15
13	6	13	17.75	7.22	-17.54	-6.80	0.212	0.42
14	7	8	-0.00	-17.16	0.00	17.62	0.000	0.46
15	7	9	28.07	5.78	-28.07	-4.98	0.000	0.80
16	9	10	5.23	4.22	-5.21	-4.18	0.013	0.03
17	9	14	9.43	3.61	-9.31	-3.36	0.116	0.25
18	10	11	-3.79	-1.62	3.80	1.64	0.013	0.03
19	12	13	1.61	0.75	-1.61	-0.75	0.006	0.01
20	13	14	5.64	1.75	-5.59	-1.64	0.054	0.11
						Total:	13.393	54.54

ISSN 2394 - 7780

TABLE-VI: POWER FLOW AFTER INJECTING TCPAR (IEEE-14 BUS SYSTEM*)*

PQREC =	Ybus_Out =	PQSEND =
-1.4633 - 0.2127i	-0.7914 + 6.1813i	1.5046 - 0.0803i
3.5013 - 2.3462i	-1.0259 + 4.2350i	-1.3406 - 6.5540i
-2.4817 - 8.4792i	-1.1350 + 4.7819i	6.1141 - 6.8014i
7.2225 - 3.5751i	-1.6860 + 5.1158i	-3.6124 - 7.3586i
4.3931 - 3.3939i	-1.7011 + 5.1939i	-0.4444 - 8.6493i
1.0392 -10.8016i	-1.9860 + 5.0688i	6.5130 - 8.4562i
7.5354 + 5.1802i	-6.8410 +21.5786i	-5.0264 -13.0894i
0.0009 + 0.0007i	0.0000 + 4.8895i	-0.0009 - 5.0038i
0.9242 - 0.0036i	0.0000 + 1.8555i	-0.9242 - 1.1357i
0.2351 - 1.6959i	0.0000 + 4.2574i	-0.2351 + 1.0454i
-0.0277 - 0.0023i	-1.9550 + 4.0941i	2.2394 - 4.6294i
-0.0229 + 0.0155i	-1.5260 + 3.1760i	1.7352 - 3.5792i
-1.3431 - 1.2016i	-3.0989 + 6.1028i	5.1051 - 6.2069i
0.0003 - 6.4149i	0.0000 + 5.6770i	-0.0003 - 0.0014i
0.0000 - 3.7887i	0.0000 + 9.0901i	-0.0000 + 0.0014i
-0.1111 + 0.4727i	-3.9020 +10.3654i	0.1342 - 0.5342i
0.5892 - 5.5656i	-1.4240 + 3.0291i	1.0548 + 2.0688i
-0.0151 - 0.0041i	-1.8809 + 4.4029i	0.6229 - 1.4186i
0.1366 - 0.1307i	-2.4890 + 2.2520i	0.0016 + 0.0056i
3.5313 - 4.9823i	-1.1758 + 2.3444i	

CONCLUSION

According to the sensitivity approach the transmission line which is the most sensitive is considered to be an optimal location of the TCPAR device. Therefore as we observed table I, “line 3” i.e. “2-3” is the most sensitive transmission line and which is to be denoted by rank 1 is considered as an optimal location of the TCPAR device in IEEE-5 bus system and table II shows “line 5” i.e. “2-5” is the most sensitive transmission line and which is to be denoted by rank 1 is considered as an optimal location of the TCPAR device in IEEE-14 bus system.

The formulas of TCPAR device are taken into consideration and after the installation of TCPAR device in IEEE-5 bus system on the "line 3" its effect on power flow is as shown in table IV. Power flow after injecting TCPAR in IEEE-14 bus system on “line 5”, the effect of this is shown in table VI. It enhances the real power flow as well as it reduces the losses and it gives maximum relief of congestion in the system.

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A SURVEY ON BIG DATA

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ABSTRACT
Big data is a field that treats ways to analyze, systematically extract information from, or otherwise deal with data sets that are too large or complex to be dealt with by traditional data-processing application software. Data with many cases (rows) offer greater statistical power, while data with higher complexity (more attributes or columns) may lead to a higher false discovery rate. Big data challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy and data source. Big data was originally associated with three key concepts: volume, variety, and velocity. When we handle big data, we may not sample but simply observe and track what happens. Therefore, big data often includes data with sizes that exceed the capacity of traditional software to process within an acceptable time and value.

1. INTRODUCTION

Big data usually includes data sets with sizes beyond the ability of commonly used software tools to capture, curate, manage, and process data within a tolerable elapsed time. Big data philosophy encompasses unstructured, semi-structured and structured data, however the main focus is on unstructured data Big data "size" is a constantly moving target, as of 2012 ranging from a few dozen terabytes to many zetta-bytes of data. Big data requires a set of techniques and technologies with new forms of integration to reveal insights from data-sets that are diverse, complex, and of a massive scale

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). It's a virtualization framework.

Cloud plays an important role within the Big Data world, by providing horizontally expandable and optimized infrastructure that supports practical implementation of Big Data.

2.0 Types of Big Data

Big Data' could be found in three forms:

c) Structured

ci) Unstructured

cii) Semi-structured

ciii) Structured

Structured data is the data which conforms to a data model, has a well define structure, follows a consistent order and can be easily accessed and used by a person or a computer program.

Structured data is usually stored in well-defined schemas such as Databases. It is generally tabular with column and rows that clearly define its attributes.

SQL (Structured Query language) is often used to manage structured data stored in databases.

Characteristics of Structured Data

- Data conforms to a data model and has easily identifiable structure
- Data is stored in the form of rows and columns

Example: Database

- Data is well organised so, Definition, Format and Meaning of data is explicitly known
- Data resides in fixed fields within a record or file

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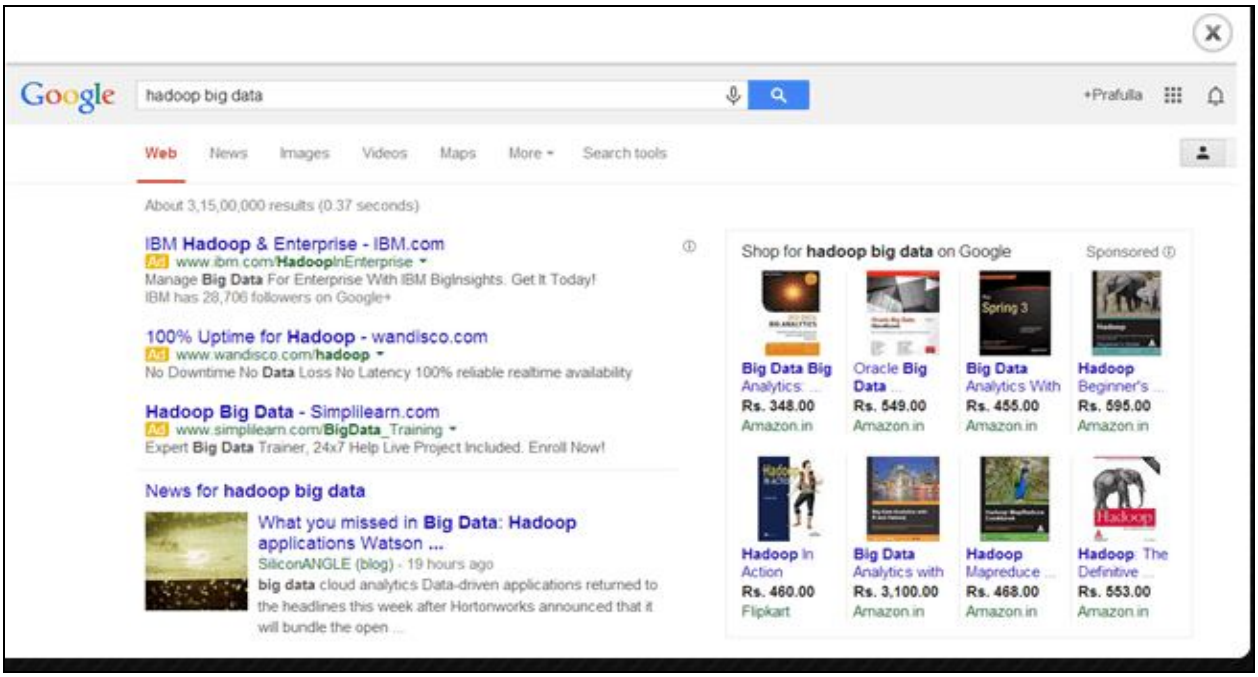
Employee_ID	Employee_Name	Gender	Department	Salary_In_lacs
2365	Rajesh Kulkarni	Male	Finance	650000
3398	Pratibha Joshi	Female	Admin	650000
7465	Shushil Roy	Male	Admin	500000
7500	Shubhojit Das	Male	Finance	500000
7699	Priya Sane	Female	Finance	550000

Unstructured data

It is the data which does not conforms to a data model and has no easily identifiable structure such that it can not be used by a computer program easily. Unstructured data is not organised in a pre-defined manner or does not have a pre-defined data model, thus it is not a good fit for a mainstream relational database.

Characteristics of Unstructured Data

1. Data neither conforms to a data model nor has any structure.
2. Data can not be stored in the form of rows and columns as in Databases
3. Data does not follows any semantic or rules
4. Data lacks any particular format or sequence



➢ **Semi-structured**

Semi-structured data is the data which does not conforms to a data model but has some structure. It lacks a fixed or rigid schema. It is the data that does not reside in a rational database but that have some organisational properties that make it easier to analyse. With some process, we can store them in the relational database.

Characteristics of semi-structured Data

- Data does not conforms to a data model but has some structure.
- Data can not be stored in the form of rows and columns as in Databases
- Semi-structured data contains tags and elements (Metadata) which is used to group data and describe how the data is stored
- Similar entities are grouped together and organised in a hierarchy

ISSN 2394 - 7780

```
<rec><name>Prashant Rao</name><sex>Male</sex><age>35</age></rec>
<rec><name>Seema R.</name><sex>Female</sex><age>41</age></rec>
<rec><name>Satish Mane</name><sex>Male</sex><age>29</age></rec>
<rec><name>Subrato Roy</name><sex>Male</sex><age>26</age></rec>
<rec><name>Jeremiah J.</name><sex>Male</sex><age>35</age></rec>
```

3.0 CHARACTERISTIC OF BIG DATA

Volume – The name Big Data itself is related to a size which is enormous. Size of data plays a very crucial role in determining value out of data. Also, whether a particular data can actually be considered as a Big Data or not, is dependent upon the volume of data. Hence, 'Volume' is one characteristic which needs to be considered while dealing with Big Data.

Variety – The next aspect of Big Data is its variety.Variety refers to heterogeneous sources and the nature of data, both structured and unstructured. During earlier days, spreadsheets and databases were the only sources of data considered by most of the applications. Nowadays, data in the form of emails, photos, videos, monitoring devices, PDFs, audio, etc. are also being considered in the analysis applications. This variety of unstructured data poses certain issues for storage, mining and analyzing data.

Velocity – The term **'velocity'** refers to the speed of generation of data. How fast the data is generated and processed to meet the demands, determines real potential in the data.

Big Data Velocity deals with the speed at which data flows in from sources like business processes, application logs, networks, and social media sites, sensors, Mobile devices, etc. The flow of data is massive and continuous.

4.0 BENEFITS OF DATA PROCESSING

Businesses can utilize outside intelligence while taking decisions

Access to social data from search engines and sites like facebook, twitter are enabling organizations to fine tune their business strategies.

- Improved customer service

Traditional customer feedback systems are getting replaced by new systems designed with Big Data technologies. In these new systems, Big Data and natural language processing technologies are being used to read and evaluate consumer responses.

1. Early identification of risk to the product/services, if any
2. Better operational efficiency

Big Data technologies can be used for creating a staging area or landing zone for new data before identifying what data should be moved to the data warehouse. In addition, such integration of Big Data technologies and data warehouse helps an organization to offload infrequently accessed data.

5.0 CONCLUSION

So according to survey we can state that using the BIG DATA we could make various enchantments in below fields :

Banking and Securities :

The Securities Exchange Commission (SEC) is using big data to monitor financial market activity. They are currently using network analytics and natural language processors to catch illegal trading activity in the financial markets.

1. **Communication , media and Industry :**

Since consumers expect rich media on-demand in different formats and a variety of devices, some big data challenges in the communications, media, and entertainment industry include: Collecting, analyzing, and utilizing consumer insights

- Leveraging mobile and social media content
- Understanding patterns of real-time, media content usage

ISSN 2394 - 7780

3.Health care provider : The healthcare sector has access to huge amounts of data but has been plagued by failures in utilizing the data to curb the cost of rising healthcare and by inefficient systems that stifle faster and better healthcare benefits across the board.

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AN OVERVIEW OF INTRUSION DETECTION BASED ON DATA MINING TECHNIQUES

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ABSTRACT
Intrusion-detection systems goal is to detect attacks beside computer systems and networks or, in general, beside information systems. The aim of an ID is to detect malicious traffic. In order to achieve this, the IDS monitor all incoming and outgoing traffic. There are some approaches on the implementation of IDS. Among those, two are the most common: Anomaly detection is based on the detection of traffic anomalies. The nonconformity of the monitored traffic from the normal profile is measured. Various different implementations of this technique have been projected, based on the metrics used for measuring traffic profile deviation. And other one is Misuse/Signature detection which looks for patterns and signatures of already known attacks in the network traffic. A continuously updated database is usually used to store the signatures of known attacks. The way this technique deals with intrusion detection resembles the way that anti-virus software operates. In recent years significant attention has been given to Data Mining approaches for addressing network security issues. As there are different data mining techniques as Association Rules, Frequent Episode Rules, Classification, Clustering which gives the appropriate results but combination of all this techniques can achieve better results. Different classifiers such as combination of clustering and classification or other techniques can be used to form a hybrid approach. In this paper, I have reviewed the hybrid learning approach by combining different techniques of data mining to achieve best possible high detection rate and low false alarm rate.

1. INTRODUCTION

Intrusion detection is the practice of monitoring and analyzing the events occurring in a computer system in direction to detect signs of security problems. An intrusion detection system (IDS) monitors networked devices, also looks for anomalous or malicious behavior in the patterns of activity in the audit stream. Intrusion detection is an area rising in significance as more sensitive data are stored and managed in networked systems.

Usually, intrusion detection techniques are classified into two broad groups:

Misuse Detection: It works by searching for the traces or patterns of well- known attacks. Clearly, only known attacks that leave characteristic hints can be detected that way. Anomaly detection: It uses a model of normal user or system behavior and ages significant deviations from this model as potentially malicious. This model of normal user or system behavior is commonly known as the user or system profile. Strength of anomaly detection is its ability to detect formerly unknown attacks.

Additionally, Intrusion Detection systems (IDs) are characterized as per the kind of input information they study. This leads to the variance among host-based and network-based IDSs. Host-based IDSs analyze host-bound audit sources for instance operating system audit trails, system logs, or application logs. Network-based IDSs analyze network packets that are captured on a network.

Data mining supports to understand normal behavior inside the data and use this knowledge for detecting unknown intrusions. Different Data Mining techniques for example clustering and classification are proving to be beneficial for analyzing and dealing with large amount of network traffic.

Clustering is an unsupervised learning technique that can handle unlabeled data i.e. it can notice unknown attacks. While classification is a supervised learning technique that can handle only labeled data i.e. it can detect only known attacks. Clustering is more appropriate than classification in the domain of intrusion detection to achieve high detection rate and low false alarm rate. The best possible high detection rate and low false alarm rate can be attained by using Hybrid learning methods.

2. REVIEW OF RELATED WORK

Security of network systems is becoming a significant issue, as more and sensitive information is being stored and manipulated online. So it is essential to find an effective way to protect it. An intrusion can be well-defined as “any set of actions or a type of attack that attempt to negotiate the integrity, confidentiality or availability of a resource” [1]. An Intrusion Detection System (IDS) is a system that plays an significant role to secure a network system and monitor network activities automatically to detect malicious attacks.

ISSN 2394 - 7780

2.1 Goal of IDS

Goal of IDs is to detect security violations in information systems. Intrusion detection is an inactive approach to security as it monitors information systems and raises alarms when security violations are detected [5].

2.2 Drawback of IDS

Intrusion Detection Systems (IDS) is important in security infrastructures as they allow network administrators to detect policy violations. These policy violations range from external attackers trying to gain unauthorized access to insiders abusing their access. Current IDS have a number of significant drawbacks [5]:

- Data overload:

It does not relate directly to misuse detection but important is how much data an analyst can efficiently analyze. That amount of data he desires to look at seems to be growing rapidly. Depending on the intrusion detection tools occupied by a company and its size there is the possibility for logs to reach millions of records per day.

- False positives:

A collective complaint is the extent of false positives IDS will generate. A false positive occurs when normal attack is mistakenly considered as malicious and treated accordingly.

- False negatives:

This is the case where an IDs does not produce an alert when an intrusion is really taking place. Data mining can help recover intrusion detection by addressing each and every one of the above mentioned problems. Remove usual activity from alarm data to allow analysts to focus on actual attacks.

- Find false alarm generators and "bad" sensor signatures
- Find irregular activity that exposes a real attack• Identify long, current patterns (different IP address, same activity).

Data mining-based IDSs require less knowledge however provide good performance. These systems are too proficient of generalizing to new and unknown attacks.

3. HYBRID LEARNING APPROACH

Data mining techniques can be distinguished by their different model functions and representation, preference criterion, and algorithms. The main function that we are interested in is classification, as normal, or malicious, or as a particular type of attack. We are concerned in link and sequence analysis. Moreover, data mining systems offers the means to easily perform data summarization and visualization, assisting the security analyst in identifying areas of concern. Common representations for data mining techniques include rules, decision trees, linear and non-linear functions (including neural nets), instance-based examples and probability models. An Intrusion Detection System (IDS) is a defense system that plays an important role to protect or secure a network system and its main goal is to monitor network activities automatically to detect malicious attacks [2].

Table-1: Comparison of Different Hybrid Techniques

Sr. No	Techniques Comparison Criteria	An improved network intrusion detection technique based on k-means clustering via naive bayes classification [2].	Novel intrusion detection system integrating layered framework with neural network [3].	A two-stage hybrid model for Intrusion detection [4].
1	CLASSIFIER	Naive Bayes classifier, we have a hypothesis that the given data belongs to a particular class. So calculate probability for the hypothesis to be true. The approach requires only one scan of the whole data. Also, if at some stage there are additional training data, then each training eg. can incrementally increase/decrease the probability that a hypothesis is correct.	Neural Network classifier (Back Propagation Network) and combination of 'weak' classifiers (Heterogenous classifier) are used where the individual classification power of weak classifiers is shown to be slightly better than that of random guessing.	Rule based classifier where Rules are developed using features present in a given dataset or Automated rule generation techniques can build the optimal set of rules on given data. Though these rules are the best fit for the given data set they are difficult to comprehend and manage if original data

ISSN 2394 - 7780

				set is slightly revised.
2	**IDS approach**	Anomaly Detection	Anomaly Detection and Misuse Detection	Misuse Detection
3	**Improved Variants Detection**	Yes	Yes	No
4	**Type of DATA**	Can handle unlabeled data	Can handle unlabelled data	Can't handle unlabelled data
5	**Rate of FALSE ALARM ('False Positive')**	High	Low But accuracy of less occurring attack is not good (False Negative)	Low
6	**Reduced False Dismissal**	Yes	Yes	No
7	**Speed of ID based on**	Resulting Cluster centroid in new monitoring data	Autonomous mobile agents.	Automated rule generation techniques but difficult to comprehend and manage if original data set is slightly revised
8	**Data Overload**	No	No	No (small no of best rule produced which are enough to select initial prototype)
9	**Detection Rate**	High	Moderate by Model B	High
10	**Hybrid of**	k-Means Clustering and Naive Bayes Classification	Integrating layered (Model A and B) network framework with Neural Network (BPN)	Rule Based classifier and k-Means Clustering

4. CONCLUSION

In this paper summarizes and compares different data mining techniques and their combination to form hybrid approach to apply it for detecting intrusions are described. To understand normal behavior inside the data and use this knowledge for detecting unknown intrusions this techniques are beneficial.

Different data mining techniques like classification, clustering and hybrid learning approaches such as combination of clustering and classification techniques are compared with respect to reduced false dismissal, speed of ID based on, data overload, classifier, IDS approach, and improved variants detection, type of data and rate of false alarm as the comparative criteria.

The best probable high detection rate and low false alarm rate can be achieved by using Hybrid learning approaches, But the approach with combination of k means clustering and Naive Bayes classification gives the higher detection rate with more false positive whereas layered model effectively detect attack but not able to detect all types of attack and two stage model gives accuracy in detection. So from all these approach combination of k-means clustering and Naive Bayes classification is beneficial and works effectively.

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APPLICATION OF IOT BASED SYSTEM FOR AGRICULTURE IN INDIA

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ABSTRACT
We live in 21st century, everything here is technology based. Agriculture plays vital role in development of the country. In India most of the people are having farming as prime occupation. There are some issues in traditional way that causes bad effect in farming. Hence to overcome this issue we have to make agriculture smart using automation and IOT. The highlight feature of this system is the precision farming, soil moisture, agricultural drone. This system will work automatically as per certain scenarios arises.

1. Keywords: Soil moisture, Agricultural Drones, IOT, smart greenhouses, smart farming, precision farming.

2. INTRODUCTION

We live in 21st century, everything is automated. In fact, it should because doing such things without technology is very difficult task. Agriculture is considered as the basis of life for the human species. It plays main role in the growth of country's economy. It also provides large ample employment of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which result in low yielding of crops and fruits but wherever automation has been implemented and human beings had been replaced by automatic machineries, the yield has been improved IOT is one of those growing technology.it is a shared network of objects where these objects interact with the internet.

According to the current sex ratio of earth. The global population is set to touch 9.6billion by 2050.So to feed this large population, the farming industry must embrace IOT against the challenges such as extreme weather conditions, rising climate change, insufficiency of water and the demand for more food has to be met.

3. What is smart farming and what its purpose?

Smart farming is a capital hi-tech system of growing food cleanly and sustainable for the masses. In IOT based smart farming a system is built for monitoring the crop field with the help of the sensors and automating the irrigation system. The farmer can monitor the field condition form anywhere and it is highly efficient as compared with the conventional approach.

4. Purpose

-automation

-efficient

-climate independency

-reducing wastage of resources

-maximizing crop yield

5. Sensors and equipment-

What is sensor? It is a device which detects or measures a physical property and records, indicates, or otherwise responds to it. Precision agriculture allows farmers to maximize yield using minimal resources such as water, chemical fertilizers and seeds by developing sensors and mapping fields, farmers can begin to understand their farms at micro scale. These sensors will sense different conditions and will work according to it. Following are the few sensors which are used in agriculture.

1. Agricultural Drones -

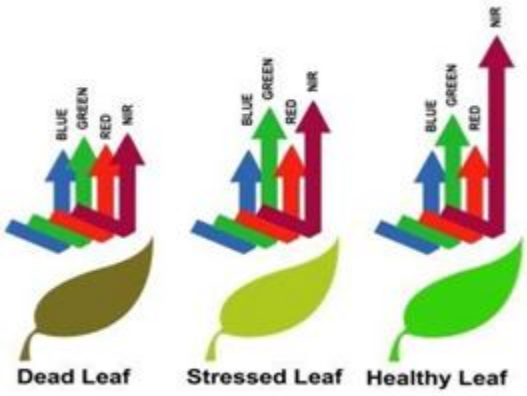
Many types of drones are available today, but not all are good candidates for farming. Those suitable for agricultural applications fall into two categories: Fixed-wired and multi rotor these fixed-wired drones have long range capacity. An advantage when a large area is to be covered. And the multi-rotor

ISSN 2394 - 7780

Drones are faster to set up in the field and can take off and land vertically.

Leaf analysis (also called as stem leaf analysis, tissue analysis) is the most precise method of monitoring plant nutrient levels. While soil analysis reveals the levels of essential soil nutrients. We can do this analysis with the help of agriculture drones. These drones will capture image of leaf that will convert the leaf color into RGB (Red, green, blue) and according to the intensity of RGB we can analyses the health of the plant or crop.

2.Soil Moisture sensor-

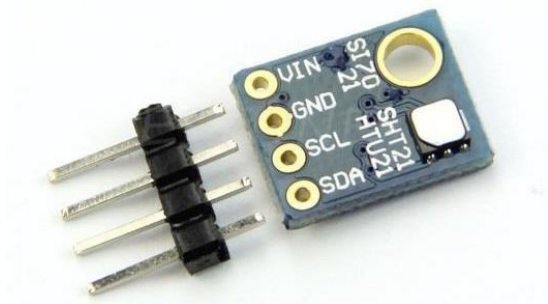


Soil moisture sensor measures the volumetric water content indirectly by using some other properties of soil such as electrical resistance, dielectric constant or interaction with neutrons, as a proxy of the moisture content. If soil moisture is less means soil is dry so there is need to turn on the motor. In this case there is no manual work. As the moisture get decrease, motor will on automatically and this status.

3. Arduino-

To connect all these sensors and equipment all together we need and interface hence arduino is used here because it is more cost efficient and easy to implement then Raspberry-pi "Agri" apps are continuously innovating in the agricultural industry by using Arduino based solution at the core of its data loggers. Our rate of innovation is extremely high as we can implement new sensor solutions rapidly by leveraging the open source community's libraries and contribute back to them.

3. **Air Humidity Sensor –**Plants require the proper environmental conditions for optimal growth and health if the mixture of temperature, humidity and lights are incorrect, fruit and vegetables yields can be affected. Humidity sensor senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. The warmer the air temperature is; the more moisture it can hold. Humidity sensors use capacitive measurement, which relies on electrical capacitance. The sensor composed of two metal plates and contains non-conductive polymer. Film between them. This film collects moisture from the air, which causes the voltage between two plates to change. These voltage changes are converted into digital reading showing the level of moisture in the air.



ISSN 2394 - 7780

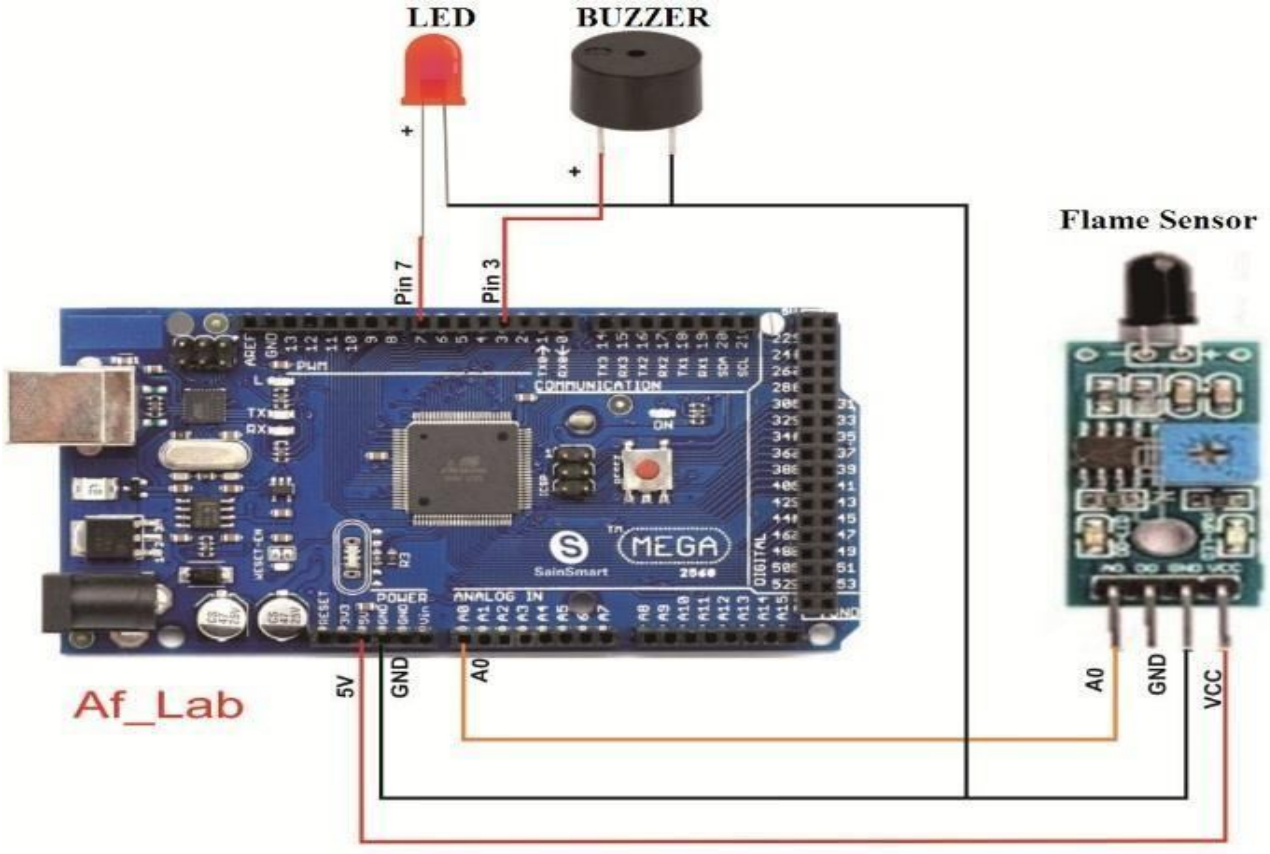
5. Soil Temperature –

The temperature sensor can be used with soil moisture sensor and together they can be used to detect the presence of ice.

Thermistor based temperature sensor are typically inaccurate and uses complex equation which contains complex calculations such as logarithmic and third order terms which are difficult for microcontroller to compute hence THERM200 is used. The THERM200 is a soil temperature probe, which has a temperature span from -40oC to 85oC. It outputs a voltage linearly proportional to the temperature so no complex equations are required, to calculate the temperature from voltage. It is highly accurate with 0.125oC of resolution.

6. Fire Detection sensor –

The fire detection facility is also included in this IOT system. If there is a fire in the crop area, then it will detect and send the notification to farmers. So farmer will know about the fire in the crop and take the necessary action to protect it.



Flame Detector Uisng Arduino Mega 2560

6. Application of IOT in Agriculture -

1. Precision farming–

Here is the first application of IOT in agriculture that is precision farming is one of the most famous

ISSN 2394 - 7780

applications of IOT in agriculture sector and numerous organizations are implementing this technique around the world. Crop Metrics is a precision agriculture organization focused on ultra- modern agronomic solutions while specializing in the management of precision irrigation. The goal of precision farming is to not only simply generate data via sensors but to analyses the data to evaluate needed reactions. Smart farming application areas include farm vehicle tracking, livestock monitoring, field observation and storage monitoring.

1. Agricultural Drones –

Technology has changed over time. And today there are many drones out in the market. From film industry to defense, drones are being used in every field. And agriculture is one of the major industries to incorporate drones. These are used for crop health assessment, irrigation, crop monitoring, crop spraying, planting and soil and field analysis. In India using drone to take care of crops will benefit in multiple ways. Firstly, it will save a lot of time and effort. Secondly, it will cut a lot of expenses

For Example,

DJI MG-1S agricultural wonder drone

Most of the times it is difficult to handle drone due to their massive size.

DJI MG-1S overcome this problem; it is very responsive and easy to use. Just take the controller in your hands and move across the field. DJI's intelligent system will remember your path and makes the flight in the same way. The intelligent system also strictly follows the spraying direction you set on the controller.

Pros

- Easy to handle.
- Good battery life.
- Carries spray load up to 10kgs

Cons

- Not great in features like plant health
- Requires a license to operate

3. Animal Husbandry

Animals were first domesticated from around 13,000 BC on words, antedating farming of the first crops. Animal husbandry is the one part of agriculture so not only using IOT in farming but also using it into Animal husbandry will increase the rate of productivity. It will contain monitoring of metabolites, breath analyzer, virtual animal fitness, financial result, food analyzer.

4. Smart Greenhouse

Greenhouse is being closed structure protects the plant from extreme weather conditions namely: wind, hailstorm, ultra-violet radiation and insects and pest attacks. Greenhouse farming methodology that enhances the yield of vegetables, fruits and crops.it controls the environmental parameters through manual intervention. which causes product loss, labor cost loss, energy lost etc. but using IOT smart greenhouses can automatically control the climate inside the house. We can create a cloud server for remotely accessing the system when it is connected to IOT. That will provide cost-effective and optimal solutions to the farmers with minimum manual intervention.

ISSN 2394 - 7780

ADVANTAGES

1. Increased production

Optimized crop treatment such as accurate planting, watering, pesticide application and harvesting directly affect production rate.

2. Water conservation

Weather predictions and soil moisture sensors allow for water use only when and where needed.

3. Low cost

Automating process in planting, treatment and harvesting can reduce resource consumption, human error and overall cost.

4. Remote monitoring

Local and commercial farmers can monitor multiple fields in multiple locations around the globe from an Internet connection. Decision can be made in real- time and from anywhere.

DISADVANTAGES

1. Compatibility

Currently there is no international standard of compatibility for the tagging and monitoring equipment. I believe this disadvantage is most easy to overcome. The manufacturing companies of this equipment just need to agree to a standard, such as Bluetooth, USB etc. this is nothing new and innovating needed.

2. Complexity

The IOT is a diverse and complex network. Any failure or bugs in the software or hardware will have serious consequences. Even power failure can cause a lot of inconvenience.

7.CASE STUDY

PRECISION FARMING BY DTAC

In Thailand, local telecommunication firm DTAC, fully owned by Norwegian telecommunications group Telenor, has launched a precision farming IOT solution through a partnership with Thailand's Department of Agriculture (DOAE) and National Electronic and Computer Technology Centre (NECTEC).

The government agencies aim to equip local farmers with the technology they need to face challenges, such as climate change, plant dieses and soil moisture.

They launched a one-year pilot project that introduces this IOT based solutions to monitor, analyses and predict the factors affecting cultivation. The new solution will allow farmers to control the quality of agricultural product and reduce production Cost.

DTAC is responsible for the wireless internet connectivity and cloud computing, while NECTEC will develop and research on sensory system.

8. CONCLUSION

Implement agricultural IOT solutions in a successful manner. The proposed system will benefit for farmers while providing them a facility like analyzing health of the crop by its color, providing only required water to crops by knowing the moisture level of the soil. This will reduce the wastage of water.

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ARDUINO BASED SMART IRRIGATION SYSTEM

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ABSTRACT
The population of the world is around 7.4 billion and is expected to rise up to 10 billion by the year 2050. With this growth in population there will be huge demand to fulfil their needs and through smart automation we can lessen their burden. Our aim is to make a smart irrigation system which will be low in cost, power efficient and eco-friendly. This system is based on Arduino which is powerful still very cost-effective platform. The system can operate at as low as 5v thus making it very power efficient. The system uses moisture sensor through which it senses water content in soil and once it senses that humidity of soil is below certain defined level it turns on motor until moisture level is achieved. The main advantage of this system is that if it is installed once it does not require any human intervention or any kind of maintenance thus cost effective even in long term. Besides, it only takes in water as it is required and hence leading to less use of water. It can be used in various applications like farming, gardening at home and office. If someone is on vacation or has to go outstation then he can go without worry of watering his plant as this system works flawlessly without any need to turn on or turn off. The main highlights of the project are low cost, saves water and power, completely automated and no special maintenance is needed.

Keywords: Arduino, Soil moisture sensor, pH sensor

INTRODUCTION
Around 71% of earth surface is covered with water of which 96.5% is sea water. The available 3.5% is freshwater is sourced from rivers, lakes and ground. This water is used in various applications like drinking, industries, agriculture, etc. Agriculture is fully based on freshwater and it uses around 69% of used freshwater. Drought is still a major problem in our world so it is very important to use available water resources in a efficient way. Farmers in India are still dependent on rain for farming. Different crops need different parameters of soil humidity, pH values and temperature to grow. But due lack of knowledge, farmers do not take this in to consideration and do farming which may lead to their loss.

Agriculture is one of the most important part of an Indian economy. Agriculture accounts for 18% of India's GDP and of all the work force India has 50% is involved in agriculture. As India is developing country people still use traditional ways of farming, cultivation and irrigation. Before sowing any seed. the farmer must be aware of the quality of soil because the soil parameters are different at different places. Farmers still use old irrigation system which requires lot of power and there is wastage of water. This kind of irrigation is completely manual and need to be monitor constantly. This can also lead to under irrigation which will result in drying of crops and over irrigation which can lead to increase in salinity of soil which will make land infertile. Automation can be used to do irrigation. Automation do the work with precise accuracy and with more efficiency than any human being. It will work flawlessly 24x7 without need of maintenance or any kind of attention. Needless to sayour future is set based on automation and IoT agriculture will be a no stranger.

OBJECTIVES OF STUDY
1. To understand the concept of irrigation.

2. To understand the concept of soil humidity, pH in agriculture.

3. To develop a smart irrigation system to water crops and test soil qualities.

CONCEPT
A. What is Arduino?
Arduino is an open-source platform for designing and developing electronics devices and modules. Arduino has a different micro-controllers like uno, nano, mega, etc.Arduino has an IDE for writing and debugging codes which can be loaded into its memory via USB.There are various sensors and modules available in market for Arduino which can programmed and used according to our needs.

B. Why Arduino?
Arduino is an open-source platform which makes it royalty free. Arduino platform is simple to use and build. It is inexpensive to buy and comes in various configurations and we can choose the right platform as per our need. Arduino micro-controllers operates at very low voltage making them power efficient. Arduino IDE works on

ISSN 2394 - 7780

cross-platform which means you run it on Windows, Mac OS or Linux. It also has a huge community so troubleshooting will be easy if any problem arises.

C. Literature survey

We had studied various research papers amongst which these are followings :

[1] Archana and Priya (2016) proposed a paper in which the humidity and soil moisture sensors are placed in the root zone of the plant. Based on the sensed values the microcontroller is used to control the supply of water to the field.

[2] Sonali D. Gainwar and Dinesh V. Rojatkar (2015) proposed a paper in which soil parameters such as pH, humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the level of moisture in the soil.

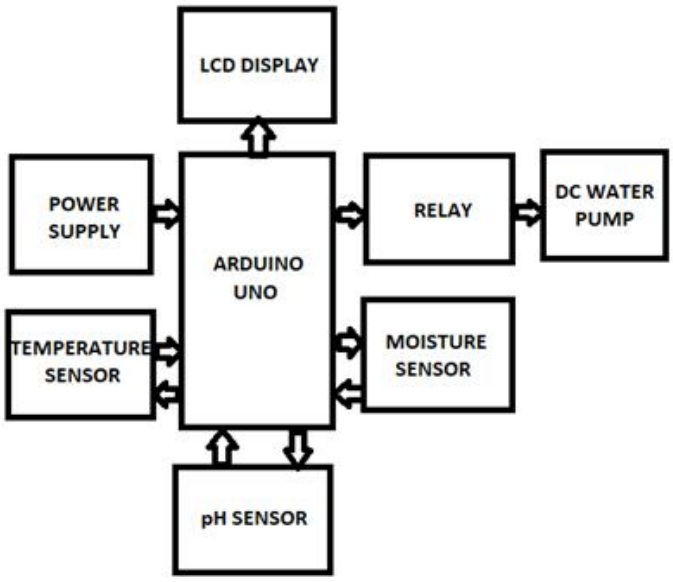
[3] V. R. Balaji and M. Sudha (2016) proposed a paper in which the system derives power from sunlight though photo-voltaic cells .This system doesn't depend on electricity. The soil moisture sensor has been used and based on the sensed values PIC microcontroller is used to ON/OFF the motor pump.

[4] R.Subalakshmi (2016) proposed a paper to make irrigation system simpler, the complexities involved in irrigation is tackled with automationsystem using microcontroller and GSM. Based on the sensed values from soil moisture, temperature and humidity sensors, the GSM sends message to the farmer when these parameters exceed the threshold value set in the program. The nutrient content in the soil is not determined.

[5] S.Reshma and B.A.Sarath (2016) proposed an IOT based automatic irrigation system using wireless sensor networks in which various sensors are used to measure the soil parameters. This system provides a web interface to the user to monitor and control the system remotely. Weather monitoring is not done in this system

D. Proposed System

The proposed system is designed to irrigate the crop automatically without any human intervention. The system uses arduino which operates at 5V DC. The system uses three sensors namely, soil moisture sensor, temperature sensor & pH sensor. All these sensors will be placed in soil where crops are located. The soil moisture sensor will sense the humidity or the water content level of that soil. Different crops need different level of soil moisture. The sensor will continuously monitor the humidity level ands it back to arduino and once the moisture level falls below the threshold value, the arduino sends the signal to relay to turn on the motor pump. The water supply will be on until the moisture level meets the threshold value. The temperature and pH sensor will check for the temperature and acidity of soil and display it on 16x2 LCD by which the farmers can know about the soil quality.



1. ARDUINO UNO

Arduino UNO is microcontroller board which is based on ATMEGA 328P which has 32kB of memory for storing code. It has 14 digital input and output pins & 6 analog input pins. It operates at 16MHz frequency and can bepowered via USB cable.

ISSN 2394 - 7780

2. SOIL MOISTURE SENSOR
Soil moisture sensor senses the level of moisture in the soil. If it senses the moisture level below the threshold value, it sends the signal to arduino which then turns on the motor and once the moisture level is reaches the threshold value, it sends the siganal to arduino to turn on motor.

3. pH SENSOR
The pH sensor can sense the pH level of soil. Om the pH scale 7 is neutral, below 7 is acidic and above 7 is basic in nature. It does it by measuring Hydrogen (H+) or Hydroxyl (OH-) ions in the soil. It sends the obtained value to arduino which then displays it on LCD.

4. TEMPERATURESENSOR
The temperature sensor will check the temperature of soil and once it senses it temperature, it then sends the value of temperature to the Arduino module which will display that on LCD display. As different plants need different temperature to grow, it is important to know the temperature of soil.

5. RELAY MODULE
Relay module is used to supply power to the pump. When the moisture level falls below the threshold value it sends signal to pump to start watering.

6. DC MOTOR PUMP:
The DC motor pump draws the water and supplies to the soil until relay module turns it off.

7. LCD
The LCD display the readings from the sensors like the pH value and temperature of soil.

CONCLUSION
The main objective of this smart irrigation system is to make it more innovative, user friendly, time saving and more efficient than the existing system. Measuring four parameters such as soil moisture, temperature, humidity and pH values.The primary applications for this project are for farmers and gardeners who do not have enough time to water their Crops/plants. It also covers those farmers who are wasteful of water during irrigation. The project can be extended to greenhouses where manual supervision is far and few in between. The principle can be extended to create fully automated gardens and farmlands. Combined with the principle of rain water harvesting, it could lead to huge water savings if applied in the right manner. In agricultural lands with severe shortage of rainfall, this model can be successfully applied to achieve great results with most types of soil..

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[4] R.Subalakshmi and Anu Amal, “GSM Based Automated Irrigation using Sensors” presented at Special Issue published in International Journal of Trend in Research and Development (IJTRD), March-2016 .

[5] Karan Kansara and Vishal Zaweri, ”Sensor Based Automated Irrigation System with IOT” presented at International Journal of Computer Science and Information Technologies, vol-06, 2015.

[6] Joaquin Gutierrez (2013) prposed a gateway unit which handles sensor information, triggers actuators, and transmits data to web application. It is powered by photovoltaic panels and has duplex communication link based on cellular internet interface that allows for data inspection and irrigation scheduling to be programmed through web page.

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ISSN 2394 - 7780

CONTROLLABLE POWER FACTOR AND EFFICIENCY AMENDMENT OF SINGLE PHASE INDUCTION MOTOR USING EXTINCTION ANGLE CONTROL

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ABSTRACT
The general study of power converters is to ameliorate the overall competence of the power system by some highly developed methods of control techniques. Forced commutation of the power semiconductor switches leads to amended power factor in DC converters. Homogeneous techniques may be applied to amend the performance of AC controllers. For example, an AC controller can be used to adjust the stator voltage of an induction motor operation under erratic load in order to maintain better competence. In this paper, the performance assessment of the extinction-angle control procedure has been illustrated as applied to a 1-Ph voltage converter by examples of static load and the widely used 1-Ph induction motor to validate the viability of the projected technique. The power factor and efficiency control by utilizing Extinction angle control in 1- Ph induction motor is done by utilizing single IGBT switch across the 1- Ph supply and bridge circuit of four diode. In addition to this the power factor can be incremented from lagging to leading. Visual examinations on power factor, displacement factor and motor efficiency make up the outcome of this work.

Keywords - Power Converters (AC Voltage Controller), Extinction Angle Control, Power Factor, Static Load, Single-Phase Induction Motor.

I. INTRODUCTION

AC voltage converters are widely used as one of the power electronic systems for controlling the output voltage; where a variable ac voltage is obtained from a fixed ac voltage, power ranges ranging from a few watts (as in light dimmers) to a fraction of megawatts (as in large induction engine starting systems). For many applications, phase-angle control (PAC) line commutated voltage controllers and integral-cycle thyristor control have been commonly used in this type of controller. Such techniques offer advantages such as simplicity and the ability to economically control large quantities of power. Nonetheless, they suffer from inherent disadvantages such as; retardation of the firing angle leads to a lagging power factor on the input side, especially at large firing angles and a high level of harmonic content on both load and supply sides [1-3]. In addition, a power flow discontinuity appears on both the input and output sides[4-8].

On the other hand, a squirrel cage induction engine's performance sometimes approaches its full rating load price. The system becomes quite unstable at light loads and the power factor is low as the stator current step is lagging.

It's almost impossible to try to solve this problem with simple ac voltage converters. On the other hand, it is an objectionable solution in itself to add a complex controller costing several times the price of the engine. Accordingly, the present paper describes a simple scheme for generating a variable ac voltage directly from the line with few commutations at each time for single-phase induction motors speed control. The extinction angle control (EAC) is used to control the extinction angle by using the forced switching character of the switches while adding a freewheeling direction parallel to the load terminals. The proposed ac voltage converter only uses two operated switches with the aid of two bridge diode rectifiers. Reducing the number of managed switches is important in terms of simplicity, expense, reliability, reduction of switching losses; a problem that improves the efficiency of the converter.

The extinction angle control (EAC) is similar to the control of the phase angle where there is only one pulse per half- cycle. In the phase angle control, the conduction is started at the appropriate delay angle (a) and continues until the current naturally reaches zero value, whereas in the EAC control the conduction is started at zero crossing of the supply voltage and forced switching at a certain angle before the next zero crossing (/). Fig 1. shows the voltage and current waveforms in the EAC.. Of course, the load current is provided with a freewheeling path to discharge the stored load inductance power. The voltage of the output is regulated by varying the angle of extinction. The fundamental portion of the input current leads the input voltage, and the factor of displacement (and the factor of power) leads. This function may be useful in some applications to simulate a capacitive load and compensate for falls in line voltage. Thus, the performance of ac voltage converters with extinction-angle control is similar to the performance of phase-angle control, except that the power factor leads while the power factor lags in phase-angle control.

ISSN 2394 - 7780

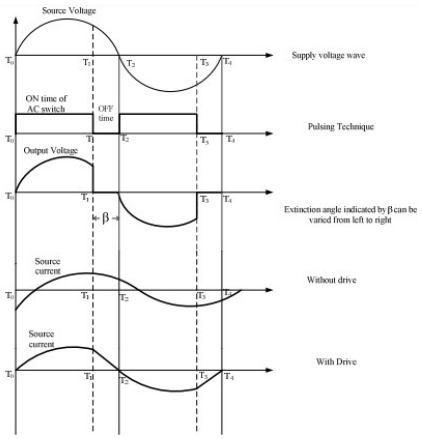

Fig 1. Waveforms with extinction-angle control input voltage, output voltage, input current and output current.

This research is concerned with the analysis of single-phase induction motor squirrel cage ac voltage controllers using the EAC technique applied to static loads. From the point of view of supply power factor improvement, the operation of this controller as a variable voltage source using EAC is evaluated and compared with conventional PAC.

I. CIRCUIT DESCRIPTION AND OPERATION PRINCIPLE

Fig. 2 Shows a schematic representation of the power circuit configuration consisting of a single-phase induction motor connected by an ac voltage regulator to an ac source. In the EAC technique, the forward switch S is used regularly to connect and disconnect the load to the supply, i.e.

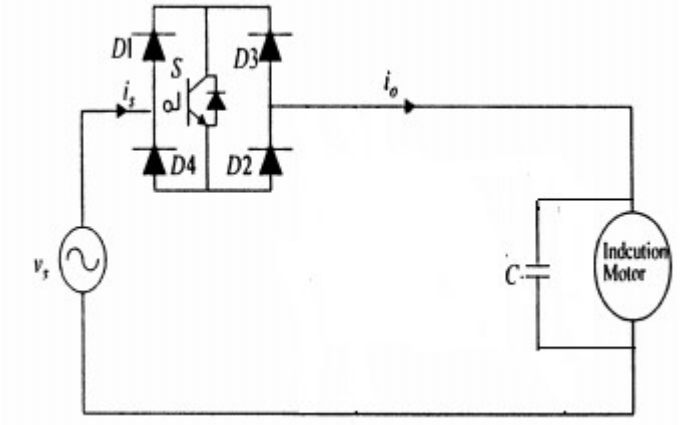

Fig. 2 Circuit diagram of ac voltage source fed single-phase induction motor

The working of the proposed drive having two types of operation mode.

1. Active Mode: Operation of main switch
2. Freewheeling Mode: Operation of Capacitor

1. ACTIVE MODE

It includes the semiconductor switch's ON-state era. During this service, the switch S will turn on. The switch had been given a gate pulse and allowed to turn on which will be carried out as assigned by us for up to a certain period of time. As the switches remain active in this mode, the mode of operation is called Active.

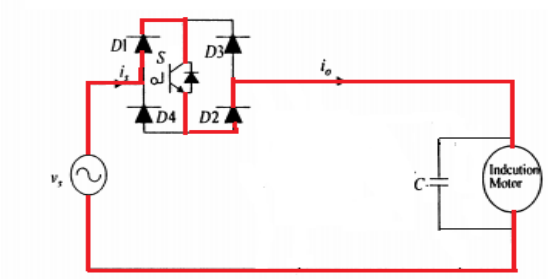

Fig. 3 Conduction mode of operation

ISSN 2394 - 7780

The current will be transmitted to the motor from the AC source as well as supplied to the condenser across the motor, so condenser loading will also occur in this mode without disrupting the induction motor operation. Figure 3. indicates the mode of operation of conduction.

2. FREEWHEELING MODE

The switch will be switched off during this operation mode. And the operation mode of freewheeling will begin. The condensers that are connected parallel through the motor enter into operation in this way. The motor will not stop as the source supply is turned off while using the energy stored in the condenser will run continuously. So the engine won't turn off. It's going to continue running. Figure 6 indicates the mode of operation for freewheeling.

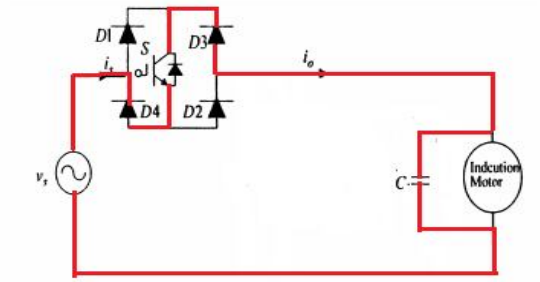

Fig. 4 Freewheeling mode of operation

II. MATHEMATICAL ANALYSIS

Copper losses = 3i2r

Minimizing the input current would result in minimizing the three-phase induction motor's 2 copper losses as it is square times connected to current. The voltage of supply given to the engine is constant. Since the current is directly proportional to the losses of copper, it is therefore necessary to reduce the current drawn by the motor. It is possible to reduce the current drawn by the drive by improving the cosmic power factor. Extinguishing angle control technique eliminates the existing drive requirement.

For extinction angle control:

$\Phi n = \tan^{-1}(-\sin(n\beta) + \cos(n\beta)\ \Phi 1 = -\beta 2$

Hence the input power factor : $\cos(-\beta 2) = \cos \beta 2$

Speed is directly proportional to the small reduction in input power in speed would result in a significant reduction in input power. Hence the input current is reduced as the input power factor has been increased. Reduction of the input current reduces the loss of copper. Reduction in copper losses will reduce the power input and therefore this drive will save power. Only one switch is supplied in the drive per cycle. The switch consists of an IGBT and four bridge-like diodes. The use of the diode bridge rectifier is designed to maintain the unidirectional current flow so that there is no reverse current flow during the freewheeling operating mode. Fig.5 shows the IGBT symbol.

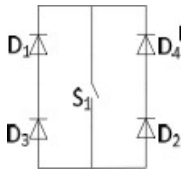

Fig.5 AC switch.

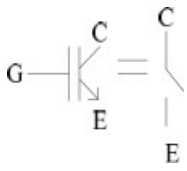

Fig.6 IGBT symbol

III. CONCLUSIONS

The Induction motor performance enhancement systems are capable of increasing efficiency on a small scale, but they are not capable of providing drive operation with high power factor. By using the extinction angle control technique, the proposed drive provides the power factor improvement from lagging to leading range by compensating the lagging P.F. Comparison of the technique of EAC and FAC also reveals that the proposed drive gives a better power factor than the FAC. The uniqueness of this drive is high-power factor operation with unidirectional current flow. In this, the power factor would increase to unity, which was especially difficult to obtain in the case of AC induction motor. But it's easily possible with the help of this system.

ISSN 2394 - 7780

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CONVERSION OF PLASTIC WASTES INTO DIESEL

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ABSTRACT
Plastics are natural / synthetic material. Plastics have become in indispensable part in today's world. due to their light-weight durability ,energy efficiency ,coupled with a faster rate of production and design flexibility ,these plastic are employed in entire gamut of industrial and domestic areas. Plastic are non degradable polymers of mostly containing carbon, hydrogen and few others elements such as chlorine, nitrogen etc. Due to its non-biodegradable nature. The plastic waste contributes significantly to the problem of municipal waste management.

The present paper aims to study to solve the twin problem of environment pollution due to plastic and the need for an alternative fuel source. A small farm can use a device this size and make fuel for itself by converting plastic waste to fuel, farms have very much plastic waste and it is a big problem, at least in our country.

Keywords: Low density Plastic wastes, Diesel, Pyrolysis

INTRODUCTION
Plastic is a high molecular weight material that was invented by Alexander Parkes in 1862. Plastics are also called polymers. The term polymer means a molecule made up by repetition of simple unit. Plastic are natural / synthetic materials. Plastics have become indispensable part in today's world. Due to their light-weight durability, energy efficiency, coupled with a faster rate of production and design flexibility, these plastic are employed in entire span of industrial and domestic areas. Plastics are non degradable polymers of mostly containing carbon, hydrogen and few others elements such as chlorine, nitrogen etc. Due to its non-biodegradable nature. The plastic waste contributes significantly to the problem of municipal waste management.

So here we will convert waste plastic into diesel, plastics are shredded and then heated in an oxygen- free chamber (known as pyrolysis) to about 350 degrees Celsius. As the plastics boil, gas is separated out and often reused to fuel the machine itself. The fuel is then distilled and filtered. Because the entire process takes place inside a vacuum and the plastic is melted- not burned, minimal to no resultant toxins are released into the air, as all the gases and or sludge are reused to fuel the machine. Most of the big cities in our country produces waste at a rate that outpaces its capacity to collect and dispose it of in a safe and environmentally sound manner. Its current approaches to waste management are neither effective nor sustainable. Traditional end-of-pipe solutions to waste management problems only deal with symptoms of poor management and not the root causes.

LITERATURE SURVEY
Plastic waste into fuel using pyrolysis process, by Mantesh Basappa Khot, S Basavarajappa (Step. 2017) Volume 04 Issue 09.
Pyrolysis is generally defined as the controlled heating of a material in the absence1of oxygen. In plastics Pyrolysis, the macromolecular structures of polymers are broken down into smaller molecules and sometimes monomer units. Further degradation of these subsequent molecules1depends on a number of different1conditions including (and not limited to) temperature, residence time, presence of1catalysts and other process conditions.

Article Alternative Diesel from Waste Plastics by Stella Bezergianni , Athanasios Dimitriadis , Gian-claudio Faussone and Dimitrios Karonis (31 October 2017).
The pyrolysis of plastics and other MSW (end-of-life tires, organic wastes, etc.) for fuel production is practiced by several small-size companies worldwide, especially those of emerging economies, where industries such as cement, glass, and other energy-intensive sectors represent the reference market for this type of fuel (diesel-range hydrocarbons produced via the pyrolysis of plastics and MSW). The pyrolysis of plastics yields on average 45–50% of oil, 35–40% of gases, and 10–20% of tar, depending on the pyrolysis technology.

Plastic Waste to fuel : A Sustainable method for Waste Management by Dinish Chacko , Anirudh P. , Anuj.K, Abhijith Mohan and Akshay M.K volume 7, issue 3 , March 2016.
The global production of plastics has seen an increase from around 1.3 million tonnes in 1950 to 245 MT in 2006 [1]. In recent years, significant growth in the consumption of plas-tic globally has been due to the introduction of plastics into newer application areas such as in automotive field, rail, transport, aerospace, medical and healthcare, electrical and electronics, telecommunication, building and infrastructure, and furniture.

ISSN 2394 - 7780

Pyrolytic Waste Plastic oil and its diesel blend: Fuel Characterization by M.Z.H. KHAN , M. Sultana , Al-Mamun and M.R. Hasan 5 June 2016
The gases produced through plastic pyrolysis consist principally of hydrogen (H2), carbon dioxide (CO2), carbon monoxide (CO), methane (CH4), ethane (C2H4), and butadiene (C4H6), with trace amounts of propane (CH3CH2CH3), propene (CH3CH=CH2), n-butane (CH3(CH2)2CH3), and other miscellaneous hydrocarbons.

Energy Conversion and Management : A review on pyrolysis of plastic wastes by Shafferina Dayana Anuar Sharuddin , Faisal Abnisa , Mohamed Kheireddine Aroua 12 February 2016.
Pyrolysis is the process of thermally degrading long chain polymer molecules into smaller, less complex molecules through heat and pressure. The process requires intense heat with shorter duration and in absence of oxygen. The three major products that are produced during pyrolysis are oil, gas and char which are valuable for industries especially production and refineries. Pyrolysis was chosen by many researchers since the process able to produce high amount of liquid oil up to 80 wt% at moderate temperature around 500 C.

OBJECTIVE OF STUDY
1. The primary objective in our project is to convert waste plastic into oil.
2. The oil collected from waste plastic is mixture of number of fuels which can be used for burning, it can replace furnace oil.

Plastics from used bottles, milk bags etc. are made up of virgin plastics that means we can recycle it again to make plastics, so from that we will not going to make oil, recycled plastics will be more worthier than making oil. But after recycling number of times the time comes when plastic cannot be further recycled. This plastic has no option except to dispose off or we can say throw away which will be like throwing money and it will create environmental issues. So from this type of plastics we will make oil. For example the waste and number of time reused plastics from injection molding company. This oil will be the mixture of various hydrocarbons like naphtha, petrol, diesel, kerosene etc.

WORKING
The process is really simple, it is similar to how alcohol is made. If you heat plastic waste in non oxygen environment, it will melt, but will not burn. After it has melted, it will start to boil and evaporate, you just need to put those vapors through a cooling pipe and when cooled the vapors will condense to a liquid and some of the vapors with shorter hydrocarbon lengths will remain as a gas. The exit of the cooling pipe is then going through a bubbler containing water to capture the last liquid forms of fuel and leave only gas that is then burned. If the cooling of the cooling tube is sufficient, there will be no fuel in the bubbler, but if not, the water will capture all the remaining fuel that will float above the water and can be poured off the water. On the bottom of the cooling tube is a steel reservoir that collects all the liquid and it has a release valve on the bottom so that the liquid fuel can be poured out. This device works on electricity (3 phase), it has nichrome coils as heating elements and consumes a total of 1 kW. The coils are turned on and off by three solid state relays, one for each phase, the relays are controlled by a digital thermostat with a temperature sensor just a bit below the lid, so that the vapor temperature can be monitored.

The device has a capacity of 50 liters and can hold about 30 kg of shredded plastic. The process takes about 4 hours, but it can be shortened considerably by tweaking the design a bit. As I said, this makes a liquid fuel that can be used as multifuel, that means it can be used on diesel engines and also on gasoline engines, but we still need to test it will work on gasoline. It works for diesel engines just fine, that has already been tested. There is a difference in what plastic you use, if you use polyethylene (plastic cans, plastic foil, and all kind of flexible non break plastics) you will get out liquid fuel that will solidify as it cools into paraffin, it is still good for diesel engines as long as you use a heated fuel tank, because it needs to be heated just about at 30 degrees Celsius to be liquid and transparent. If you don't want that, you can put the paraffin through the device for one more time and you will chop those hydrocarbons even smaller and half of the paraffin will turn to liquid fuel and other half will remain a paraffin, but much denser and will melt at higher temperatures, this is the stuff you can make candles out of and it does not smell at all when burned, maybe a bit like candles.

FUTURE SCOPE
Put plastic in one end of the machine and out the other end comes diesel, petroleum distillate, light naphtha and gases such as methane, ethane, butane and propane. The machine accepts unwashed, unsorted waste plastics, composites and commingled materials and returns about 1 gallon of fuel from 8.3 pounds of plastic. And the processor uses its own off-gases as fuel, therefore using minimal energy to run the machine. John currently has two massive steel processors up and running, with financing secured for three more to be built in the very near future.

ISSN 2394 - 7780

CONCLUSION

Over 14 million tons of plastics are dumped into the oceans annually, killing about 1,000,000 species of oceanic life. Therefore waste plastic pyrolyzed oil represents a good alternative for diesel and petrol engine, subsequently must make thought seriously about later on to transportation reason for existing.

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DESIGN ANALYSIS AND FABRICATION OF ATV KNUCKLE-HUB

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ABTRACT
The Paper presented over here deals with the Design and Analysis of Rear Knuckle-Hub required for the construction of All Terrain Vehicle (ATV). Knuckle-Hub is a critical and load sustaining component of a rear wheel assembly. It is a part which contains knuckle and wheel hub connected to suspension and braking components. The primary function of the Knuckle-Hub is to keep the wheels attached to the vehicle while carrying the vehicle load and sustaining various loading conditions as well as to allow the wheels to freely rotate enabling the safe driving conditions. Knuckle-Hub must be designed and build in such a way that it will withstand all the forces exerted on it during normal or working conditions. Knuckle-Hub must be produced in order to reduce the weight of All Terrain Vehicle (ATV) while retaining a satisfactory safety factor for better performance of the vehicle. A two step process has been used for the successful design and analysis of Knuckle-Hub. First step is modeling the Knuckle and Hub as per the structural, dimensional and design considerations set by type of suspension system used and brake assemblies as well as determination of loads acting on the knuckle and Hub. The second step is deformation and stress analysis using ANSYS software and design adjustments for reducing weight without compromising on the structural strength.

I. INTRODUCTION
Knuckle-Hub is a part which contains knuckle and wheel hub attached to chassis, suspension and braking components. The wheel and tyre assembly is attached to the hub of knuckle where the tyre/wheel rotates while being held in stable plane of motion by knuckle-hub assembly. It can be designed according to the requirement of vehicle. The proper mountings to hold braking components, Tie rod, Trailing rod and bearing should be provided at exact places. Proper material selection is of great significance in order to increase strength and reduce weight and cost of Knuckle-Hub, eventually increasing efficiency of an ATV. Design and Analysis of the Knuckle-Hub is be done using SOLIDWORKS, 2016 and ANSYS, 2019 considering and applying all the Design Topologies for optimum Design.

II. OBJECTIVE OF STUDY
1. Design and fabrication of a Knuckle-Hub that would sustain various loading effects during normal and working condition.
2. Selection of proper materials for both Knuckle and Hub which would be light in weight, cost effective and strong enough to withstand various forces exerted.
3. Development of an optimum design with less material requirement.
4. Design Knuckle and Hub with all the necessary mountings placed on the exact positions.
5. Analyze the Design for the forced exerted on it during working conditions.
6. To fabricate the Knuckle-Hub by using the final Design that have passed the analytical tests.

III. DESIGN METHODOLOGY
1. Material Selection While designing Knuckle and Hub, material selection is a crucial topic. The selected material must be light in weight and also withstand all the stresses applied on it during working conditions without failure. So to optimize these conditions, different materials for both Knuckle and Hub are used as per the magnitude and types of forces exerted on it so that it can withstand with overall light weight Knuckle-Hub assembly and without affecting the strength of assembly. The material considered for Knuckle is ALUMINIUM 7075 T6 and for the Hub is ALUMINIUM 6061 T6 as these materials fulfill all our requirements.

Material selected for Knuckle : ALUMINIUM 7075 T6

Material selected for Hub : ALUMINIUM 6061 T6

Properties	**Values**
Density (g/cm^3)	2.7
Brinell hardness Number (BHN)	95
Ultimate Tensile Strength (MPa)	310

ISSN 2394 - 7780

Tensile Yield Strength (MPa)	276
Young's Modulus (GPa)	68.9
Poisson's Ratio	0.33
Melting Point (°C)	582-652

Properties	**Values**
Density (g/cm^3)	3.0
Brinell hardness Number (BHN)	150
Ultimate Tensile Strength (MPa)	560
Tensile Yield Strength (MPa)	480
Young's Modulus (GPa)	71.7
Poisson's Ratio	0.33
Melting Point (°C)	477-635

2. Construction of CAD Model

It is important to Design a 3D model on the software before actual production of the component. The 3D models of the Knuckle and Hub and its assembly is designed on the SOLIDWORKS 2016 software. It is designed by considering various essential factors like design topologies, dimension, size limits, mounting points, force applied, loading conditions and other factors. The 3D models of both Knuckle and Hub designed in SOLIDWORKS 2016:

Knuckle : Hub :

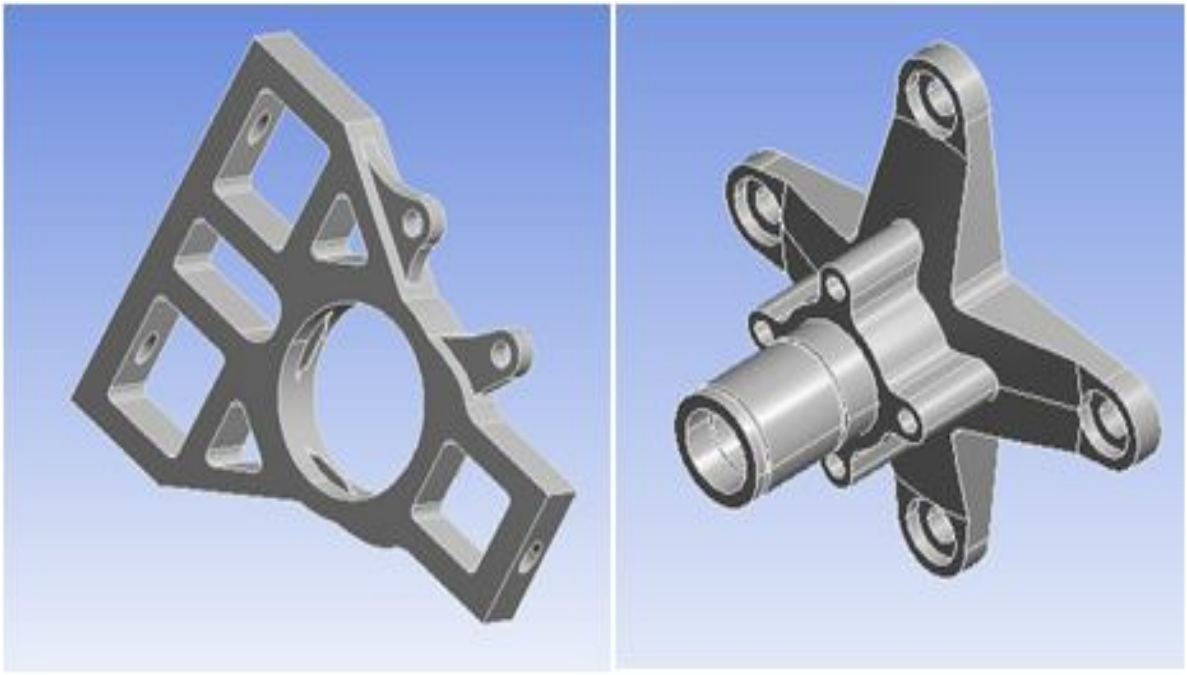

Fig 1 : 3D model of Knuckle **Fig 2 : 3D model of Hub**

3. ANALYSIS

Analysis for Deformation and Stress is done for ensuring that the designed components will withstand while various forces act on them during working conditions.

3.1 Analysis of Knuckle

The stresses are generated on the Knuckle and the points where the brake caliper is mounted when the brakes are applied in running condition. So the analysis must be done to ensure that the stresses generated do not exceed the limiting value and if the deformation occurs, that should be acceptable.

Load: 5000N

Fixed Points: Mounting points of trailing arm and tie rods

Loading Points: Mounting Points of Brake Caliper

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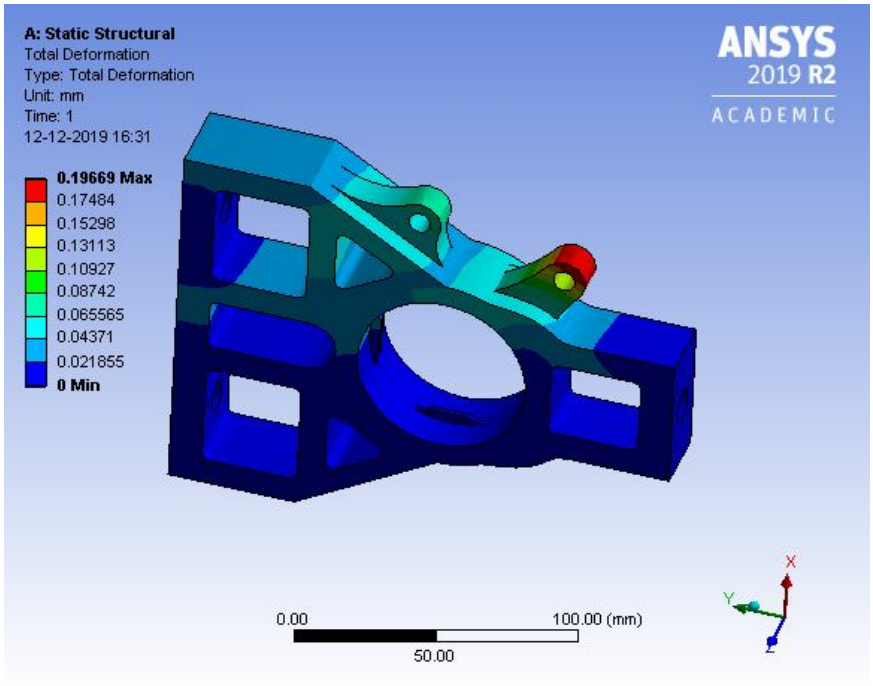

Fig 3 : Total Deformation of Knuckle

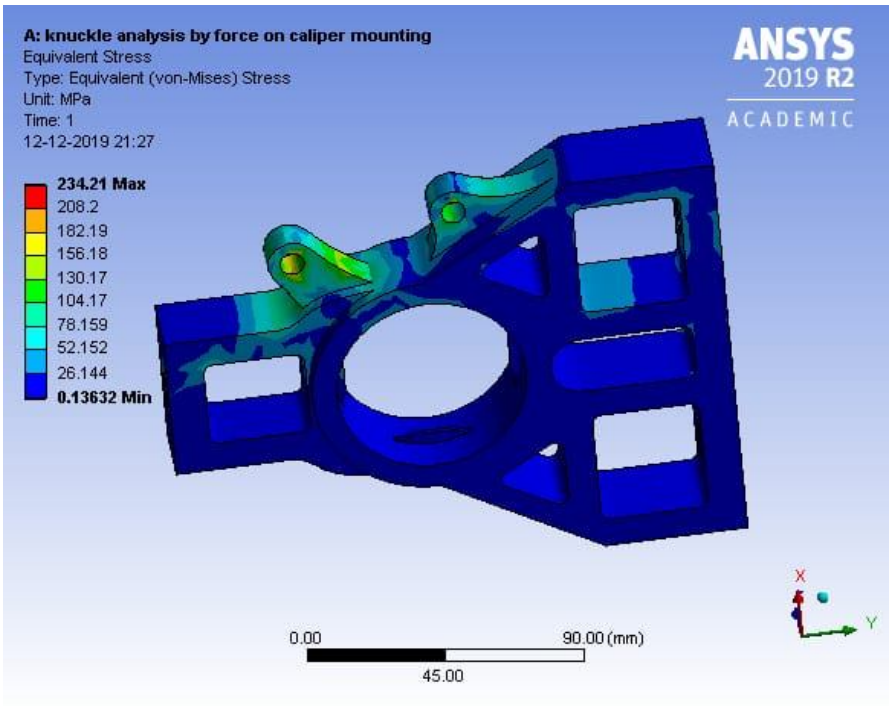

Fig 4 : Equivalent Stress in Knuckle

RESULT

The maximum deformation obtained after the application of mentioned load is 0.19mm which is almost negligible in real practice. Also the Equivalent stress calculated is 234.21Mpa which is also under the limiting value. Hence the designed model leads to a safe design.

3.2 Analysis of Hub

The deformation will occur and the stresses will be generated in the wheel hub where the wheel is mounted. As shown the wheel would be mounted on the hub at the four points designed for the wheel mounting. For analysis, the brake disc mounting hole points are kept fixed and the moment (rotational force) is applied on the points where the wheel mounts on hub.

Moment applied: 7500 N.mm

ISSN 2394 - 7780

Fixed Points: Mounting points of Brake disc

Loading points: Wheel mounting points on hub

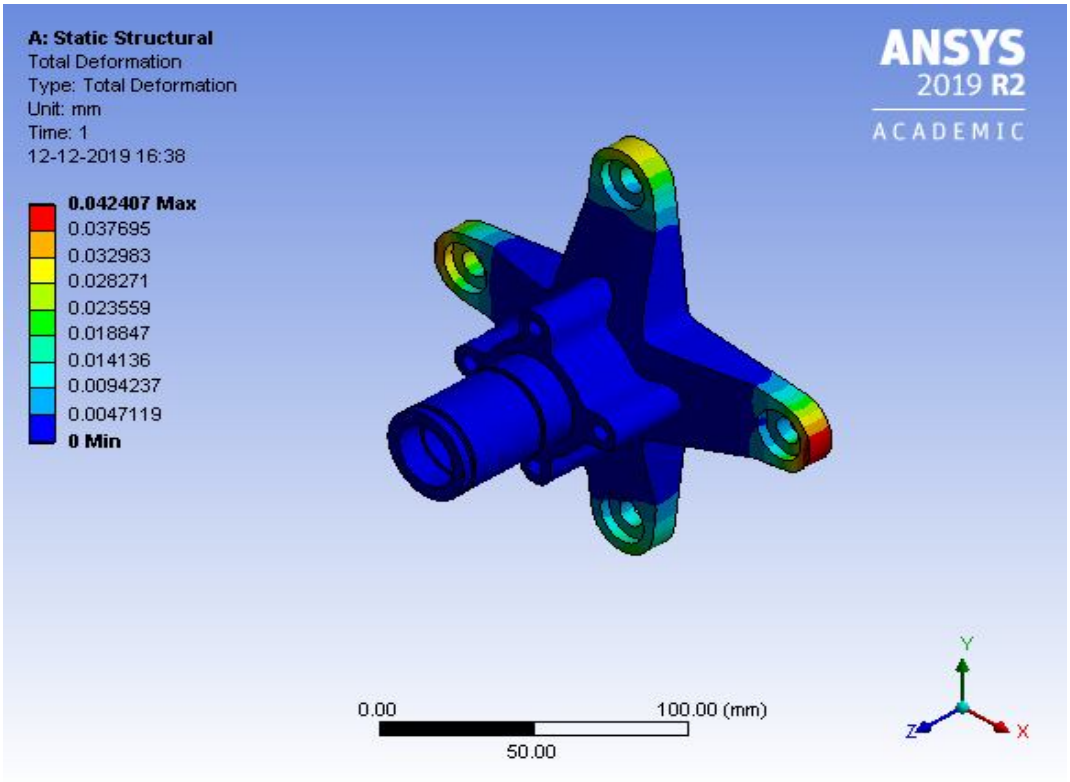

Fig 5 : Total Deformation of Hub

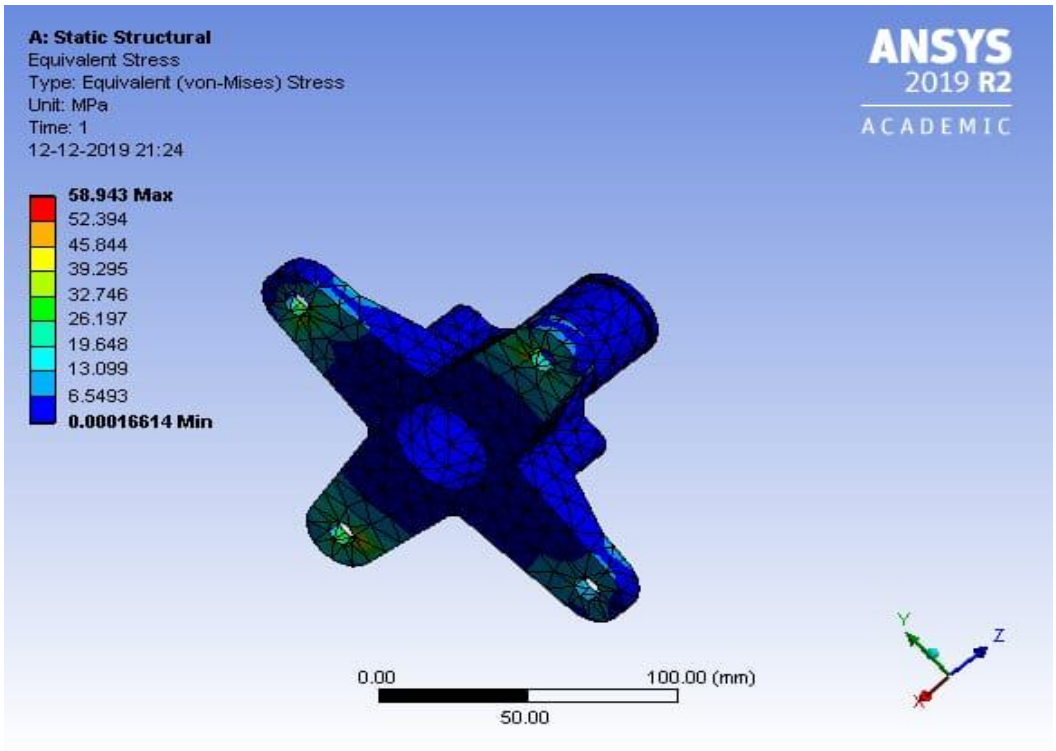

Fig 6 : Equivalent Stress in Hub

RESULT

After this analysis it was found that the maximum deformation occurring in the Hub is 0.042mm which is far below the limits and also the Max equivalent stress value does not exceed the permissible value. Hence the design and analysis is positive.

ISSN 2394 - 7780

IV. CONCLUSION

The design is safe when various forces are exerted during normal and running conditions. Different materials for Knuckle and Hub serve Optimum results. Engineering design principles and design topologies are used to fabricate the Knuckle-Hub with light weight and high strength. This increases the efficiency and overall performance of the All Terrain Vehicle with less fuel consumption. Fabrication cost is reduced due to optimum use of material. The design process includes the 3D modeling of Knuckle-Hub in SOLIDWORKS 2016 and using this model in ANSYS 2019 to analyze it and to make it safe by performing different analytical tests in ANSYS 2019. The FEA results obtained indicate that the Knuckle-Hub is able to perform safely in real track conditions as per the requirement.

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DESIGN AND FABRICATION OF ELECTROCOIL SOLAR DRYER

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ABSTRACT
Drying of food is necessary in order to maintain its colour, taste, and also help to prevent from insect dust and rain which may damage and spoil the food product. So the drying is an excellent way to prevent the agriculture products and as well as the house hold food product in large as well as in small scale to prevent it from contamination and damage of it. Drying from the sun directly is the earliest method of drying farm produce ever known to man and it involves simply laying the agricultural products in the sun on mats, roofs or drying floors. This has several disadvantage since the farm produce are laid in the open sky and there is greater risk of spoilage due to adverse climatic situation like wind, rain, moist and dust, loss of product to insects, birds and rodents; totally dependent on good weather and very slow drying rate with danger of mould growth thereby causing deterioration and decomposition of the product. The process also requires large area of land, takes time and highly labour intensive.
In solar drying, solar dryers are specialized devices that control the drying process and protect agricultural product from damage by insect, dust and rain. In addition, it takes up less space, takes less time and relatively inexpensive compared to artificial mechanical drying. The solar dryer can be seen as one of the solutions to the world's food and energy crises. With drying, most agricultural product can be preserved and this can be achieved more efficiently through the use of solar dryer.

The present paper aim to design and fabricate the solar dryer from the reference of previous concept and design in order to overcome with the new innovative idea about the drying of agriculture products as well as other by using the convection drying method.

INTRODUCTION
The drying of agriculture products by using open air and uncontrolled sun is still existing now a day. But the main problem arising in this type of solar dryer is the uncontrollable heat and temperature and also the humidity which cause the agriculture products to damage. Solar dryers are specialized devices that control the drying process and protect agricultural product from damage by insect, dust and rain.

In addition, it takes up less space, takes less time and relatively inexpensive compared to artificial mechanical drying. The solar dryer can be seen as one of the solutions to the world's food and energy crises.

With drying, most agricultural product can be preserved and this can be achieved more efficiently through the use of solar dryer. One of the modern type of solar dryer has a black absorbing surface which collects the light and converts it to heat; the substance to be dried is placed directly on this surface. These driers may have enclosures, glass covers and/or vents to in order to increase efficiency.

AIMS AND OBJECTIVE
- The objective of a solar dryer is to provide ample amount of heat i.e. more than ambient heat under given humidity.
- It increases the vapor pressure of the moisture confined within the product and decreases the relative humidity of the drying air so that the moisture carrying capacity of the air can be increased.
- The moisture absorption capacity of air is affected by its initial humidity and by the temperature to which it is subsequently heated.
- Studying the efficiency of solar dryer for drying fruits and grains and discovering ways to improve it.MATERIAL REQUIRED

- Balsa wood.
- Epoxy paint.
- ARC coated glass.
- Solar panels.
- 12-24 V Battery.
- 4 mini computer fans.

ISSN 2394 - 7780

METHOD OF IMPLEMENTATION

The method of designing and fabrication of the electrocoil solar dryer begins with the collection of solar radiations. Solar radiation can be transfer either into thermal energy or into electrical energy.

This can be done by using of thermal collectors for conversion into heat energy or photovoltaic collectors for conversion into electrical energy. And also involve the solar plate to collect the energy and directly convert the energy in heat. Two main collectors are used to save solar energy and convert it to thermal energy, these are flat plate collectors and concentrating collectors. In this paper, significance is laid much on the flat plate collectors which are also known as non-focusing collectors.

A Process involve an insulated cabin in which the trays are fitted inside which carry the material which is used to dry. And such an arrangement is allow to rotate around an axis which drip out the water for the further drying process. The insulated cabin is attached with the main unit which is solar dryer. The solar dryer consist of fins, two inlet fans through which air is sucked inside the cabin and other than it is consist of heating coil which is electric heated by using solar panel which tends to increase the temperature of the incoming hot air. Also the use of silica gel absorb the moisture present in the air and allow the hot air in the drying cabin. After drying the hot air is remove out from the outlet fans which is operated by using solar panel.

ADVANTAGES OF ELECTROCOIL SOLAR DRYER SYSTEM

- Prevent the agriculture products and the food products from contamination.
- Two way heating process (by sun and solar panels).
- Useful in winter season also.
- It is more efficient and cheap.
- Maintain the quality of the product.
- Easy to install anywhere.

Expressed sufficient ability to dry agricultural produce most especially food items to an appreciably reduced moisture level.

Locally available cheap materials were used in manufacturing of solar dryer making it available and affordable to all and especially for farmers. This will go a long way in reducing food wastage and at the same time food shortages, since it can be used extensively for majority of the agricultural food crops. Apart from this, solar energy is required for its operation which is readily available in the tropics, and it is also a clean type of energy. It protects the environment and consume cost and time spent on open sun drying of agricultural produce since it dries food items faster. The food items are also well protected in the solar dryer than in the open sun, thus reducing the case of pest and insect attack and also contamination.

However, the performance of existing solar food dryers can still be improved upon especially in the aspect of reducing the drying time and probably storage of heat energy within the system. Also, meteorological data should be easily available to users of solar products to ensure maximum efficiency and effectiveness of the system. Such information will probably guide a local farmer on when to dry his agricultural product and when not to dry them.

CONCLUSION

Solar radiation can be highly effective and utilized for drying of agricultural product in our environment if proper design is carried out. This was demonstrated and the solar dryer designed and constructed

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EFFECT OF UPFC ON DISTANCE RELAY

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ABSTRACT
Among the FACTS controllers, the Unified Power Flow Controller (UPFC) is a device that control all three parameters of line power flow (i.e. line impedance, voltage and phase angle) at the same time. It is the most versatile FACTS controller for the regulation of voltage and power flow in a power system. But whenfault occurs, due to presence of UPFC in fault loop, the apparent impedance of line is affected which results inmal-operation of distance relay. This paper discusses the effect of UPFC in different modes on apparent impedance and thus on distance relay tripping characteristics.

I INTRODUCTION
Power transfer in most integrated transmission systems is affected by transient stability, voltage stability, and power stability. These parameter limit the total utilization of accessible power flow. FACTS may be a technology that creates complete use of existing transmission systems and, therefore, improve stability and thermal limit. Among the FACTS controllers, UPFC is a device which may manage all three parameters of line power flow at same time (i.e. line electrical phenomenon, voltage and phase angle) [1]. The impact of UPFC in minimizing the disturbances in voltages, currents and power flows at intervals the fault affected parallel line ought to be assessed, attribute to the presence of UPFC in associate extremely fault loop, the voltage and current signals at the relay point are going to be affected in each the steady state and thus the transient state. This in turn can have an impact on the performance of existing protection schemes, like the distance relay which is one among the really wide used ways in transmission line protection. that works on principle, impedance between the relay and fault points; the apparent impedance is then compared with the relay trip characteristic to ascertain to determine whether it is an enclosed or external fault. A typical methodology of conniving this impedance is to use symmetrical component transformation using power frequency elements of voltage and current signals measured at the relay purpose [2]

II APPARENT IMPEDANCE OF LINE
Distance relay operation is based on the apparent impedance

(measured impedance at the relaying point) of the line. When the fault resistance is equal to zero, the measured impedance by a distance relay is the actual impedance of the line section between the fault and the relaying points. Consider a single phase to earth fault as shown in Fig.1, according to figure this impedance is equal to pZ_{1L}, where p is the per-unit length of the line section located between the fault and the relaying points, and Z1L is the line positive sequence impedance in ohms.

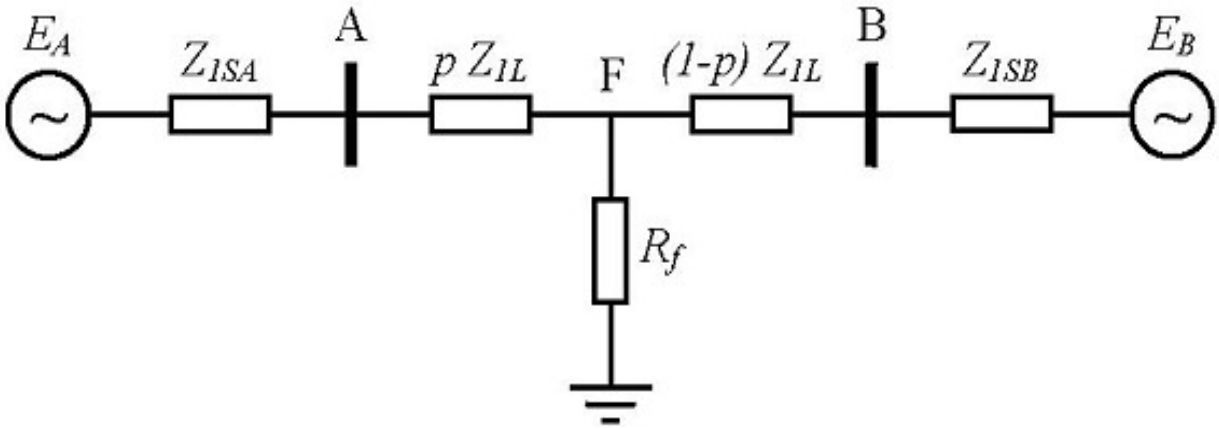

Fig.1. Equivalent circuit for single phase to earth fault

In the case of a non-zero fault resistance, the measured impedance by a distance relay is not equal to the mentioned magnitude. In this case, the structural and operational conditions of the power system affect the measured impedance at the relaying point. The operational conditions prior to the fault instance can be represented by the load angle of the line, i.e. δ, and the ratio of the magnitude of the line end voltages, i.e. h, or in general $EB/EA = he^{-j\delta}$. The structural conditions are evaluated by the short circuit levels at the line ends, i.e. S_{SA} and S_{SB}. With respect to Figs. 1 and 2, the measured impedance at the relaying point can be expressed by the following equations.

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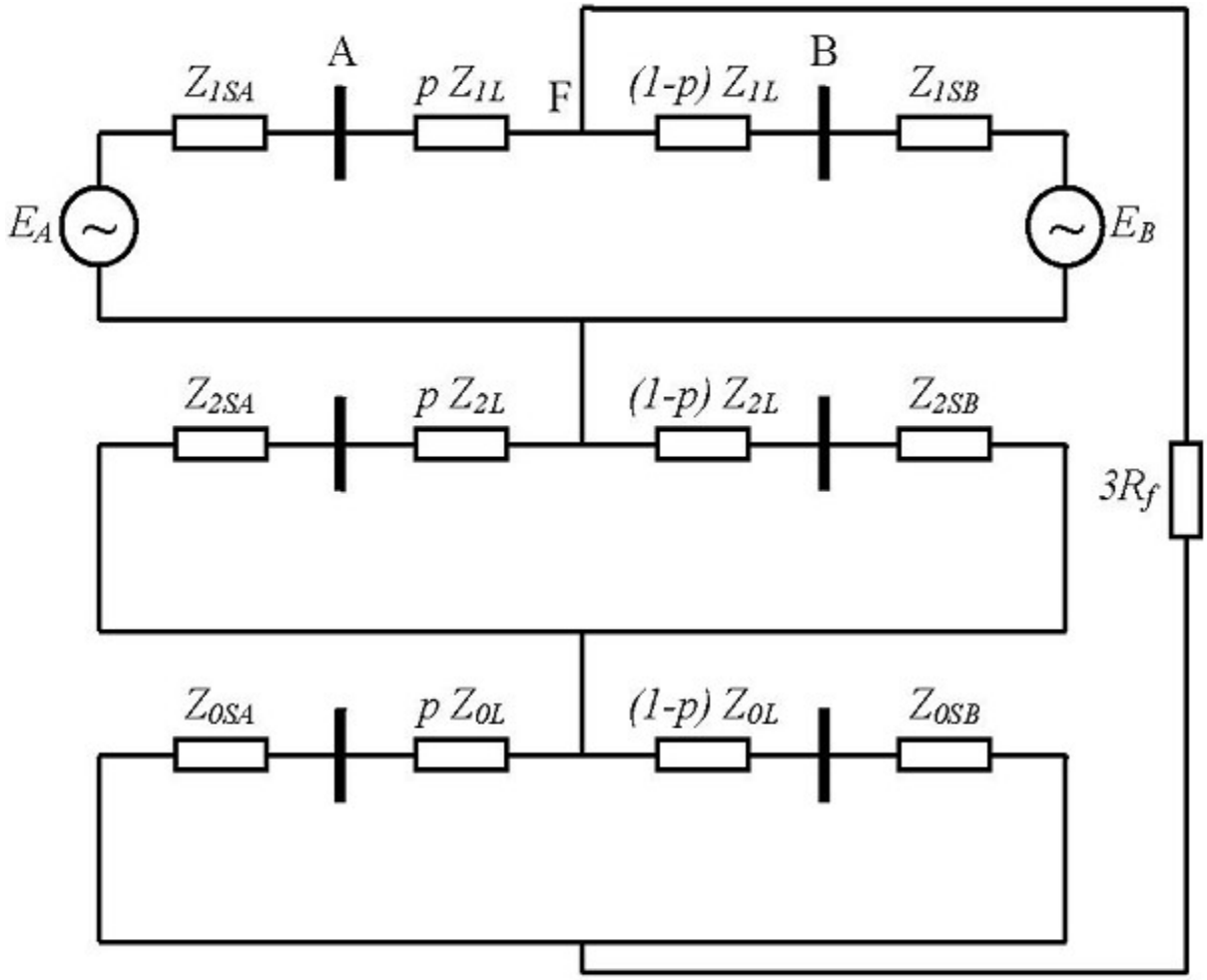

Fig.2. Equivalent circuit of phase A to earth fault

$$Z_{1A} = Z_{S1A} + pZ_{1L} \quad (1)$$

$$Z_{0A} = Z_{S0A} + pZ_{0L} \quad (2)$$

$$Z_{1B} = Z_{S1B} + (1-p)Z_{1L} \quad (3)$$

$$Z_{0B} = Z_{S0B} + (1-p) \quad (4)$$

$$Z_{\Sigma} = \frac{2Z_{1A}Z_{1B}}{Z_{1A}+Z_{1B}} + \frac{2Z_{0A}Z_{0B}}{Z_{0A}+Z_{0B}} \quad (5)$$

$$C_1 = \frac{Z_{1B}}{Z_{1A}+Z_{1B}} \quad (6)$$

$$C_0 = \frac{Z_{0B}}{Z_{0A}+Z_{0B}} \quad (7)$$

$$K_{0L} = \frac{Z_{0L}-Z_{1L}}{3Z_{1L}} \quad (8)$$

$$K_{\delta} = \frac{1-h_e-j_{\delta}}{Z_{1B}+Z_{1A}h_e-j^{\delta}} \quad (9)$$

$$Z_A = pZ_{1L} + \frac{3R_f}{(Z_{\Sigma}+3R_f)+K_{\delta}+2C_1+C_0(1+3K_{0L})} \quad (10)$$

It can be seen that when the fault resistance is equal to zero, the measured impedance at the relaying point is equal to the impedance of the line section between relaying and fault points. The power system conditions only affect the measured impedance in the presence of fault resistance. When a UPFC is introduced to a power system, the above equations would vary. This variation not only depends on the parameters of the UPFC, but also to its installation location [3].

ISSN 2394 - 7780

III EFFECT OF UPFC ON APPARENT IMPEDANCE OF LINE

Effect of UPFC

A detailed discussion on effect of UPFC on apparent impedance and distance relay tripping characteristics for single circuit and double circuit lines is given in [7] and [8] respectively, which is summarized in this paper. Compared to STATCOM, UPFC has greater influence on apparent resistance. Even for inactive UPFC, the apparent impedance slightly increases due to the presence of the series and shunt coupling transformers. UPFC connected at different locations on the line and working in different modes (phase shifting, tap changer) is discussed in detail in [7].

IV CASE STUDY AND SIMULATION

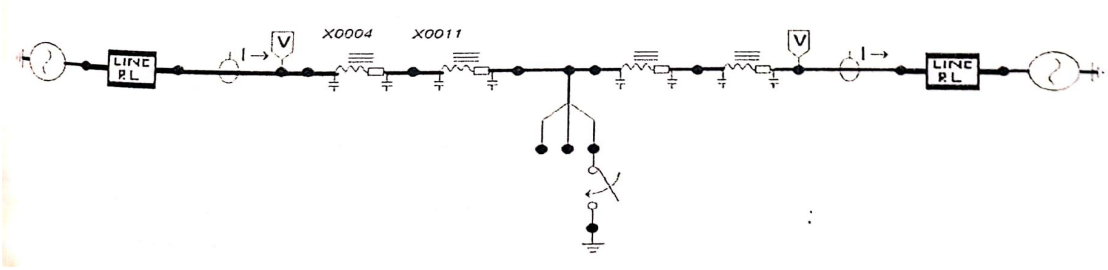

Fig.3. Single line diagram of simulated system

A two generator, 138kV , 200km, parallel transmission system[9] is simulated in

ATP/EMTP software. Single line diagram of simulated system is shown in fig. 3. Simple sources are taken instead of generator. Transmission lines are modeled as coupled Π circuit lines.UPFC is simply modeled as series and shunt connected capacitors and inductors. The system and UPFC parameters are given as:

Lines, $Z_1 = 0.195 + j3.3425\Omega/km, Z_0 = 2.638 + j11.27\Omega/km$

Generators, $\delta = 20^o$ $SCL = 6500MV\,A$

UPFC, $Q_C = 160MV\,A$

The value of compensator reactance (X_c) for UPFC is calculated using below given formulae [1]

For shunt controller, $$X_C = \frac{4V^2}{Q_C}(1 - \cos\delta \quad (11)$$

For series controller, $$Q_C = \frac{2V^2(1-\cos\delta)}{X_L}\frac{k}{(1-k^2)} \quad (12)$$

Where, $k = \frac{X_C}{X_L}$ = degree of compensation

The system is simulated for 0.2sec and results are generated for single line to ground (A-phase to ground) fault on second circuit of double circuit line, at 0.1sec at different distances from relaying point. The results are taken without and with UPFC in different modes, connected at different locations. The relay is suited at the sending end of the second circuit. The data obtained from ATP is taken in MATLAB and phasors are calculated using full cycle Discrete Fourier Transform (DFT). From these phasors, sequence components of apparent impedance are calculated and results are plotted for mho distance relay characteristics with zone-1 set for 80% of the line length. The apparent impedance for SLG fault is calculated by the formula

$$pZ_{1L} = \frac{V_a}{I_a + m * I_0}$$

Where, $m = \frac{Z_0 - Z_1}{Z_1}$

Va - voltage of phase A

I_a - current through phase A

$I0$ - zero sequence current

Z_0 - zero sequence impedance of line

$Z1$ - positive sequence impedance of line

ISSN 2394 - 7780

A UPFC at near end

Figs. 4 show the impedance trajectories of UPFC connected at near end for SLG fault at 50% and 75% of line length respectively. Red, blue and green colored characteristics show the trajectories for UPFC working in STATCOM, no compensation and UPFC modes respectively. At near end STATCOM never comes in fault loop (connected at node i.e. before relaying point) whereas UPFC always come in fault loop, hence the apparent impedance is affected. The apparent impedance is increased for SSSC and UPFC working in leading mode, which results in distance relay to see the fault at larger distance

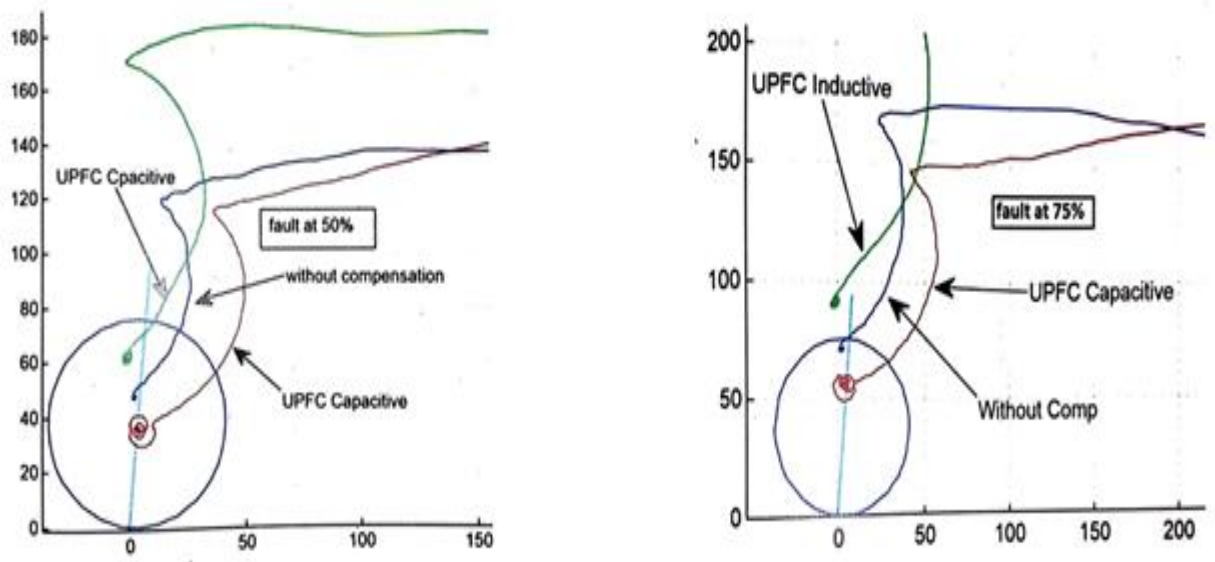

Fig.4. Impedance for UPFC at near end, SLG fault at 50% & 75 % of line

B UPFC at mid end

Figs. 5 show the impedance trajectories of UPFC connected at mid point for SLG fault at before and after 50% of line length respectively. Red, blue and green colored characteristics show the trajectories for UPFC working in STATCOM, no compensation and UPFC modes respectively. At mid end before 50 % occurrence of fault does not affect protection system i.e. distance relay. But fault occurrence of fault after 50% affect distance relay as UPFC comes in fault loop.

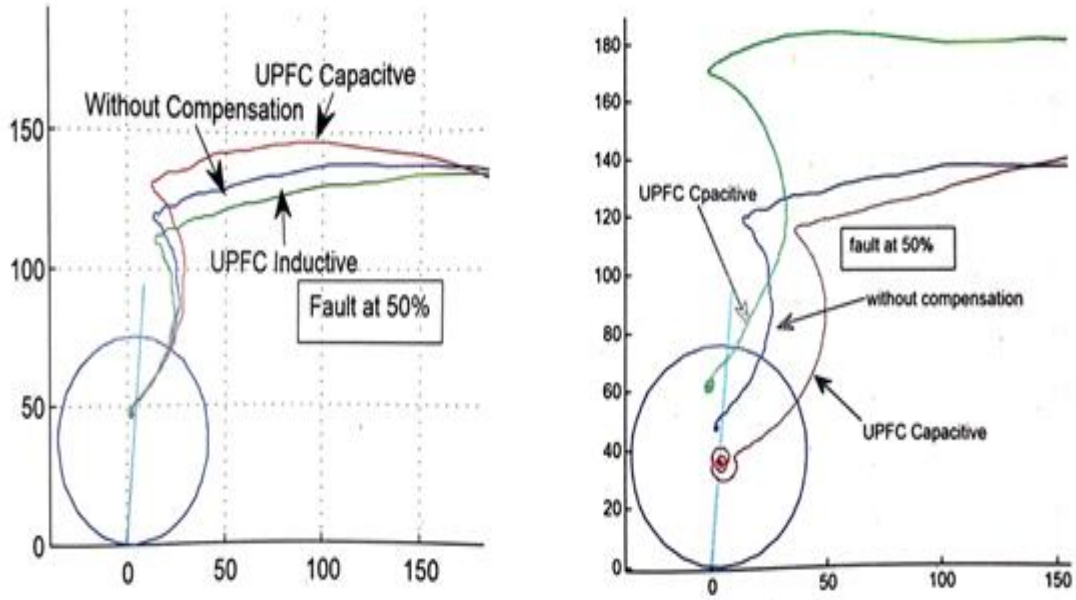

Fig.5. Impedance for UPFC at mid point and SLG fault at before and after 50%

C UPFC at far end

Figs. 6 show the impedance trajectories of UPFC connected at far end for SLG fault at 90% and 50% of line length respectively. Red, blue and green colored characteristics show the trajectories for UPFC working in STATCOM, no compensation and UPFC modes respectively. At far end UPFC never comes in fault loop (connected at node i.e. before relaying point), hence the apparent impedance does not affected.

ISSN 2394 - 7780

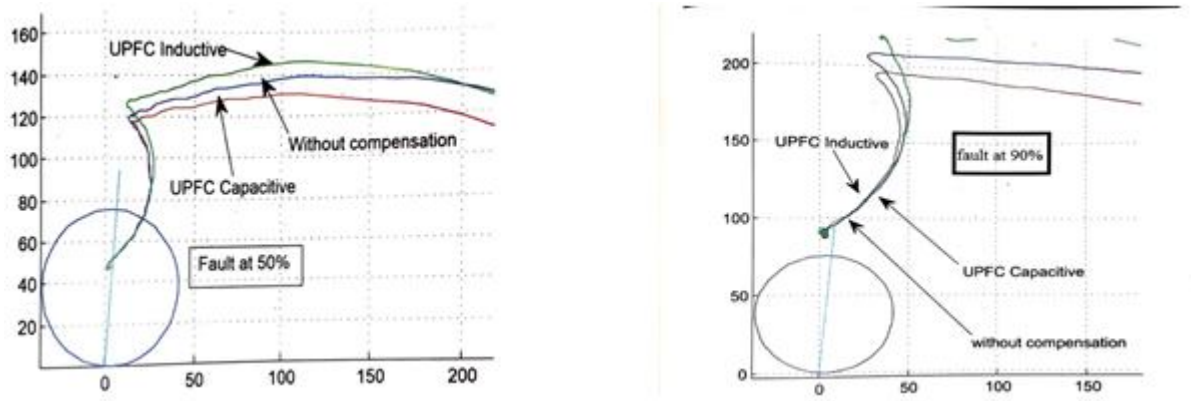

Fig.6. Impedance for UPFC at far end,SLG fault at 90 and 50%

CONCLUSION

In this study, the ATP software used to simulate the model of UPFC and result are analysed in MATLAB. From impedance trajectory it has been observed that UPFC affect, performance of distance relay when comes in fault loop. Also this paper conclude that the optimum location for UPFC is at far end in transmission line.

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EFFICIENCY IMPROVEMENT OF VORTEX TUBE, BY VARYING INSIDE SURFACE ROUGHNESS OF CYLINDRICAL HOT TUBES

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ABSTRACT

Refrigeration plays an important role in developing countries, mainly for the preservation of food, medicine and air conditioning. Conventional refrigeration systems use Freon as a refrigerant. As they are the main cause of ozone depletion, extensive research work is underway on alternative refrigeration systems. The Vortex tube is an unconventional cooling device, without moving parts that can produce cold air and hot air from the compressed air source without affecting the environment. When a high pressure air is injected tangentially into the vortex chamber, a strong vortex flow will be created which will be split into two air flows. It can be used for any type of spot cooling or heating application. In this document, the counter-flow vortex tube is compared with different performances of hot surface roughness tubes. It was found that the vortex tube with surface roughness of Ra = 6.264 µm exceeded the hot tubes with surface roughness of Ra = 4.510 µm and Ra = 3.133 µm respectively from 6% to 26% and from 16% to 52% in COP . The COP of the vortex tube increases as the roughness of the inner surface of the hot tube increases

A vortex tube contains the different main parts vortex chamber inlet and cold terminal orifice, hot control valve and orifice. It works in such a way that the fluid enters the tube circles around an axis that is called a vortex. And that rotation creates a vortex from the compressed air and separates that flow into two hot and cold air flows. From its center, the super-cooled air that is delivered through the cold end door is exceeded. The surface finish of the nozzle and tube, ie the hot end, plays an important role in the performance of the vortex tube. In this document it is observed that the vortex tube with main surface roughness values of cylindrical hot tubes is used to increase the efficiency of the tube vortex. It results in COP of the vortex tube.

Keywords: Vortex chamber, Roughness value of cylindrical hot tubes, COP of the system, Efficiency of tube.

INTRODUCTION

The vortex tube is a static thermal tube that separates the flow of compressed gas into two flows; a cooler flow than the inlet flow while the other flow is warmer than the inlet flow. The vortex tube has no moving parts and separation occurs due to vortex flow generation without requiring any external mechanical work or heat transfer. The vortex tube was first discovered by Ranque [1, 2] who was granted a French patent for the device in 1932 and a US patent in 1934. Ranque encountered the vortex tube phenomenon while he was working experimentally with the vortex tube pump in 1928 In 1945 Rudolf Hilsch [3] conducted a vortex tube experiment focused on thermal performance with different inlet pressure and geometric parameters. In recent years it has been known that the vortex tube is a low cost and an effective solution to many spot cooling problems. The separation mechanism inside the vortex tube remains until now not completely understood [4]. The ability to obtain hot or cold flow streams using compressed gas has allowed the use of the vortex tube in many engineering applications such as electronic cooling, food cooling, cooling of the fire suit and machinery cooling during operation. Despite its reduced capacity, the Ranque-Hilsch swirl tube (RHVT) is very useful for some thermal management applications due to its simplicity, high durability, compactness, lightness, sturdiness, reliability, low maintenance and safety costs [5] . RHVT can be classified into two types [6]: (1) counter-flow RHVT and (2) uni-flow RHVT. In the counter-current type RHVT the cold flow moves in the opposite direction to the hot flow, while in the uni-flow type, the hot and cold flows flow in the same direction. In general, counter-current RHVT is recommended over RHVT uni-flow due to its efficient energy separation [6]. The Vortex tube is widely treated in literature through experimental and numerical analyzes. The experimental work of Nimbalkar and Muller [7] indicated that there is an optimal diameter of the cold end orifice to obtain maximum energy separation. Furthermore, the results [7] showed that the maximum value of the energy separation was always reachable with a cold fraction of 60% regardless of the diameter of the orifice and the inlet pressure. The optimal ratio between diameter and length of the hot side was studied by Dincer et al. [8, 9]. The performance of the vortex tube was studied for three different working gases: air, oxygen and nitrogen and the results were reported using strip views in a vortex tube in Perspex [10]. Aydın and Baki [10] and Hamdan et al. [11] indicated that the inlet pressure and the cold mass fraction were the most important operating parameters. Hamdan et al. [11] in their experimental work investigated the effect of numerous operating and geometric parameters on the thermal performance of the vortex tube, in which the effect of position of the vortex plug, the pressure of the inlet gas, the number were covered. of vortex generator inlet nozzles and insulation during the study. Eiamsa-ard [12] studied the effect of multiple inlet nozzles, the ratios of the

ISSN 2394 - 7780

diameter of the cold orifice and the inlet pressure. Eiamsa-ard [12] reported that energy separation increased when the number of nozzles increased to four nozzles. The increase in the number of nozzles and the supply pressure leads to an increase in the intensity of the vortex / swirl and therefore to the separation of the energy in the tube

DESIGN AND CONSTRUCTION DETAILS

The design details of vortex tube: Diameter of vortex tube D = 20 mm; Length of vortex tube L = 135 mm. Diameter of orifice Do = 6 mm, Diameter of nozzle D*R*N *R*= 5 mm, No of nozzle= 1, Material= Mild steel, Inlet pressure= 4 - 8 bar, Surface roughness values of hot tube 3.133, 4.510 and 6.264 μm.

EXPERIMENTAL SET UP

A two-dimensional cross section of the used vortex tube is shown in Fig. 1a. The compressed air at room temperature is used as a working fluid at different inlet pressure values. The compressed air enters the middle of the vortex tube in a chamber that distributes the air into several inlet nozzles that promote the generation of vortex flow inside the vortex generator, Fig. 1b. The vortex flow is separated into two exits in which the hot air exits the outer perimeter of the vortex while the cold air exits from the center of the vortex in the opposite direction, as shown in Fig. 1a. A vortex cap shown in Fig. 1c is used to stop the flow rotation leaving the hot side of the vortex tube. The detailed drawing and dimensions of the vortex generator are shown in Table 1. The schematic diagram of the mass heat transfer of the experimental configuration is shown in Fig. 2. The compressed air is supplied through the compressor storage tank for ensure uniform pressure with minimal variation.

The size of the storage tank is 1 m^3 and the system is kept running for half an hour before performing the test to allow the system to warm up and stabilize the tank temperature. The maximum rated pressure of the compressor is 12 bar, even if all strokes have an inlet pressure of 5 bar or less. The compressed gas has passed through a dehumidifier, an oil filter and a particle separation filter to ensure the use of dry and clean air. The air is expanded into the vortex tube chamber and separated into the flow of hot air and cold air flow. The cold flow in the central region comes out of the tube through the central orifice closest to the inlet nozzle, while the hot flow in the outer ring leaves the tube through another outlet away from the inlet. The inlet air flow is regulated through the flow meter valve while the pressure is controlled by a pressure regulator connected to the compressor tank outlet. All the experimental tests are conducted in a similar way following a specific procedure, in which the compressor works for half an hour to allow the attainment of the compressed air inlet temperature. The pressure inside the pressurized tank is kept above 6 bar while a check valve is used to ensure the experiment a uniform continuous inlet pressure of 5 bar. In the event of a pressure drop within the tank of less than 6 bar, the test is maintained until the pressure builds up inside the air tank. A short plastic fitting is used at the cold / hot outlet to allow the thermocouples to be fixed and reduce the effect of heat transfer. Temperatures are recorded over a period of time using the portable portable data recorder with eight data inputs. A Borden tube gauge with 0.2 bar uncertainty is used to measure the inlet pressure

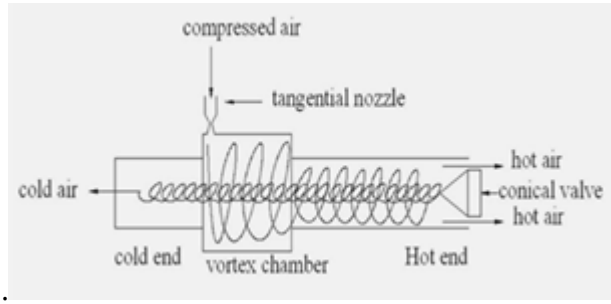

Fig1.2d. View of Vortex Tube

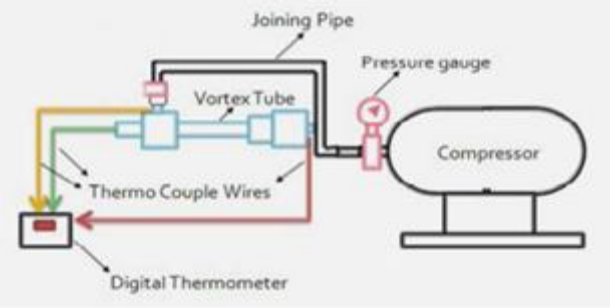

Fig. 2 Experimental Set Up

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The experimental setup consists of a compressor, a vortex tube and a temperature indicator. A stop valve at the outlet of the compressor tank controls the air entering the vortex chamber. The inlet pressure is measured by a pressure gauge. The air temperatures at the entrance, at the cold end, at the hot end and at the ambient air are measured using the thermocouple (copper constant). Fig. 2 shows the general view of the experimental setup. The compressor was initially started for about 20 minutes. to achieve a stable 4 bar (g) compressor air tank pressure. The temperatures in each position are tabulated. Therefore the same series of readings are taken at a pressure of 4, 5, 6, 7 and 8 bar. The air temperatures at the cold and hot end are the vital parameters that determine the COP of the vortex tube. The experiment is carried out with different hot tubes of surface roughness.

MATHEMATICAL ANALYSIS

List of symbols

COP - Coefficient of performance

C_p - Specific heat at constant pressure (kJ/kg K)

D - Vortex tube inner diameter (m)

P_{in} - Inlet pressure (bar)

m_h - Hot mass flow rate (kg/sec)

m_c - Cold mass flow rate (kg/sec)

m_{in} - Inlet mass flow rate (kg/sec)

RHVT – Ranque - Hilsch vortex tube

r - Radial coordinate

T_h - Hot outlet temperature (^{0}C)

T_c - Cold outlet temperature (^{0}C)

T_{in} - Inlet temperature (^{0}C)

D_{Th} - Temperature difference between the inlet and the hot outlet,

$D_{Th} = T_h - T_{in}$ D

T_c - Temperature difference between the inlet and the cold outlet,

$DT_c = T_{in} - T_c$

When the vortex tube is used as a cooling device (cold flow is used), the device is called a refrigerator and the COP is calculated by dividing the desired output (cooling load) on the required input (compression energy). The compression energy is calculated for the isothermal process (at constant temperature) which represents the minimum ideal compression work. While the cooling load is calculated for the ideal gas, as shown below

$$COP_R = \frac{Cooling\ load}{Isothermal\ compression\ energy} = \frac{\dot{m}_c C_p (T_{in} - T_c)}{\dot{m}_{in} R T_{in} \ln(P_{in}/P_{atm})} \quad (1)$$

$$COP_R = \varepsilon \left(\frac{C_p}{R}\right) \frac{1 - T_c/T_{in}}{\ln(P_{in}/P_{atm})} \quad (2)$$

The isothermal compression energy intake is adopted in this study since the compressor is kept in constant operation while the compressed air is stored in a large container (1 m3) with a sufficient surface to keep the compressed air at uniform room temperature during the test. When the vortex tube is used as a heating device (hot flow is used), the device is called a heat pump and the COP of the heat pump is defined as follows

$$COP_{HP} = \frac{Heating\ load}{Isothermal\ compression\ energy} = \frac{\dot{m}_h C_p (T_h - T_{in})}{\dot{m}_{in} R T_{in} \ln(P_{in}/P_{atm})} \quad (3)$$

$$COP_{HP} = (1 - \varepsilon) \left(\frac{C_p}{R}\right) \frac{T_h/T_{in} - 1}{ln(P_{in}/P_{atm})} \quad (4)$$

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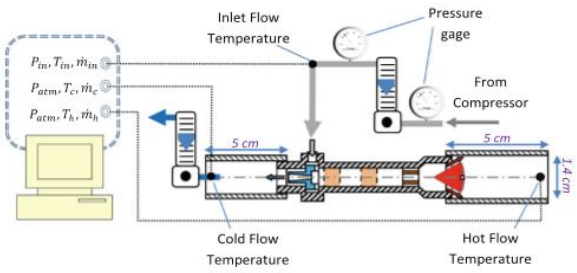

Fig 3 Vortex Tube Specification

It is clear that at any given pressure the temperature of the cold end of the hot roughness surface of 6.264 µm is better than the hot roughness tubes of surface 3.333 µm and 4.510 µm and the temperature difference between them is inversely proportional to the pressure, that is, the temperature difference is progressively increasing with pressure. From Fig. 5, the temperature of the hot end of the hot roughness surface tube of 6.264 µm is greater than the hot roughness surface pipes of 3.133 µm and 4.510 µm. From this we can say that the temperature difference between them is proportional to the pressure, that is the temperature difference B increases progressively with the pressure. Fig. 5 is plotted for pressure V / s COP. The graph shows that the COP of the vortex tube with hot surface roughness tube of 6.264 µm is higher than the hot surface roughness tubes of 3.133 µm and 4.510 µm. From Fig. 5, Fig. 6, we note that the performance of the vortex tube with hot surface roughness tube 6,264 µm is better than the vortex tube with hot surface roughness tubes Mand 3,110 µm Mand 4,510 µm. After evaluating the performance of the vortex tube with cylindrical hot tubes of different surface roughness, it was found that the vortex tube with high surface roughness hot tube offers better performance than the cylindrical hot tube with low surface roughness, ie an increase in COP of about 7% -52%. The cold temperature, hot temperature and COP values obtained for cylindrical hot tubes at various pressures are

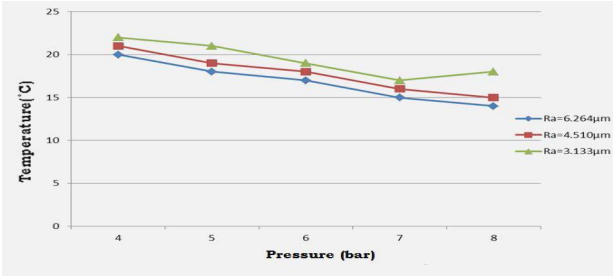

Fig 4 Inlet Pressure v/s Cold End Temp

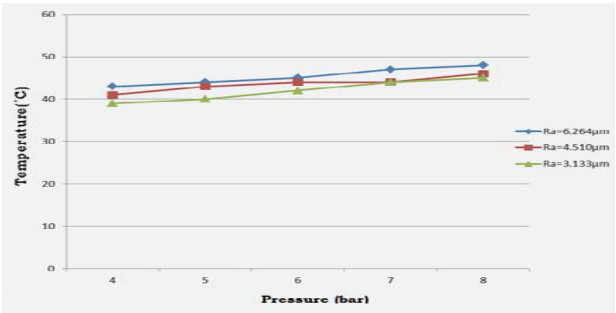

Fig 5 Inlet Pressure v/s Hot End Temperature

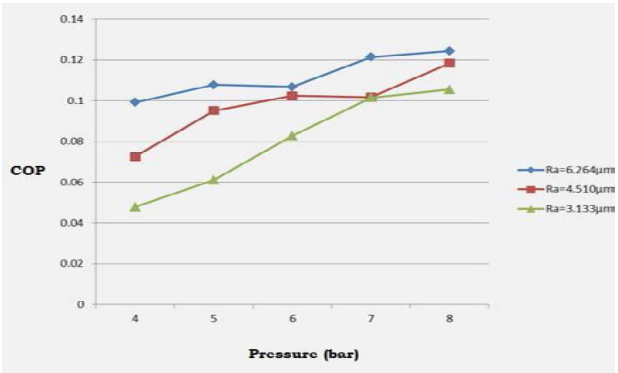

Fig 6 Inlet Pressure v/s COP

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RESULT AND DISCUSSION

From Fig. 4 it is clear that at any given pressure the temperature of the cold end of the hot roughness surface layer of 6.264 µm is better than the hot roughness superficial tubes of 3.133 µm and 4.510 µm and the temperature difference between them is inversely ie proportional to the pressure, the temperature difference progressively increases with pressure. From Fig. 6, the temperature of the hot end of the hot surface roughness tube of 6.264 µm is greater than the hot roughness surface pipes of 3.133 µm and 4.510 µm. From this we can say that the temperature difference between them is proportional to the pressure, ie the temperature difference progressively increases with pressure. Figure 6 is plotted for pressure V / s COP. The graph shows that the COP of the vortex tube with hot surface roughness tube of 6.264 µm is higher than the hot surface roughness tubes of 3.133 µm and 4.510 µm. From Fig. 4, Fig. 5, Fig. 6 we note that the performance of the vortex tube with hot surface roughness tube 6,264 µm is better than the vortex tube with hot tubes of surface roughness 3,133 µm and 4,510 µm

After evaluating the performance of the vortex tube with cylindrical hot tubes of different surface roughness, it was found that the vortex tube with high surface roughness hot tube offers better performance than the hot cylindrical tube with low surface roughness, or an increase in COP of about 7% -52%. The cold temperature, hot temperature and COP values obtained for cylindrical hot tubes at various pressures are

Table.1. Vortex Tube with 6.264 µm surface roughness hot tube

S:NO	Pressure Pi(bar)	Cold temperature Tc (°C)	Hot temperature Th (°C)	COP
1	4	20	43	0.0992
2	5	18	44	0.1078
3	6	17	45	0.1067
4	7	15	47	0.1214
5	8	14	48	0.1266

Table.2. Vortex Tube with 4.510 µm surface roughness hot tube

S:NO	Pressure Pi(bar)	Cold temperature Tc(°C)	Hot temperature Th(°C)	COP
1	4	21	41	0.0721
2	5	19	43	0.0951
3	6	18	44	0.1024
4	7	16	44	0.1017
5	8	15	46	0.1189

Table.3. Vortex Tube with 3.133 µm surface roughness hot tube

S:NO	Pressure Pi(bar)	Cold temperature Tc (°C)	Hot temperature Th (°C)	COP
1	4	22	39	0.0478
2	5	21	40	0.0611
3	6	19	42	0.0828
4	7	17	44	0.1015
5	8	18	45	0.1054

Table.4. Comparison of COP of cylindrical hot tubes with Ra=6.264 µm & Ra=4.510 µm

S.NO	Pressure in Bar	COP of cylindrical hot tube R_a=6.264µm	COP of cylindrical hot tube R_a=4.510µm	% increase in COP of R_a=6.264µm hot tube
1	4	0.0992	0.0726	26.81
2	5	0.1078	0.0951	11.78
3	6	0.1067	0.1024	04.03
4	7	0.1214	0.1017	16.23
5	8	0.1266	0.1184	06.48

Table.5. Comparison of COP of cylindrical hot tubes with Ra=6.264 µm & Ra=3.133 µm

ISSN 2394 - 7780

Table.5. Comparison of COP of cylindrical hot tubes with Ra=6.264 μm & Ra=3.133 μm

S NO	Pressure in Bar	COP of cylindrical hot tube Ra=6.264μ	COP of cylindrical hot tube Ra=3.133μm	% increase in COP of Ra=6.264μm hot tube
1	4	0.0992	0.0478	51.81
2	5	0.1078	0.0611	43.32
3	6	0.1067	0.0828	22.39
4	7	0.1214	0.1015	16.39
5	8	0.1266	0.1054	16.75

The performance of the vortex tube was evaluated by conducting the experiment, replacing the cylindrical hot tubes with different surface roughness at various inlet pressures. The other parameters such as diameter of the orifice, nozzle remain unchanged. The highest COP is obtained at 8 bar for a cylindrical hot tube of Ra = 6.264 μm and the value is 0.1266. The lowest cold temperature for vortex tube with cylindrical hot tube of Ra = 6.264 μm is 14˚C at 8 bar and with hot cylindrical tube of Ra = 4.510 μm it is 15˚C at 8 bar and with hot cylindrical tube of Ra = 3.133 μm is 18 ° C at 8 bar. The maximum hot temperature for vortex tube with hot cylindrical tube of Ra = 6.264 μm is 48˚C at 8 bar and with hot cylindrical tube of Ra = 4.510 μm is 46˚C at 8 bar and with hot cylindrical tube of Ra = 3.133 μm it is 45 ° C at 8 bar. The fraction of cold mass obtained is better for the vortex tube with the cylindrical hot tube of Ra = 6.264 μm compared to the hot cylindrical tubes of Ra = 4.510 μm and Ra = 3.133 μm as shown in the tables above. The maximum difference of 34˚C between the temperature of the hot and cold ends for vortex tube with cylindrical hot tube of Ra = 6.264 μm and the maximum difference of 31˚C between the temperature of the hot and cold ends for vortex tube with cylindrical tube of Ra = 4.510 μm is obtained and a maximum difference of 27˚C between the temperature of the hot and cold ends for the vortex tube with the cylindrical tube of Ra = 3.133 μm.

CONCLUSION

A series of experiments were conducted to study the performance of the vortex tube based on different design parameters mainly: (1) inlet pressure, (2) cold mass fraction, (3) number of inlet nozzles, (4) position of the vortex cap (5) angle of entry of the nozzles and (6) arrangement of the nozzles. The following has been concluded from the experimental data. Inlet pressure is the driving force for energy separation. Experimental data show that a greater temperature difference and a higher COP are reached as the inlet pressure increases. However, the increase in the COP depends on other parameters related to the vortex tube. The cold mass fraction is an important parameter that influences the energy separation performance in the vortex tube. And there is an optimal value to obtain the maximum temperature difference which is not the same for the maximum separation of the energy load or COP. The effect of the number of nozzles is very important. For the constant inlet pressure test, it is clear that there is an optimal number of nozzles for the maximum COPHP which depends on the operating conditions and the parameters of the vortex tube. For the current vortex geometry, the increase in the number of nozzles shows an inverse effect on the COP.

The effect of hot cylindrical tubes on the cold temperature drop, the warm temperature rise and the COP of the Vortex tube and the results obtained are analyzed. The cold fall temperature ΔTc increases with the increase of the incoming air pressure. The increase in the hot temperature ΔTh increases with the increase of the inlet air pressure. The COP of the vortex tube increases with increasing inlet pressure. From the results obtained, it was discovered that the performance of the vortex tube is better for hot tubes with high surface roughness. Optimal opening of the final gate value offers the best performance. The effect of the nozzle design is more important than the design of the cold orifice to achieve higher temperature drops. The surface finish of the nozzle and hot tube plays an important role in the performance of the vortex tube, a good surface finish leads to better performance. Therefore, be careful when manufacturing parts to get a good surface finish. The plotted graphs show the effect of the increase in inlet pressure with the temperature drop showing an increasing trend, or initially with an increase in the inlet pressure the temperature drop.

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EXPERIMENTAL STUDY ON BETA STIRLING ENGINE

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ABSTRACT
This essay mainly makes an exposition of the Stirling Engine. Firstly, the history of Stirling Engine is showed to make a guide of first comprehension. Then the Stirling Engine's thermodynamic cycle is explained and the configuration is analyzed, which we do to make sure a further insight into the Stirling Engine. After that, the reasons to use a Stirling Engine are discussed, especially from an economic point of view. This is to describe why the Stirling Engine is widely used in nowadays' world. And the last part is to show out how the Stirling Engine is applied in each field. But with a special focus on sterling engines in applications with renewable energies. This whole essay displayed a broad overall presentation to the Stirling Engine, and analyzed its intrinsic value for the future.

I. INTRODUCTION
The Stirling Engine was invented by Robert Stirling. This device was born as a competence to the vapor machine, since a Stirling Engine works with smaller pressures than the device created by Watt and it did not require a qualified train engineer.With the development of the internal combustion engine and the appearance of electric engines, the machine of this study was forgotten.

Nowadays the technology that involves the invention of Robert Stirling is in completely development because of the fact that now very useful applications are available.

This document travels in the history of this curious device looking for reasons of this incredible development in this called high technology with its different applications and doing an analysis from the point of view of the economy. This project explains the principle function of the engine with a deep investigation. And we show how the Sterling Engine in combination with renewable energy sources can be part of a sustainable energy supply.

The Stirling Engine is one of the hot air engines. It was invented by Robert Stirling (1790-1878) and his brother James. His father was interesting in engine and he inherited it. He became a minister of the church at Scotland in 1816. At this period, he found the steam engines are dangerous for the workers. He decided to improve the design of an existing air engine. He hope it wound be safer alternative. After one year, he invented a regenerator. He called the "Economiser" and the engine improves the efficiency. This is the earliest Stirling Engine. It is put out 100 W to 4 kW. But the internal combustion engine substituted for it quickly. The Ericsson invented the solar energy in 1864 and did some improvements for after several years. Robert's brother, James Stirling, also played an important role in the development of Stirling engines.

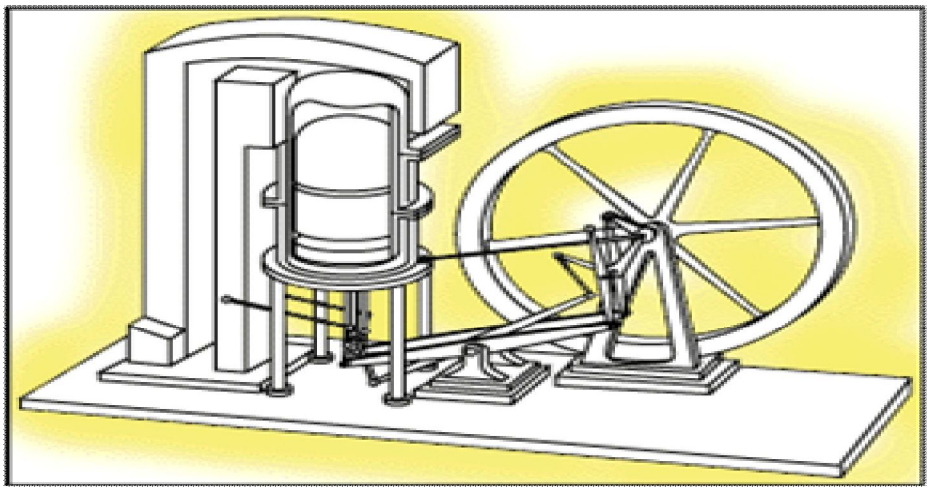

Figure: Earliest Stirling engine

Robert Stirling gets a patent for the economizer with an air engine incorporating it in 1817. Since the Stirling engine worked at a lower pressure, and could not cause steam burns, the danger to explode is impossible. In 1818 he built the first practical exponent of his engine, used to pump water from a quarry. The inventors sought to create a safer engine instead of steam engines at that time, whose boilers often exploded as a result of high pressure of the steam and the inadequate materials.

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The original patent by Reverend Stirling was called the "economizer", for its improvement of fuel-economy. The patent also mentioned the possibility of using the device in an engine. Several patents were later determined by two brothers for different configurations including pressurized versions of the engine. This component is now commonly known as the "regenerator" and is essential in all high-power Stirling devices.

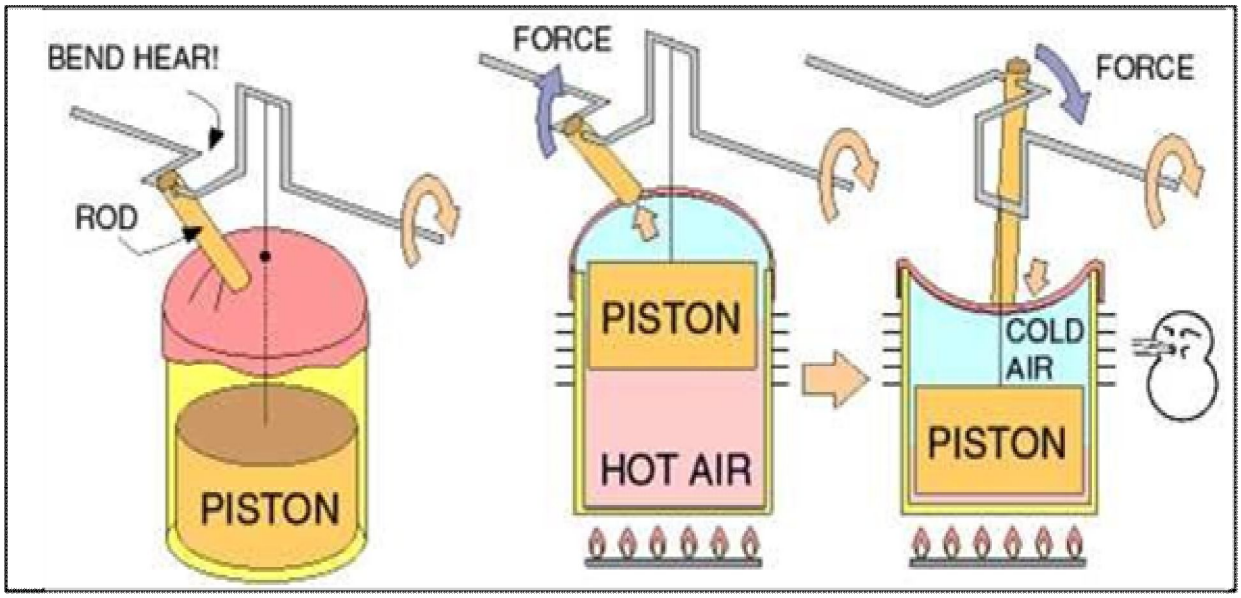


Figure: Stirling Engine's principle of operation

Stirling engine of the second generation began in 1937.The Philips of Holland used new materials and technology to ascend a very high level. The knowledge about the heat transfer and fluid physical, which is a great significance to improving of the structure and raised the stability.

Throughout World War II and by the late 1940s, Philips' subsidiary Johan de Witt does this work continued. And they did the Type 10, incorporated into a generator set as originally planned The set progressed through three prototypes (102A, B, and C), with the production version, rated at 200 watts electrical output from a bore and stroke of 55x27mm, being designated MP1002CA.

In 1951, the price of Stirling engine is too high for the market. It made used of radios at that time. Though the MP1002CA may have been a dead end, it represents the blooming of the modern age of Stirling Engine development. In addition to which the advent of transistor radios with their much lower power requirements meant that the market for the set was fast disappearing. Though the MP1002CA may have been a dead end, it represents the start of the modern age of Stirling engine development.

II. LITERATURE SURVEY

Author: Halit Karabuluta,Huseyin Serdar 30 October 2007

Title: An experiment study on the development of b-type Stirling engine for low and moderate tempreture heat sources.

Remark: Experiment results presented in this paper were obtained by testing the engine with air as working fluid.the hot air of the displacer cylinder was heated with a LPG flame and kept about 200 C constant tempreture throughout the testing period.

Author:Chin-Hsiang cheng 6 April 2010

Title:Dynamic simulation of beta-type Stirling engine with cam-drive mechanism via the combination of the thermodynamic and dynamic models.

Remark:An extensive parametric study of the effects of different operating and geometrical parameters has been performed,and results regarding the effects of mass moment of inertia of the flywheel,initial rotational speed,initial charged pressure,phase angle,gap size,displacer length,and piston stroke are investingated.

Author:Dawei Tanga, Zhigang Lia 20 July 2011

Title: Development and test of a Stirling engine driven by waste gases for the micro-CHP system.

Remark:The test results confirm the fact that Stirling engine driven by mid-high tempreture waste gases are able to achieve a valuable output power for engineering application.

ISSN 2394 - 7780

Autho: Siddhant jadhao September 2014

Title:The Stirling engine has multi-fuel capability to oprate with any possible fuel source.

Remark:Fuel like liquid gaseous or solid fuel with wide range of temperature.This is an important feature of the engine that it can be use abundant heat source from solar radiations,waste heat from industry,heat produce from agriculture waste and so many other low temperature sources.

III. PROBLEM DEFINITION

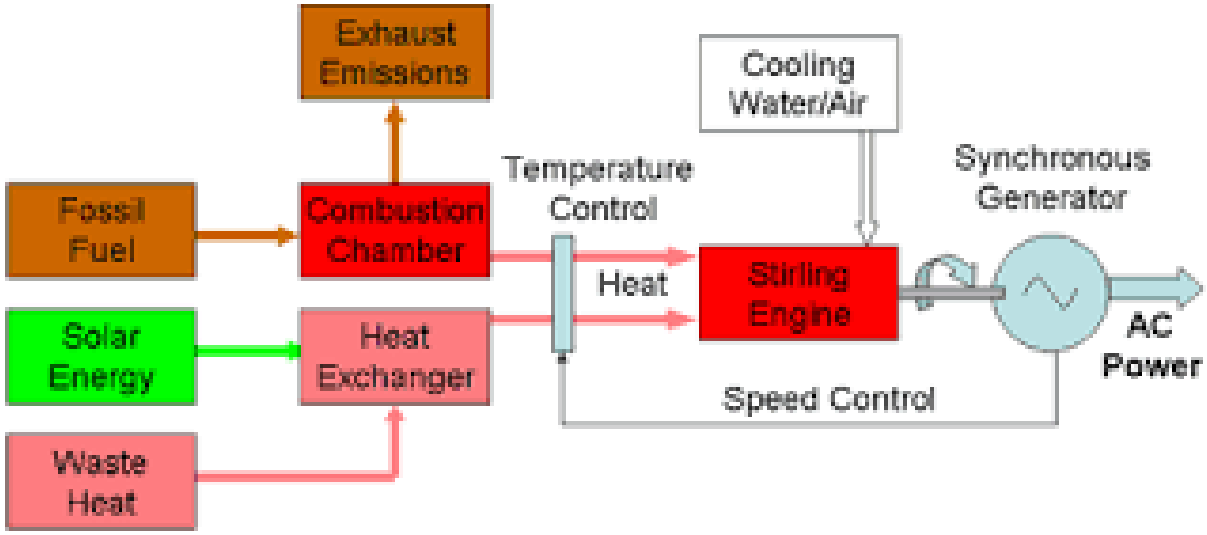
1) Opening of the can lid for making pressure vessel top,pressure vessel bottom,displacer top and displacer bottom.
2) Non linear motion of straight pin through the hole of pressure vessel top.
3) Dissipation of heat from the space between the legs of the ring stand.
4) Sliding the crankshaft through the holes in crankshaft supports.
5) Maintaining exact length of connecting rod through PVC elbow

IV. AIMS & OBJECTIVES

IMPLEMENTATION IN INDUSTRIES

1) Stirling engine can run directly on any available heat source,from solar,geothermal,etc
2) Electricity production
3) Alternate for motors
4) Dual power output to increase engine efficiency
5) Fuel saver
6) Alternate for air conditioner

V. PROPOSED METHODOLOGY



Electric Power Generation by External Combustion Engine

The purpose of the single power piston and displacer is to "displace" the working gas at constant volume, and shuttle it between the expansion and the compression spaces through the series arrangement cooler, regenerator, and heater.

A beta Stirling has a single power piston arranged within the same cylinder on the same shaft as a displacer piston. The displacer piston is a loose fit and does not extract any power from the expanding gas but only serves to shuttle the working gas from the hot heat exchanger to the cold heat exchanger.

When the working gas is pushed to the hot end of the cylinder it expands and pushes the power piston. When it is pushed to the cold end of the cylinder it contracts and the momentum of the machine, usually enhanced by a flywheel, pushes the power piston the other way to compress the gas. Unlike the alpha type, the beta type avoids the technical problems of hot moving seals.

ISSN 2394 - 7780

VII. REFRENCE

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GREENING OF CHEMICAL LABORATORIES IN SCIENCE AND TECHNICAL COLLEGES

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ABSTRACT
Efficient management of laboratory has been the bone of contention amongst laboratory managers . Gone are the days when people used to carry out work in chemical laboratory spending unrestricted amount of energy, chemical, water and other utilities. Reducing waste and introduction of green practices in routine chemical lab activities have become essential considering the recurring cost, expenditure and reducing their environmental footprint as well as pressing need from regulatory institutions. Various steps have been enumerated in this study to make lab green and efficient as well as a few case studies have been presented to substantiate this. The study has special relevance to improving the efficiency in chemical laboratory of science degree and engineering colleges as never before such an effort has been made to present steps for introducing green ,efficient and sustainable practices which has been substantiated by a few case studies and examples at one place.

Keyword: Green practice, waste reduction, sustainable lab, green chemistry, efficiency, colleges.

INTRODUCTION
Around twenty years ago efficient and good laboratory practice was limited to use of pure chemicals and proper utilities to produce desired product or result of highest grade and quality. However, with the pressing need for efficient management of laboratory by the regulatory institutions and need for reducing cost as well as increasing chemical lab productivity the use of lean and green practices have become more pertinent. Broken fumehoods, confusing and dirty waste beakers,distillation apparatuses that have been running since the lab bench was installed[1] and utter disregard for energy usage as well as least concern for waste recovery and liquid , solid waste treatment[2] generated in the chemical lab are common occurences within chemistry department labs of universities.Using tap water for cooling condensers,purchase of duplicate and excess amount of chemicals , solvents than required, haphazard upkeep of chemicals,solvents , shoddy maintenance of equipments and their spares are common observations in college chemical laboratories. Use of old instruments for more than ten to fifteen years causes increase in recurring cost in their maintenance as well as require more energy than their modern versions. Even time required in getting results from them is more when compared to new ones.

Keeping in view the frugal consumption ,waste creation and recurring cost due to inefficient and lackadaisical approach to the chemical lab management issues introduction of green and efficient practices are essential to bring economy in the lab activities as well as to develop sustainable lab ethics in colleges and bring them at par with the industrial chemical laboratories. It has become more important in the present context of industry-academia collaborative activities.

In the present monograph an effort has been made to enumerate steps that can be followed to develop green, efficient and sustainable chemical lab in science degree and engineering colleges .This has been followed by specific case studies carried out in chemical labs and examples in order to substantiate the benefits of use of adopting green practices in labs.

PROCEDURE AND DISCUSSION
Notwithstanding regulatory requirements , use of green practices in chemical laboratory activity has far reaching impacts so far cost effectiveness and environmental issues are concerned.There are various ways of using green practices in chemical laboratory viz, (a) Reduction in wastage of water (b) reduction in energy usage(c) reduction in chemical waste (d) recovery of chemicals from waste (e)proper waste treatment for its discharge as effluent (f) proper management of lab infrastructure and space (g) proper record and management of inventory (h) use of green chemistry principles (i)reduction in time in lab activities.

(a) Reducing consumption of water: The various methods of reducing water consumption are : (i) use of restricting valves in taps to dispense desired flow of water (ii) automation in taps used for hand wash and cleaning glasswares (iii)Collecting desired amount of water in a sink for dish wash(iv)use of innovative techniques using pumps from discarded air coolers to reduce wastage of water passing through cooling glass condensers in lab and thereby saving recurring cost on usage of water.

The cost calculation of one such system using tap water for cooling condenser is given below:

A leibig water condenser used in synthesis chemical lab dispensed volume of water in 1 minute = 100 ml

ISSN 2394 - 7780

Therefore, total volume of water coming out of condenser = 100 ml per minute.

The cooling through water condenser used to be done for 12 hrs continuously daily for 24 days.

Therefore volume of water dispensed from water condenser in 12 hrs=100 X60X12 =72000 ml

Therefore volume of water dispensed from water condenser in 24 days=100 X60X12X24 = 1728000 ml

= 1728000/1000

=1728 litres

Thus in a month from one water condenser the volume of water wasted =1728 lts.

There were three such water condensers being used ,hence volume of water wasted = 1728X3= 5184 litres per month.This much of water can be saved by use of alternative procedure using water cooler pumps. Instead of running tap water through glass water condenser continuously it is much better to run stored ice cooled water using pump from discarded home air cooler. Once the stored water becomes hot on continuous recirculation it can be replaced by fresh ice cooled water while the previous one is kept for cooling.This cycle can be continued indefinitely thus saving copious amount of water and consequently recurring cost on water use.

Alternatively the water coming of the outlet can be stored separately and be passed through water condenser repeatedly after cooling.This would save considerable amount of water and energy.

An example for bringing economy by use of innovative condenser is given here[6]-Findenser super condenser replaces water-cooled **condensers** in over 95% of common chemistry applications. ... Findenser comprises of an internal glass **condenser** and an external, finned aluminium jacket, between which a small amount of water is permanently sealed. The glass **condenser** design has a greater internal surface area than traditional air condensers, increasing heat transfer capacity.The finned jacket fits around the glass condenser, further increasing the external surface area.The result is a 'SUPER air condenser'.

Water is a precious resource. It makes little economic or environmental sense to waste thousands of

litres just to cool a single condenser. Whereas Findenser requires no running water to operate.

How much water costs a lab[6] when water condenser is used according to a manufacturer of condenser is given in the following table1

Table-1

	1 tap running at 2.5 litres per minute		
The cost running a water condenser	4 hours	8 hours	24 hours
Water consumption per day litres	600	1200	3600
Cost per Day	£1	£2	£6
Cost per Month, 20 working days	£20	£40	£120
Cost per Year	£240	£480	£1440
Based on a flow of 2.5 litres per minute, at a cost of 0.16p per litre of supply and disposal of water. Price from Veolia Water 2012 commercial pricing.			

(ii) Proper management of lab inventory[3,4] and record: There are number of different types of glassware, equipments and chemicals used in chemical laboratory. In an academic year the quantity of chemicals to be used should be ascertained and accordingly a purchase order should be made so that at the end of the session there should not be large excess of chemicals left. Similarly for glasswares also there should be a certain number of excess quantity of glsswares.In case of equipments there should be calculated number of spares available so that equipment downtime should not be affected by nonavailability of spares. Proper upkeep of record of usage of chemicals,glasswares as well as spares of equipments makes it easier to trace the balance quantity of each and every chemicals,glasswares as well as spares at a glance .For a large chemical laboratory or lab involving interdisciplinary work involving very large number and quantity of chemicals ,utilities ,gadgets

ISSN 2394 - 7780

,equipments etc. a software systems viz, SAP or LIMS can be used to track inflow and outflow in realtime. . It is better to keep records of chemicals, solvents,equipments etc. as a soft copy with proper categorization for easy retrieval than keeping hard copies of them for smaller laboratories. Timely inventory audit should be scheduled to in order to keep proper check on the chemical lab authorities and avoid stock pile up and clutter.

(iii) Lean way of arranging chemicals, glasswares as well as spares : Lean process is related to reducing wastage of time and wasteful activity. The lean way of arranging chemicals, glasswares as well as spares pertains to proper labeling , classification and placement of chemicals and other lab materials based on their nature,safety issues ,type and proximity to the user so that no time is wasted in their retrieval whenever they are needed is an example of lean management.

(iv)Use of green chemistry principle: Green chemistry principle is related to waste minimization,risk mitigation,efficient procedure for maximised atom economy using benign chemicals and less energy.Some examples related to this are given below[5].

In 2005, the Nobel Prize in chemistry was awarded for the discovery of a catalytic chemical process called *metathesis* – which has broad applicability in the chemical industry. It uses significantly less energy and has the potential to reduce greenhouse gas emissions for many key processes. The process is stable at normal temperatures and pressures, can be used in combination with greener solvents, and is likely to produce less hazardous waste. Application of green chemistry helps green lab activities and fulfills its requirements . Examples of application of green chemistry is given in the following paragraph.

In 2012, Elevance Renewable Sciences won the Presidential Green Chemistry Challenge Award by using metathesis to break down natural oils and recombine the fragments into high-performance chemicals. The company makes specialty chemicals for many uses, such as highly concentrated cold-water detergents that provide better cleaning with reduced energy costs.

To manufacture computer chips, many chemicals, large amounts of water, and energy are required. In a study conducted in 2003, the industrial estimate of chemicals and fossil fuels required to make a computer chip was a 630:1 ratio! That means it takes 630 times the weight of the chip in source materials just to make one chip! Compare that to the 2:1 ratio for the manufacture of an automobile.

Scientists at the Los Alamos National Laboratory have developed a process that uses supercritical carbon dioxide in one of the steps of chip preparation, and it significantly reduces the quantities of chemicals, energy, and water needed to produce chips. A case study having relevance to the application of green practice is given below:

At Theem college of engineering chemistry lab following experiments were carried out in different manner thus introducing green practice.

(A) Estimation of iron in steel alloy:

Earlier oxalic acid was heated for standardization of potassium permanganate which required LPG cylinder.In the modified method for standardization oxalic acid was replaced by mohr salt solution.This does not require heating .Thus heating by any energy source was obviated. Moreover, in the oxalic acid method students need to hold heated flask in their hand for titration which has potential hazard of burning their hands and consequent falling of flask (glassware).

Thus the alternative method using mohr salt solution has multipronged benefits:

(a) The heating energy is saved as LPG cylinder is not required.

(b) Cost reduction on two accounts (i) mohr salt costs less than oxalic acid [mohr salt –Rs.160/- per 500 gms,Oxalic acid-Rs. 200/- per 500 gms approx. (ii) cost on gas cylinder saved.

(c) Green gas emission reduced.

(d) Hazard involved is eliminated.

(B) Estimation of zinc in brass alloy:

In the earlier method for estimation of zinc in brass alloy, solution was prepared and hydrogen sulfide gas was used for removal of copper from brass alloy and subsequent determination of zinc. However, use of H_2S gas involved lot of waste creation in the form of black ppt. of copper sulphide.Moreover, H_2S gas caused lot of obnoxious smell and air pollution.In the alternative method, use of H_2S gas was obviated as the copper in brass solution was masked using sodium thiosulphate.

ISSN 2394 - 7780

Thus the modified method has several benefits:

(a) Removal of air pollution source.

(b) Obnoxious smell stopped.

(c) Less cost involved in masking chemical than in use of hydrogen sulfide gas.

(d) Less cumbersome process as precipitation and filteration is removed from the process and subsequent less waste creation.

(v) Reduction in energy usage: Planning of routine analysis and experimental work in an efficient manner. For example equipment once switched on for one experiment should need not be switched off and again switched on to attain the same temperature for the next batch of experiment to start.Energy saving effort like use of microwave,sonicator[7] and solar energy assisted heating should be given not only preference but also should be made as routine methods by designing experiments and modifying raw materials.This would save energy and time both.As mentioned earlier use of findenser as cooling condensers will not require water and hence that much of water pumping is not required and thus saves energy.Closing the sash of fumehood while in operation and even when not in operation saves considerable amount of energy.

A comparison of conventional and microwave, sonicator heating is given in following tables[7]

Table-2

Type of heating	Conditions	Energy consumption (kJ/L)
Conventional	Continuous (industrial scale)	94.3
Microwave	Continuous, 7.2 L/min	26

Table-3

Comparison between conventional, microwave and ultrasonic heating methods for biodiesel production

Conventional heating	Microwave heating	Ultrasonic heating
Thermal gradient (outside to inside)	Inverse thermal gradient (inside to outside)	Limited thermal gradient due to mixing
Conduction and Convection currents	Molecular level hot spots	Microbubble formation and collapse (compression and rarefaction cycles)
Longer processing times	Very short and instant heating	Relatively very short reaction times, not as quick as microwaves
No or low solvent savings	No or low solvent reactions possible	Solvent savings possible
Product quality and quantity can be affected	Higher product quality and quantity possible	Same as conventional heating
Separation times are long	Very short separation times	Less than conventional heating
High energy consumption	Moderate to low consumption	Moderate to low consumption
Simpleprocess configuration	Very simple process	Moderate complexity

(c) Reduction in chemical waste : First and foremost chemical waste can be reduced considerably by use of best practices in inventory management of chemical lab. Secondly, use of green chemistry principles viz, maximization of atom economy ,using benign raw materials, reducing steps of a synthetic reaction etc. has apparent impact in chemical waste reduction effort. Thirdly, only preparing desired amount of solutions and reagents required for particular analysis or experiment saves the undesired wastage which would have otherwise occurred. Recovery of chemicals from waste generated can be another step in reducing chemical waste.

A chemical lab recovered a tuberculosis drug pyrazinamide from chemical waste generated in a synthetic process. Solvent recovery from HPLC effluent or distillation waste is generally practiced as a measure for waste recovery.

(f) Proper management of lab infrastructure and space: Lab infrastructure includes right from the stool, chair, tables to computer, printer, work bench etc. Proper identification and documentation for each is a prerequisite to keep a tab on these. Secondly, effort should be made to share computers , printers and commonly required

ISSN 2394 - 7780

gadgets and equipments as far as practicable so that idle time for these is considerably reduced and cost on purchase of new one is obviated. Space within the lab should be economically used by proper placement of infrastructures. Between two work benches in chemistry lab there should be considerable space so that students working on them should not have to rub their shoulders against one another in moving within the lab.There should be a routine practice for monitoring of lab infrastructure by the maintenance department so that preventive measures could be taken before they get faulty or broken and lab staff has to report for their repair.

(i)Reduction in time in lab activities: SOP's and STP's should be in place in college chemistry lab also as it is in industry or large commercial laboratories.It facilitates accuracy in work , rework is less and minimizes chance of error thus saving time. Besides, proper planning of experiments placement of chemicals and solutions at appropriate place ,briefing students about the steps to be taken in performing experiments ,use of modern equipments and gadgets help save time.Use of realtime analytical instruments save considerable time and minimizes the chance of error in experiments. . Display of list of chemicals, solutions, indicators indicating in which order and direction they have been placed on the workbench rack helps in reducing time in their search whenever they are needed during experiment performance or otherwise. Similarly putting glassware and glass apparatus at appropriate place on the workbench help in reducing time.These also come under adoption of lean practice in the lab.

CONCLUSION

Thus introduction of green practices in chemical laboratories not only bring efficiency in the lab activities but also decreases the cost associated due to waste creation and wasteful activities. Considering the areas where chemical labs of engineering colleges and degree colleges lack in efficiency the above mentioned practices should be adopted .In current scenario of stringent requirements put forward by accrediting bodies and other regulatory institutions it is essential to adopt these practices in an organized manner instead of following conventional and age old methods.This would help an academic institution to come in the reckoning for being considered as an institution par excellence which in turn would help its students in various ways in the job market,exchange programs and make the institution better equipped to be considered for academia-industry collaboration and prestigious accredition.

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HEALTH DIRECTORIES BASED ON ANDROID APPLICATION

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ABSTRACT
In the last decade significant progress have been made in smart phone technology as well as wireless area network technologies. Presently, due to hectic lifestyle to cope with fast pace more and more people are facing health problems. Health Directory System thus becomes an inevitable part of every family. Getting efficient and quick healthcare becomes necessity; it is an approach which can be adopted by hospital/doctors to provide quick access to health directory services to the needed person. Such as Online Medical Prescription, Scheduling Appointment, searching about nearest Hospital and about Doctor's, Uploading of medical reports with security measures necessary while consultation. One way to solve this problem is using the Android Application. Android is open supply mobile software with huge user base and simplified mobile app development method. Enterprises are leveraging Android and creating custom mobile apps for easy adoption and increase value for their business and help them to use services on the tip of their fingers. The health directory app would be build using Java and Rich Android Libraries of open source Android SDK. It would help people to search for various health care services by specifying various set of criteria and which in turn would show them appropriate services there by helping people to get proper treatment.

INTRODUCTION
When people fall sick, they often have limited information beyond their own prior experience and the recommendations of family and friends regarding which doctor to go to. Most of them who do not know the exact location of the offices of the doctors or the way to contact their intended doctors have to go through much hassle. Physicians, when making referrals to specialists, might also find themselves equipped with inadequate data. This project aims at providing them an easy way to locate the desired doctors in the country through an android app and, if needed, contact them in an instant straight from inside the app. With more individuals turning to the net as a supply of health care information, online doctor directories and corresponding mobile applications could become very valuable assets in the near future. Unfortunately, the available sites are frequently difficult to use, not objective, or contain data that's outdated, inaccurate, or incomplete. Moreover, there is no suitable android mobile application which can connect a person to his desired doctor. Our Health Directory Application is a web based application which is available in the form of a mobile application for the android platform. The project aims at maximizing the ease of use and navigation, for example, by incorporating advanced search functions and interactive features; providing a wide range of content, including the location of the office of any doctor on the Google maps; and ensuring the credibility of data by regularly updating and monitoring for accuracy.

EXISTING SYSTEM
A. Similar Online Systems and Web Applications
There are a few similar online systems or web applications which have such specific categorization of the doctors in India based on both their specialty and area of the city they live in, which is there in our proposed system Health Directory Application Besides, the few such websites which intent on providing the users with an online directory of the doctors in India is often found to contain inadequate, outdated and sometimes inaccurate data. Moreover, none of them are so user friendly as our proposed project Health Directory Application is. Some such local websites worth mentioning in terms of application and built-in directories are

B. Similar Mobile Applications
Though current age is being dominated by smartphone technology, if we consider the case of mobile applications, there is none in the online mobile application stores which aim at locating doctors' offices in the context of India. There are some mobile applications which tend to do so in the context of some technologically developed countries like the USA, England, Canada, etc. But when it comes to the countries which are technologically less developed in terms of health management, only a few have such facilities. Our project aims at inspiring those countries through setting an example by making such a system both popular and more accessible to people of all age groups in a technologically developing country like India. In order to do so, our project permits the users to access the system on android smartphones in a user-friendly manner with the app version of Health Directory Application.

ISSN 2394 - 7780

SYSTEM DESIGN

A. Basic Architecture Design.

Our project Doctor Locator is dedicated to the purpose of live query and instant rendering of data from the servers to the clients. The system is setup in a way so that it facilitates this purpose. Our system implements the basics of web application as they are meant to be. The application is responsive. The architecture of our entire project is based on the principles.

B. Requirement Specification Design.

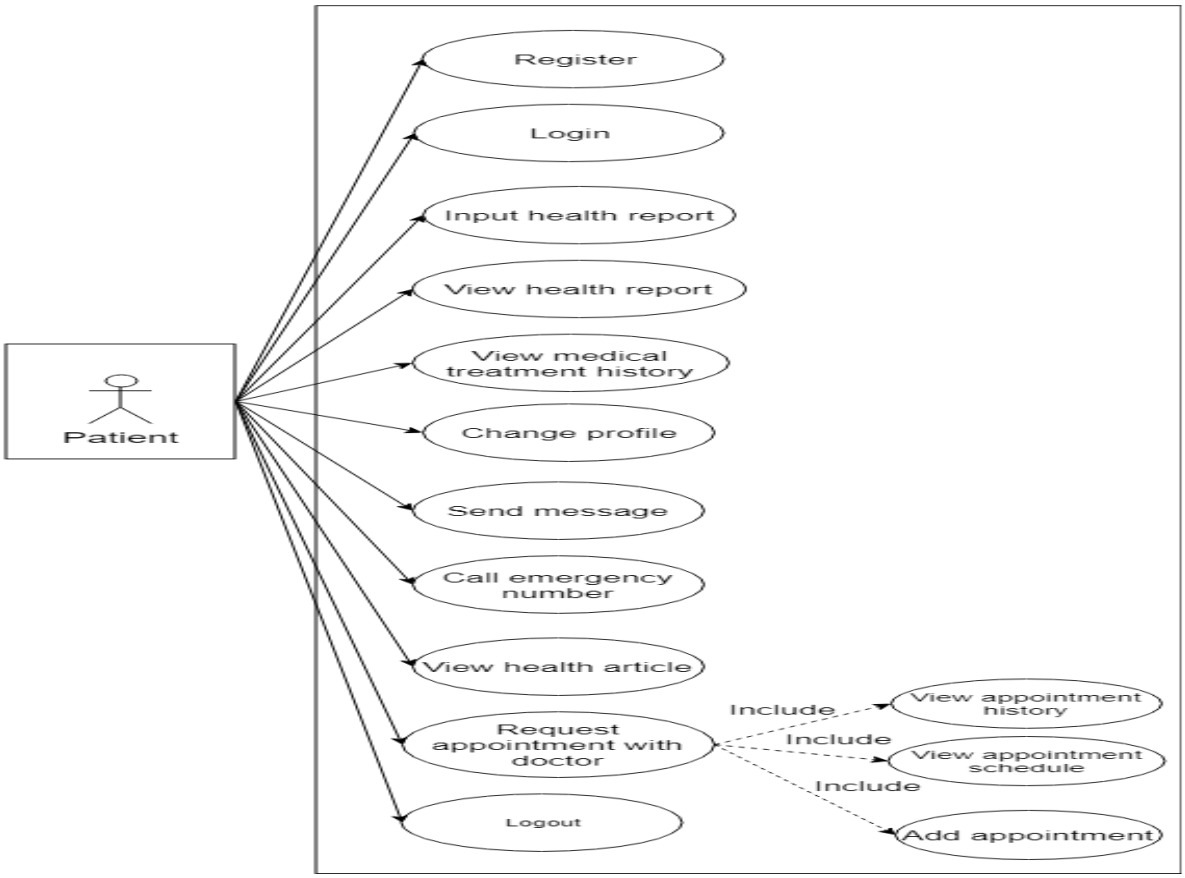
The requirement specification of our application is very simple. Doctor Locator is full of features and very user-friendly. Keeping that under consideration, the following requirement specification has been designed:

1) Content Maturity: Everyone.
2) Platform: Android.
3) Android Version: 2.0.3 and above.
4) In-app Purchases: No.
5) Special Permissions (On Desktop): Access to computer's default email software

METHODOLOGY

1. Use Case Diagram

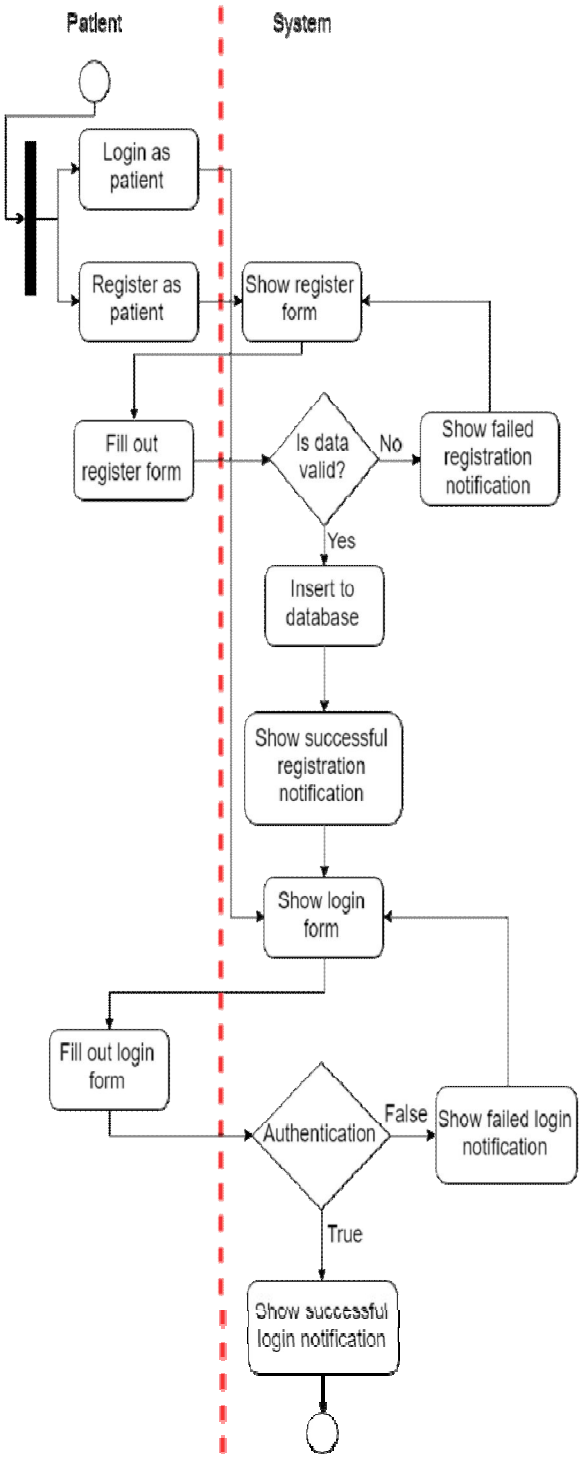
Use case diagram is used to determine which users can use the system and what the users can do to the developed system. For mobile application subsystem, there will be patient as actor that can access several features such as register, a feature to create an account for patients who have never accessed the system before; login, a feature to enter the system after an account has been created; insert health report, a feature to input patient's health condition; view health report graph, a feature to view the progress of patient's health condition in a graph; view medical treatment history, a feature to view what treatments have been carried change out by the patient; profile, a feature to change patient's identity information; send message, a feature to send message to doctor; call emergency number, a feature to call emergency number in the state of emergency; view health article, a feature that provides information in the health sector; request appointment with doctor, a feature to make an appointment with doctor without having to come to the medical clinic or hospital. Use case diagram designed as the basis for developing the information system can be seen in Fig.1.



ISSN 2394 - 7780

2. ACTVITY DIAGRAM

Activity diagram is used to describe flow of function in the information system that have been described previously in the use case diagram. To use the application, the patient must do the login process or register first. For patients who do not have an account, the registration process is required before logging in. The login and registration process is done by filling out the form with patient data for further data to be entered into the system and authenticated. Register and login activity diagram can be seen in Fig. 2.



A successful login process will direct the patient to the display to choose a health condition. Then the patient needs to choose the location where he/she is currently and what health conditions are felt at this time. If the patient chooses an unhealthy condition, the system will direct the patient to the display to include more detailed health conditions so the accurate information will reach to the Doctor's available at that movement. In this view the patient chooses a part of his body that he feels unhealthy, then chooses how much pain is felt on that part of the body or the particularly regarding any disease. So on the basis on that whether the to see any specialist will be sorted on the list.

ISSN 2394 - 7780

FUTURE WORK

1. The feature of directly video-calling a doctor from inside the application. We are going to implement it for use on desktop by allowing the application to ask for permission to use the default video-calling software of the device.
2. Sorting and counting of ratings and comments.
3. Making the address of the clinics more accurate to find them precisely on the Google map.
4. Addition of more data to the database to make the application a complete online doctor directory of India.

CONCLUSION

Those that do any monitoring at all, especially the private clinics and hospitals make direct phone calls to patients, or send SMS to remind them of appointments, medical reviews but not reminders on prescription, awareness or health related surveys. Technologies like traditional phone calls, SMS, E-Mail and physical interaction between service providers and consumers is a common means of information /data sharing but it is tedious, slows down response and absorption of medical services to the greater population. This does not only suffocate business but also leads to avoidable health complications and even deaths.

As the idea of the project was initialised, the project was only going to be used as health directory based but as the information was gathered than the idea brought us to the next level and we thought that we can also merge other features like Health news that shows recent news related to health and other initiatives of various health organization so the user will updated with it and steps to be taken to get those facilities, A contact page to contact and provide feedback to us, A Helpline page to display important hiplines like Ambulance, Cardiac ambulance, Suicide helplines, Statistics to help users and other stake holders to gain insights. The project is an android application which is user friendly and it helps lot of people who are sick to get proper health care service in a healthy manner. As the project was started, During its initial phase, We got to know more about android studio application with SDK very efficiently, Programming concepts, OOPS concepts, Types of applications, Advantages and Disadvantages of different types of apps, Requirement gathering.

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INTELLIGENT TRANSPORT SYSTEM USINGGLOBAL INFORMATION SYSTEM

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ABSTRACT
Intelligent transport system refers to efforts to add information and communication technology to transport infra structured vehicles in an effort to manage factors that typically are at odds with each other like vehicles, loads and routes to improve safety and reduce vehicle wear transportation times and fuel consumption. Global information system is a computer based system which is used to digitally reproduce the features, present on the surface of earth and events that take place. Advanced Traveler Information Systems (ATIS) is one of the user services provided by ITS. With ATIS information, drivers make informed decisions and are better equipped to plan their route and estimate their travel time. Route planning is an essential component of ATIS, aiding travelers in choosing the optimal path to their destinations in terms of travel distance, travel time.

Nature has gifted man and animals the ability to move. With his intelligence man has developed transportation system leading to economic well-being. However we have to pay for this in the form of its undesirable effects as environmental impacts, energy consumption, congestion, casualties and money required to build infrastructure. This has led us to a more balanced and sustainable transportation system. Here Intelligent Transportation system comes into picture – the application of computer and communication technologies to transport problems. The old adage, 'knowledge is power' is the obvious solution to this.

In this paper, how an advanced traveler information system for a developed in GIS environment can be useful is shown. This user friendly system provides complete information of a city such as road network, tourist places within the city limits, hospitals, government and private offices, stadiums, bus and railway stations. This system provides shortest path and path to closest facility based on distance and drive time. The GIS can be used in bus stands, railway stations, airports, tourist information centers, in personal computers to give information to the travelers.

INTRODUCTION
Nature has gifted man and animals the ability to move. With his intelligence man has developed transportation system leading to economic well-being. However we have to pay for this in the form of its undesirable effects as environmental impacts, energy consumption, congestion, casualties and money required to build infrastructure. This has led us to a more balanced and sustainable transportation system. Here *Intelligent Transportation system* comes into picture – the application of computer and communication technologies to transport problems. Here *Intelligent Transportation system* comes into picture – the application of computer and communication technologies to transport problems.

Japanese seems to have initiated the whole modern day notion of ITS with work carried out in the 1980s. The United States was also addressing the application of ITS at an early stage in the course of the Electronic Route Guidance project (ERGS) in the 1970's. The European Union picked up the theme, and referred to it as Road Transport Informatics. In the course of time the name of this technology subjected to many changes until USA had given a name called ITS to it.

ATIS provides both preterit and en route information to the users, both of which offer distinctive advantages. The availability of preterit information drivers enhances their self-belief to use freeways and allows commuters to make better-informed transit choices. En route information and guidance saves travel time, helps a traveler avoid congestion, can improve traffic network performance, and is more efficient than paper maps or written nstructions.

The old adage, 'knowledge is power' is the obvious solution to this. Customers want real-time information to help them select the best route to take at any given time. They need to know traffic speeds, incidents (accidents or lane closures), and road conditions. With Advanced Traveler Information Systems (ATIS) information, drivers make informed decisions and are better equipped to plan their route and estimate their travel time. The ultimate solution has a big mandate. Critical features include accuracy, timeliness, and reliability. The ideal solution is an up-to-the minute traffic information system that enables drivers to make more intelligent travel decisions at any time of the day and any day of the week. There is wide scenario of problems, which are specific to India, and indigenous solutions are required to suit its requirement of a cost effective, efficient, reliable and at the same time compatible with the present level of development in the country in the related areas.

ISSN 2394 - 7780

OBJECTIVES OF STUDY

1. This user friendly system provides complete information of a city such as road network, tourist places within the city limits, hospitals, government and private offices, stadiums, bus and railway stations.

2. This system provides shortest path and path to closest facility based on distance and drive time. A facility consisting of city bus routes with bus numbers, origin and destination points, and all intermediate stations have been included in the system.

PACKAGE DEVELOPMENT

1. MECHANISM

Developing *Advanced Traveler Information System (ATIS*) in *Geographic Information System (GIS) is main objective of current project*. In this system shortest path, closest facility and city bus routes were included. Besides these features location wise information and inter-city traveler information like bus, train and airways timing are also included. Mechanism involved in the development of package is described in following sections.

1.1 SHORTEST PATH

Shortest path is determined by *route planning* a fundamental issue which helps vehicle drivers to plan a route using route optimization criteria or planning criteria. The quality of a route depends on travel cost factors such as distance, travel time, travel speed and number of turns. Some drivers may prefer the shortest path based on distance and some prefer based on travel time. The route selection is done via on travel time. The route selection is done via user interface. Optimization of travel distance is done by storing distance in digital database and using route planning algorithms. While optimization of travel time is done by storing road length and speed limit in digital database, and using Speed = distance/time, travel time is calculated.

1.2 CLOSEST FACILITY

In the closest facility problem *route length* and *travel time* (drive time) were considered as *travel costs*. Different facilities like hospitals, bus stations, and tourist places were taken as themes in the project. Closest facility algorithm calculates all the routes from selected origin to facilities based on travel cost. It compares travel costs of these routes and gives one optimal route as output [1].

1.2 CITY BUS ROUTES

City buses with their numbers were stored in a data base in a compressed format because on one road segment there will be more than one bus. A search algorithm was used to find bus service number from selected origin and destination. According to bus number, road segments on the map were selected and highlighted with different color. The schematic flow chart of the package is shown as Fig 1.

2 SOURCE PROGRAM

The source program for this package has been written in Avenue programming language. Avenue is object-oriented and scripting language for ArcView GIS. Customization of the package was done in Avenue. The source code was divided into many numbers of scripts because in Avenue language functions or procedures are not available. Each script is used for a specified purpose.

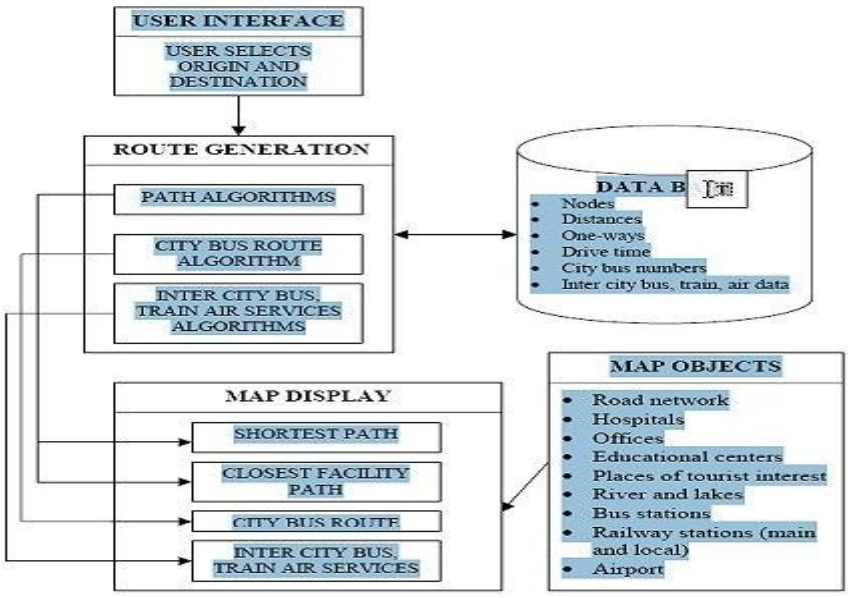

Fig 1

ISSN 2394 - 7780

3 SOFTWARE DEVELOPMENT FOR A CITY

Software that can be used in the development of current project is

- Arc View GIS version 3.1
- Network Analyst version 1.1b
- Avenue programming language

3.1 ARCVIEW GIS VERSION 3.1

Arc View GIS software is a desktop GIS with an easy-to-use, point-and-click graphical user interface (GUI) that lets us easily load spatial and tabular data so we can display the data as maps, tables, and charts. Arc View provides the tools we need to query and analyze the data and present results as presentation-quality maps.

3.2 NETWORK ANALYST

The Arc View Network Analyst is an extension product designed to use networks more efficiently. It can solve common network problems on any theme containing lines that connect.

3.3AVENUE

Arc View scripts are macros written in Avenue, Arc View's programming language and development environment. With Avenue we can customize almost every aspect of Arc View, from adding a new button to run a script we write, to creating an entire custom application that we can distribute.

CONCLUSION

1. Digital traveler information system for a city can be developed in geographic information system (GIS) using Arc View GIS software package and it was customized using Avenue programming language.
2. This package has point-and-click graphical user interface (GUI) and it is user friendly also.
3. The developed package can show the following capabilities.

- Finding shortest path based on distance and drive time
- Finding closest facility and its path based on distance and drive time
- City bus routes
- Search engine - which searches different facilities in Hyderabad city
- Provides intercity bus, train and airways information (timings, distance and service name)
- Site tour planning

4. The developed package can be used in the following areas to give information to the travelers

- Bus stands
- Railway stations
- Airports
- Tourist information centers.
- In personal computers.

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LAPLACE TRANSFORMS AND INVERSE LAPLACE TRANSFORMS WITH ITS PROPERTIES

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ABSTRACT
The Laplace transforms is typically used to simplify a differential equation into an easy and solvable algebra problem.The Laplace transform is used often in Engineering and Physics.The Laplace transforms provide a method to makea transfer function for an input-output system. Laplace transformation makes it simple to solve Engineering problems and makes differential equations easy to solve. In this paper we will discuss the way to follow convolution theorem holds the Commutative property, Associative Property and Distributive Property.

Keywords: Inverse Laplace transformation, Laplace transformation, Convolution theorem

INTRODUCTION
Laplace transformation is a technique which is used in the solving of differential equations by converting it from time domain form to frequency domain form. Generally it is effective in solving linear differential equations. The Laplace transforms converts a linear differential equation to an algebraic equation, which can then be solved by the formal rules of algebra. The original differential equation can then be solved by using the inverse Laplace transform. It is used in solving physical issues. The Laplace transform involving integral and ordinary differential equation.It is also used to transfer the signal system in frequency domain for solving it on a simple way. The Laplace transformation is usedin control system engineering.The Laplace transformationis used to study andexamine systems like ventilation, heating and air conditions, etc. which are used in every single modern day construction and building. It has some applications in nearly all engineering subjects, like System Modeling, Analysis of Electrical Circuit, Digital Signal Processing, Nuclear Physics, Process Controls, and Applications in Probability, Applications in Physics, and Applications in Power Systems Load Frequency Control etc.

- **Laplace Transformation**

Definition

The Laplace transform of f(t) is a well defined function of t for all $t \geq 0$, denoted by g(q)or L{f(t)}, is defined as

$$L\{f(t)\} = \int_0^\infty e^{-qt} f(t)\, dt = F(q)$$

When the integral exists, i.e. convergent. If the integral is convergent for some value of q, then the Laplace transformation of f (t) exists otherwise not. Where q the parameter which may be real or complex number and L is the operator of Laplace transformation.

The Laplace transformation of f (t) i.e. $\int_0^\infty e^{-qt} f(t)\, dt$ exists for q>a, if f(t) is continuous and

$\lim_{n \to \infty}\{e^{-at} f(t)\}$ is finite.

- **Inverse Laplace Transformation**

Definition:
If F(q) be the Laplace Transformation of a function f(t),then f(t) is called the Inverse Laplace transformation of the function F(q) and is written as $f(t) = L^{-1}\{F(q)\}$, $Where L^{-1}$ is called the $inverse Laplace transformation.$

General Property of inverse Laplace transformation,

1. Linearty Property

$If\ k_1 and\ k_2 are\ constants\ and\ if$

$L^{-1}\{F(q)\} = f(t)\ and\ L\{g(t)\} = G(q)$

$then,$

$L^{-1}[k_1F(q) + k_2G(q)] = k_1L^{-1}[F(q)] + k_2\ L^{-1}[G(q)]$

ISSN 2394 - 7780

2. First Shifting property

If $L^{-1}\{F(q)\} = f(t)$,

Then, $L^{-1}\{F(q-a)\} = e^{at} f(t)$ and $L^{-1}\{F(q+a)\} = e^{-at} f(t)$

3. Change of scale property:

If $L^{-1}\{F(q)\} = f(t)$, then $L^{-1}\{F(aq)\} = \frac{1}{a} f(\frac{t}{a})$

4. Inverse Laplace Transform of derivatives:

I$L^{-1}\{F(q)\} = f(t)$,

$then\ L^{-1}\{(-\frac{d\{F(q)\}}{dp})\} = tf(t)$

$L^{-1}\{(-\frac{d^n\{F(q)\}}{dp^n})\} = (-1)^n t^n f(t)$,

Where n = 123……

5. Inverse Laplace Transform of integrals:

I$L^{-1}\{F(q)\} = f(t)$,

$then,\ L^{-1}[\int_p^\infty f(p)dp\ ] = \frac{f(t)}{t}$

6. Inverse Laplace transformation of division by q:

$if\ L^{-1}\{F(q)\} = f(t)$,

$then,\ L^{-1}\frac{f(q)}{q} = \int_0^t F(r)dr$

The convolution of two given functions plays an important character in a number of physical applications. It is an easy way to find the Laplace transformation by splitting the given transformation in products of transformation such that the inverse of individual product is known. Convolution theorem has proved to be very convenient.

If $P_1(t)$ *and* $P_2(t)$ *be two functions of class A and i* $p_1(s) = L\{P_{1(t)}\}, h_2(s) = L\{P_2(t)\}$.

Then the convolution of these two function $P_1(t)$ *and* $P_2(t)$, t> 0 *is defined by* the *integral*

$$\{P_1 * P_2\}(t) = \int_0^t P_1(t)P_2(t-y)dy \text{ or } \int_0^t P_1(t-y)P_2(y)dy$$

This exists if and only if $P_1(t)$ *and* $P_2(t)$ are piecewise continuous. The relation is called the convolution of $P_1(t)$ *and* $P_2(t)$.

Proof of convolution theorem:

By the definition of Laplace Transformation

$$L(P_1 * P_2)(t) = \int_0^\infty e^{-qt}\{(P_1 * P_2)t\}dt$$

ISSN 2394 - 7780

$= \int_0^\infty e^{-qt} [\int_0^t P_1(t)P_2(t-y)dy]dt$

Where the double integral is taken over the infinite region in the first quadrant deceitful linking the limit $y = 0$ $to\ y = t$.

Now order of integral are changing

$$\int_0^\infty e^{-qt}P_1(y)dy \int_y^\infty e^{-q(t-y)}P_2(t-y)dt$$

$t - y = u \Rightarrow dt = du$

$When\ the\ limit\ of\ t\ is\ y\ then\ the\ limit\ of\ u\ is\ 0\ and\ when\ the\ limit\ of\ t\ is\ \infty\ then\ the\ limit\ of\ u\ is\ \infty.$

$Now\ from\ above$

$$\int_0^\infty e^{-qt}P_1(y)dy \int_y^\infty e^{-qu}P_2(u)du$$

$p_1(q)\ p_1(q)$

Hence, $L(P_1 * P_2)(t) = p_1(q)p_1(q)$

Properties of convolution theorem: convolution theorem holds the following Properties:

(1) Commutative Property: This property states that there is no different result when the elements on either side of any operator are reversed. Commutative property hold for addition and multiplication but not for subtraction and division. The following equation gives an illustration

Addition :$P_1 + P_2 = P_2 + P_1$

Subtraction :$P_1 - P_2 \neq P_2 - P_1$

Multiplication :$P_1 * P_2 = P_2 * P_1$

Division :$P_1 \div P_2 = P_2 \div P_1$

Now we will prove the commutative property for multiplication

$\{P_1 * P_2\} = \{P_2 * P_1\}$

Proof (1):

By the definition of convolution theorem

$$P_1 * P_2 = \int_0^t P_1(t)P_2(t-y)\,dy$$

$Let\ t - y = u\ \Rightarrow dt = -du,$

$when\ the\ limit\ y\ is\ 0\ then\ u\ is\ y\ and\ when\ y\ is\ t\ then\ u\ is\ 0.$

$$P_1 * P_2 = \int_0^t P_1(t-u)P_2(u)du$$

$$P_1 * P_2 = \int_0^t P_1(t-u)P_2(u)du$$

ISSN 2394 - 7780

$$P_1 * P_2 = \int_0^t P_2(u)P_1(t-u)du$$

$$P_1 * P_2 = P_2 * P_1$$

The convolution of $P_1 and\ P_2$ follow the commutative property.

(2) Associative Property: Associative Property states that the order of grouping the numbers does not change the end results. This property holds for addition and multiplication but not for subtraction and division. The following equation gives an illustration

Addition : $P_1 + (P_1 + P_3) = (P_1 + P_2) + P_3$

Subtraction : $P_1 - (P_2 - P_3) \neq (P_1 - P_2) - P_3$

Multiplication : $P_1 * (P_2 * P_3) = (P_1 * P_2) * P_3$

Division : $P_1 \div (P_2 \div P_3) \neq (P_1 \div P_2) \div P_3$

Now we will see that how the convolution theorem follows the Associative property for multiplication

$$P_1 * (P_2 * P_3) = (P_1 * P_2) * P_3$$

$$let\ P_2 * P_3 = P_4$$

$$Now, P_4 = P_2 * P_3 = \int_0^t P_2(y)P_3(t-y)dy$$

From above the commutative property

$$P_1 * P_2 = P_2 * P_1\ Therefore\ P_2 * P_3 = P_3 * P_2$$

$$So, P_3 * P_2 = \int_0^t P_3(y)P_2(t-y)dy$$

$$Hence\ P_1 * P_4 = \int_0^t P_1(z)[\int_0^{t-z} P_3(y)P_2(t-z-y)dy]dz$$

Change of order of integration

$$P_1 * P_4 = \int_0^t P_3(z)[\int_0^{t-z} P_1(y)P_2(t-z-y)dz]dy = P_3 * (P_1 * P_2)$$

$$Hence, P_1 * (P_2 * P_3) = (P_1 * P_2) * P_3$$

(3) Distributive Property: The property in context with addition is used to eliminate the bracket in an expression. The distributive property states that each term inside the bracket should be multiplied with the term outside. The property is very useful while simplifying the expressions and solving the complicated equations.

Distributive property over addition is illustrated below

$$P_1 * (P_2 + P_3) = P_1 * P_2 + P_1 * P_3$$

Here the terms which are inside the bracket ($P_1 and\ P_2$) are multiplied with the external terms (while is P_1).

Now we will see that how convolution theorem follows the Distributive property for multiplication

ISSN 2394 - 7780

$$P_1 * (P_2 + P_3) = \int_0^t P_1(y)[P_2(t-y) + P_2(t-y)]dy$$
$$= \int_0^t P_1(y)P_2(t-y)dy + \int_0^t P_1(y)P_2(t-y)dy$$
$$P_1 * P_2 + P_1 * P_3 \; Hence, P_1 * (P_2 + P_3) = P_1 * P_2 + P_1 * P_3$$

CONCLUSION

In this paper we have discussed Laplace Transform, Inverse Laplace Transform and its property, Convolution Theorem and its property. Properties like First shifting, Change of scale and Inverse Laplace Transformation of integrals, etc. have been discussed. We have also seen that Convolution theorem holds for Commutative property, Associative property and Distributive property. The primary use of Laplace Transform is to convert a time domain function into frequency domain function.

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LITERATURE REVIEW ON: THE ELECTRIC BIKE

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ABSTRACT
An electric bicycle also known as an e-bike is a bicycle which use an electric motor for propulsion. there are various kinds of e-bikes are available through the world, from e-bikes that only having a small motor to assist the rider's pedal-power (i.e. pedelecs) to more powerful e-bikes which are as same as a moped-type functionality. All retain the ability to be pedaled by the rider and are therefore not electric motorcycles. E-bikes uses a lighter weight battery which can be recharged easily and help to travel up to 25 to 32 km/h (16 to 20 mph),which is to be depended on local laws, while the more high-powered varieties can often touch the speed limit of 45 km/h (28 mph). In some markets, such as in Germany as of 2013, they are gaining in popularity and taking some market share away from conventional bicycles, while in others, such as China as of 2010, they are replacing fossil fuel-powered mopeds and small motorcycles. Depending on local laws, many e-bikes such as pedelecs are legally classified as bicycles rather than mopeds or motorcycles. This frees them from the more stringent laws regarding the operation of more powerful two-wheelers which are often classified as electric motorcycles. E-bikes can also be defined separately and treated under distinct electric bikes laws. E-bikes are the electric motor -powered versions of motorized bicycles, which have been in use since the late 19th century.

Keywords- BLDC motor, controller, batteries.

I.) INTRODUCTION
An e-bicycle is one with an electric motor (attached to the bottom bracket or front wheel) that assists the rider with their pedalling. This means that while you're still getting a workout – and enjoying the scenery – you don't need to pedal nearly as hard, especially up hills. The electric vehicles industry is continuously evolving. One type of such electric vehicle is the electric bicycle (e-bike). E-bikes typically incorporate a battery, which can be charged at an ordinary domestic power socket, linked to an electric motor in the bicycle transmission system. The rider have the power to controls the output power from motor i.e speed using a handlebar mounted computer display panel and controller. The term 'e-bike' is generic and includes a combination of different electrically powered two-wheelers some of which function by simply turning a throttle. Electric bicycles, like other electric vehicles, use a BLDC motor. Main reason to identify the need of finding and modifying E-Bike is to overcome the issue of the pollution because of vehicles in metro towns & urban zones is swelling uninterruptedly. Considering the all class of society it is not reasonable for all to purchase (scooters, mopeds or motorcycles). So, combining both issues, environmental progress supporting and economical affordable alternative would be the best solution. In the modern days, the primary concern of government is to find out a way by which we can minimize consumption of fossil fuel and promote the use of electric vehicle ourdaily life.

However, there are certain barriers while adopting these latest technology in our daily life.

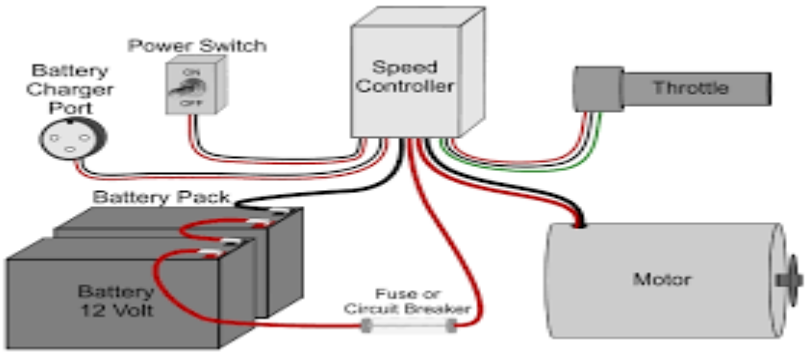

FIG.1 Major components of e-bicycle

INSTRUMENT SPECS
Some important parts required for propulsion of e-bikes are: a.)Motor, b) Battery, c) PIC Controller

a.)Motor
In e-bicycles brush less DC (BLDC) motors are to be used which consists of armature windings on the stator permanent and magnets on the rotor. The stator of this BLDC motor consists of stacked steel laminations with windings placed in the slots and these stator winding can be arranged in two patterns i.e. a star pattern or claw

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pattern. The major difference between the two patterns is that the star pattern gives high torque at low RPM and the delta pattern gives low torque at low RPM. There are many advantages of BLDC motor such as better speed versus torque characteristics, high dynamic response, better efficiency, long lasting operating life, noiseless operation, higher speed ranges.

b.)Battery

E-bikes use rechargeable batteries, electric motors and some form of controller. Battery systems in use include sealed lead-acid. battery or lithium ion battery vary according to the voltage, total charge capacity (amp hours), weight, the number of charging cycles before performance degrades, and ability to handle over-voltage charging conditions. The energy costs of operating e-bikes are least, but there can be battery replacement costs. The lifespan of a battery pack varies depending upon the type of usage. Not exhibiting discharge/recharge cycles will help extend the overall battery life. The range is a key consideration with e-bikes, and it is affected by factors such as motor efficiency, battery capacity, efficiency of the driving electronics, hills and weight of the bike and rider itself.

c.) Controller

Here we use controller to control the electric bicycle system. In this electric bicycle system, some components are installed such as brushless dc motor; PIC controller and battery are required to the controller for controlling different component of electric bicycle system. There are different functions of this controller such as under voltage protection, over current protection, control power supply, also to drive and control the Brushless dc motor. There are different signal was transmitted to pin of PIC controller to drive and control brushless dc motor, such as current detection signal, motor speed control signal, capacity detection system

II.) PROBLEM DEFINATION

In coming future days the main objective of the government is to find out a way by which we can minimize use of fossil fuel and promote the use of electric vehicle in our daily life.

III.) LITERATURE REVIEW

Duarthe.M.Souza, et.al-[1] In this paper, a traction system useful for an autonomous Electric Vehicle of individual use is described. The developed system is constituted in a first approach by two different power sources: one is constituted by batteries or by fuel cells, and the other by super capacitors. This paper describes a technical solution joining and accomplishing the usage of two energy storage systems in the same traction system. Kunjan shinde, et.al-[2] This paper details about the Electric Bike which runs on the battery thereby providing voltage to the motor. This paper compromises with design and fabrication of Electric Bike which makes use of Electric energy as the primary source and solar energy if possible by attaching solar panels. It also highlights on the design aspects of the bike. There is a provision for a charging the battery by ejecting it from the main system. The electrical power generated which is used to run the bike can give better fuel economy compared to conventional vehicle, better performance and also causes less pollution. Mitesh M. Trivedi, Manish K. Budhvani, et.al-[3]The main purpose of this research is to review the current situation and effectiveness of electric bicycle researched by various researchers. In order to approach this purpose, following objectives are specified: i. To maximize the speed and efficiency. ii. To optimize the cost. Objective of this paper to was to explore the acceleration and speed of orthodox and electrically powered bicycles under truthful statuses. Authors distinguished between electric bicycles which deliver provision up to 45 km/h (as known as S-pedelecs) and 25 km/h (speed of pedelecs).Chris Keifer, Frauke behndehrt. et.al-[4] Title “Smart e-bike monitoring system”: Real-time open source and open hardware GPS assistance and sensor d eta for electrically-assisted bicycles. The smart e-bike monitoring system (SEMS) is a platform for the real-time acquisition of usage d eta from electrically-assisted bikes (also called pedelecs or e-bikes). It is autonomous (runs off the bike battery), replicable (open source and open hardware), scalable (different fleet sizes) and modular (sensors can be added), so it can be used for further research and development. The system monitors location (global positioning system), rider control d eta (level of assistance) and other custom sensor input in real time. The SEMS data feeds an online interface for data analysis, for riders to view their own d eta and for sharing on social media. Chuanxue Song, Shixin Song, Yulong Shao et.al-[5] A” Novel Electric Bicycle Battery Monitoring System Based on Android Client”- The battery monitoring system (BMS) plays a crucial role in maintaining the safe operation of the lithium battery electric bicycle and prolonging the life of the battery pack. This paper designed a set of new battery monitoring systems based on the Android system and ARM single-chip microcomputer to enable direct management of the lithium battery pack and convenient monitoring of the state of the battery pack. The BMS realizes the goal of monitoring the voltage, current, and ambient temperature of lithium batteries, estimating the state of charge (SOC) and state of health (SOH), protecting the battery from abuse during charging or discharging, and ensuring the consistency of the batteries by integrating the passive

ISSN 2394 - 7780

equalization circuit. Filipe J. Rodrigues, Jose Alfonso et.al-[6] Title " Automatic Control of Cycling Effort Using Electric Bicycles and Mobile Devices". This paper describes the development and evaluation of a novel effort control system for cycling, which contributes to promote the users' mobility and physical health. This system provides automatic control of the motor assistance level of an electric bicycle in order to ensure that the cyclist's effort remains inside the desired target zone, regardless of changes in other variables which normally affect the effort, such as the slope of the road. The system presented in this paper controls the pedaling resistance perceived by the cyclist through the use of a sensor device placed inside of the bicycle crank set, which provides the required torque signal. The data processing, effort control algorithm and user interface are implemented in a smart phone application, whereas a microcontroller on the bicycle is responsible for the data acquisition, wireless data exchange with the smart phone, and real-time control of the motor assistance level. Experimental results validate the effectiveness of the implemented effort control system. Christian Gorenflo, Ivan Rios et.al-[7] This paper presents an analysis of data collected through the Waterloo We Bike project: a field trial in which over 30 sensor-equipped electric bicycles (e-bikes) were given to members of the University of Waterloo for personal use. Our dataset includes e-bike trip and battery charging sessions spanning nearly three years, from summer 2014 until spring 2017. We also conducted three surveys both before and during the trial. Our main findings were th et the primary purpose of the e-bikes in our trial was for commuting, with most trips lasting less than 20 minutes and most trips taking place in the summer months.Chetan Mahadik, et.al-[8] This paper presents the development of an associate degree, Electric Bicycle System" with an innovative approach. The aim of this paper is to show that the normal bi-cycle can be upgraded to electric one by some means– that including the development of a regenerative braking system and innovative BLDC motor control – but also uses real-time sensing and the powers of crowd sourcing to improve the cycling experience; get more people riding bikes; and to aid in the design and development of cities. Electric bikes have simultaneously gained popularity in many regions of the world and some have suggested that it could provide an even higher level of service compared to existing systems.Ying-Yi Hong et.al-[9]Title "Electric Power Systems Research" is a special issue of Energies for the publication of original papers about the generation, transmission, distribution, and utilization of electrical energy. This special issue presents important results of work on power systems. Papers can present applied research, the development of new procedures or components, an original application of existing knowledge ,or new design approaches. ANNETTE MUETZE et.al-[10] Electric bicycles have been gaining increasing attention worldwide, especially in China, Europe, Japan, Taiwan, and the United States. In the following, the most distinguishing aspects of electric bicycles in these countries are summarized, based on the authors' own studies.A. Rakesh Kumar, et.al-[11] The global pollution is on rise and every effort made, being to reduce the CO2 emissions and save the planet. One such effort is the introduction of Electric Vehicles (EV). The transport sector is one of the biggest emitter of CO2 and hence it is very important to convert the sector to a green sector. Indian government has come up with ambitious plans of introducing the EVs to Indian market and keep in pace with the development of EVs globally. The National Electric Mobility Mission Plan 2020 (NEMMP 2020) has come with a detailed report on the EVs. C. Abagnalea M. Cardoneb, et.al-[12] A new model of power-assisted bicycle has been designed, set up and tested. The main innovative solutions for the pedelec prototype are described in the present paper: the electric motor position; the new mechanical transmission; the low cost measurement system of the driving torque; the special test rig. Differently from a common approach, in which the electric motor is located on one of the three hubs of the bicycle, the idea of the pedelec prototype consists of an electrical motor in the central position that, by means of a bevel gear, transmits the torque on the central hub.K.V.Muralidhar Sharma, et.al- [13] This paper gives a general overview of Trends in electric vehicle. History of EV, World market for the EV. Different countries current EV trend, electric vehicle in Indian market, Key developments, government support for EV, challenges, benefits of increasing EV. Electrification of automotive power train is one of the main trends in current vehicle development. The growing threat of global warming, excessive petrol dependence, ever increases prices in fuel, and driving trends are just a selection of reasons which have accelerated the development of Electric Vehicles also The transport sector represents a critical percentage of greenhouse gas emission. Transport emissions are estimated to increase by 84% . Key technologies such as hydrogen fuel cell, electric cars and bio fuels are expected to contribute to emission reduction in the long run. Aim of this study is to compare and analyze the development of market, government support for the trend. And to accelerate the trend to save the nation, world from pollution. Esther Salmeron et.al- [14] The bicycle has gone from being an old-fashioned recreational product to a less polluting means of transport and a compact, ultra-light personal mobility tool. This is how electrical bicycles will be used as the pillar that could support individual public transport in large cities worldwide. The objective of this manuscript is to detect how worldwide research on the electric bicycle is being developed, and, especially, around which scientific domains is it clustered, to finally identify the main trends in the field. This study has been carried out based on the Scopus database, where all the public relations related to the topic of the electric

ISSN 2394 - 7780

bicycle have been analyzed up to the year 2017.Therefore, research on the global research trends of this topic was conducted. Its evolution over time shows that since 2008 the growth of publications is much higher than in the previous period. Ian Vince McLoughlin, I. Komang Narendra et.al-[15] Sustainable and practical personal mobility solutions for campus environments have traditionally revolved around the use of bicycles, or provision of pedestrian facilities. However many campus environments also experience traffic congestion, parking difficulties and pollution from fossil-fuelled vehicles. It appears that pedal power alone has not been sufficient to supplant the use of petrol and diesel vehicles to date, and therefore it is opportune to investigate both the reasons behind the continual use of environmentally unfriendly transport, and consider potential solutions. This paper presents the results from a year-long study into electric bicycle effectiveness for a large tropical campus, identifying barriers to bicycle use that can be overcome through the availability of public use electric bicycles. Yashwant Sharma ,Praveen Banker et.al-[16] Sustainable and personal mobility solutions for our bicycles or provision of pedestrian facilities. An electric bicycles offers a cleaner various travel short to-moderate distance instead of fossil fueled automotive. From conventional automobile experience problems like traffic congestion, parking difficulties and pollution from fossil fueled vehicles. It appears that only pedal power has not been sufficient to supplant the usage of petrol and diesel automotive to d ete, and therefore it is necessary to investigate both the reason behind continuous use of environment unfriendly transport and consider potential solutions. Elliot Fishman, Christopher Cherry et.al-[17] Electric bicycles (e-bikes) represent one of the fastest growing segments of the transport market. Over 31 million e-bikes were sold in 2012. Research has followed this growth and this paper provides a synthesis of the most pertinent themes emerging over the past on the burgeoning topic of e-bikes. The focus is transport rather than recreational e-bike research, as well as the most critical research gaps requiring attention. China leads the world in e-bike sales, followed by the Netherlands and Germany. E-bikes can maintain speed with less effort. E-bikes are found to increase bicycle usage. E-bikes have the potential to displace conventional motorised (internal combustion) modes, but there are open questions about their role in displacing traditional bicycles. Zhenying Shao ,Yan Xing et.al-[18] Through this project, we interviewed 27 e-bikers in Sacramento-Davis area and found that there are four benefits unique to the riding of e-bikes: Speed, Acceleration, Green, and Enabling. They are fast so that e-bikers can cut down their commute time and allow them to ride more frequently than if they ride traditional bikes, especially during hot and windy days. The ease of acceleration makes obeying stop signs or riding uphill less onerous and provides e-bikers with more confidence when only vehicle lanes are available to bikers. They also provide those who, for various reasons, don't or can't ride traditional bikes an option for green transportation. Cairns, S, F Behrendt, D Raffo et.al- [19]This paper reports on a review of the European literature about the impacts of having an electrically-assisted bike available to use, together with results from a trial in the UK city of Brighton, where 80 employees were loaned an electrically-assisted bike for a 6–8 week period. In the Brighton trial, three-quarters of those who were loaned an e-bike used them et least once a week. Across the sample as a whole, average usage was in the order of 15– 20 miles per week, and was accompanied by an overall reduction in car mileage of 20%. et the end of the trial, 38% participants expected to cycle more in the future.

IV.) METHODOLOGY

This section represent the detailed plan and the implementation carried out to acess the complete bicycle working. The diagram shows the proposal work of the project-

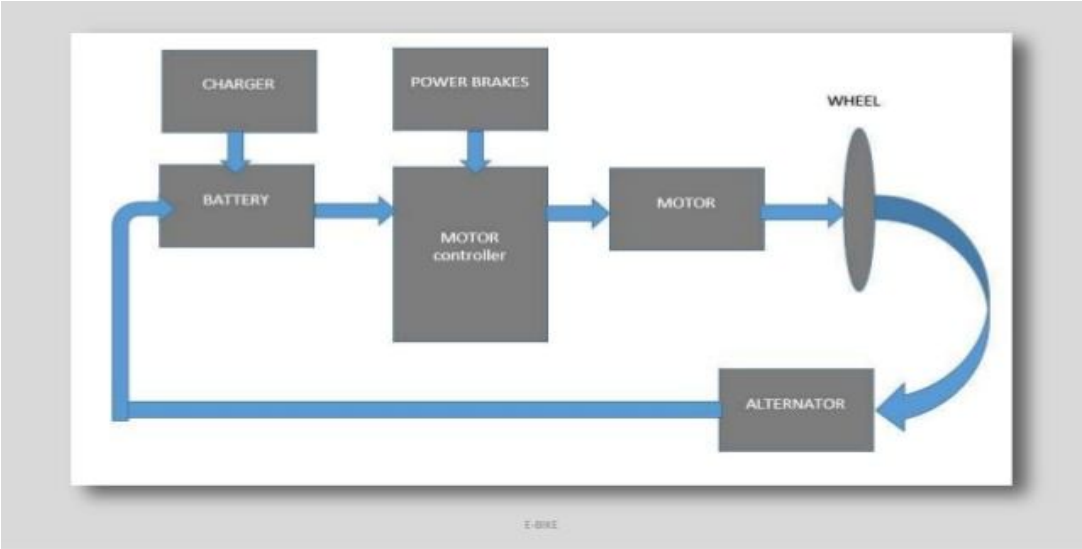

FIG. 2

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In choosing an motor for electric bicycle, which is Brushless DC motor (BLDC), there is few method will be used, the method is torque calculation, Losses, efficiency. While selection of motor for Electric Bicycle, torque calculation is necessary to be considering, as because each motor have its own torque limit for the motor to hold specific load. If the motor is to be used without calculating its torque or how much torque can the motor provide, amount of torque to the electric bicycle, if the motor have low or insufficient amount of torque so it can lead to Electric Bicycle not even move or maybe can move but only without any load or rider. So calculation of high Torque motor is important when choosing suitable motor for Electric Bicycle.

V.) CONCLUSION

With the help of these research paper we are able to design an e-bike which may be the solution to our problems which we are experience now a days like traffic congestion, parking difficulties and pollution from fossil fueled vehicles. We established an idea to develop an e-bike which discard the usual mentality i.e only pedal power can be used to move an bi-cycle. This paper shows the results from a year-long study into electric bicycle effectively. This paper identifies potential barriers of electric bicycle.We can overcomes it by using innovative "E- BICYCLE" with electric motor for assistance.

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LITERATURE REVIEW ON TOTAL PRODUCTIVE MAINTENANCE

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ABSTRACT
Total productive maintenance (TPM) is an approach to improve and enhance productivity. TPM improves the overall effectiveness of equipment with the active involvement of operators. The objectives of this paper are to review the literature on TPM and based on this summarize the findings in the form definitions of TPM as given by various researchers, benefits achieved as a result of TPM implementation, targets of TPM, and implementation aspects of TPM. In the end, some concluding observations and directions for future research.

Keywords: Total productive maintenance, attributes, benefits, implementation

INTRODUCTION
With the development of faster means of communication, better quality computers and rapid transportation systems, manufacturing is no longer restricted at local level, but has become global in character. A manufacturing company has to become competitive for its survival. Confronting these challenges, companies world-wide are forced to find ways to reduce costs, improve quality, and meet the ever-changing needs of their customers. One successful solution has been the adoption innovative techniques like TPM.
The basic idea of TPM was originally developed and formalized into a sophisticated management system by Japan. It made progressive strides in countries like USA, Europe and other south Asian countries after its successful implementation in Japan. Total productive maintenance (T P M) is a method of maximizing equipment performance, availability, and quality with the total involvement of the production operators, technicians, engineers, supervisors and managers. For staying in competitive market an organization must have continuous improvement throughout the organization with innovative plan .TPM is the right approach for continuous improvement with innovative tools like kaizan, quality circles, employee involvement, waste minimization, planned maintenance etc. This paper attempts to summarize the main findings from literature survey on TPM and then suggest some research directions.

SUMMARIZED FINDINGS FROM LITERATURE SURVEY
TPM definitions

The definitions of TPM as given by various researchers are tabulated in table 1.

Table-1: Definitions of TPM by different authors.

Name of Author	Definitions
Nakajima (1984)	TPM is a manufacturing program designed primarily to maximize equipment effectiveness throughout its entire life through the participation and motivation of the entire work force.
Christian (1994)	Total productivity maintenance (TPM) is a maintenance productivity improvement practice analogous to the use of total quality management.
Eugene (1996)	Total productive maintenance (TPM) provides a comprehensive, life cycle approach, to equipment management that minimizes equipment failures, production defects, and accidents.
Jorge (1997)	Total productive maintenance (TPM) is the process of maximizing equipment performance, availability, and quality with the total involvement of the production operators, technicians, engineers, supervisors and managers.
Venketesh (2007)	TPM is considered as a medical science of total productive maintenance.

Benefits of TPM

Various benefits as stated by various researchers are shown in table 2.

Implementation Aspects of TPM

The following steps are used in implementation of TPM in an organization are as follows;

(i) Preparatory stage

(a) Announcement by management to all about TPM introduction in the organization

ISSN 2394 - 7780

Proper understanding, commitment and active involvement of the top management in needed for this step. Senior management should have awareness programmes, after which announcement is made to all. Publish it in the house magazine and put it in the notice board. Send a letter to all concerned individuals if required.

(b) Initial education and propaganda for TPM

Training is to be done based on the need. Some need intensive training and some just awareness. Take people who matter to places where TPM already successfully implemented.

(c) Setting up TPM and departmental committees

TPM includes improvement, autonomous maintenance, quality maintenance etc., as part of it. When committees are set up it should take care of all those needs.

(d) Establishing the TPM working system and target

Now each area is benchmarked and fix up a target for achievement.

(e) Master plan for institutionalizing

Next step is implementation leading to institutionalizing wherein TPM becomes an organizational culture. Achieving PM award is the proof of reaching a satisfactory level

(ii) Introduction stage

This is a ceremony and we should invite all. Suppliers as they should know that we want quality supply from them. Related companies and affiliated companies who can be our customers, sisters concerns etc. Some may learn from us and some can help us and customers will get the communication from us that we care for quality output.

(iii) Implementation

In this 8 activities are carried which are called eight pillars in the development of TPM activity. Of these four activities are for establishing the system for production efficiency, one for initial control system of new products and equipment, one for improving the efficiency of administration and are for control of safety, sanitation as working environment.

Pillar 1 – 5S

TPM starts with 5S i.e. Seiri (sort), Seiton (Systemize), Seiso (Sweep), Seiketsu(Standardize), Shitsuke (self disciplione) Problems cannot be clearly seen when the work place is unorganized. Cleaning and organizing the workplace helps the team to uncover problems. Making problems visible is the first step of improvement

Pillar 2- Jishu Hozen (Autonomation)

This pillar is geared towards developing operators to be able to take care of small maintenance tasks, thus freeing up the skilled maintenance people to spend time on more value added activity and technical repairs. The operators are responsible for upkeep of their equipment to prevent it from deteriorating.

Pillar 3- Kaizen

"Kai" means change, and "Zen" means good (for the better). Basically kaizen is for small improvements, but carried out on a continual basis and involve all people in the organization. Kaizen is opposite to big spectacular innovations. Kaizen requires no or little investment. The principle behind is that "a very large number of small improvements are more effective in an organizational environment than a few improvements of large value. This pillar is aimed at reducing losses in the workplace that affect our efficiencies. By using a detailed and thorough procedure we eliminate losses in a systematic method using various Kaizen tools. These activities are not limited to production areas and can be implemented in administrative areas as well.

ISSN 2394 - 7780

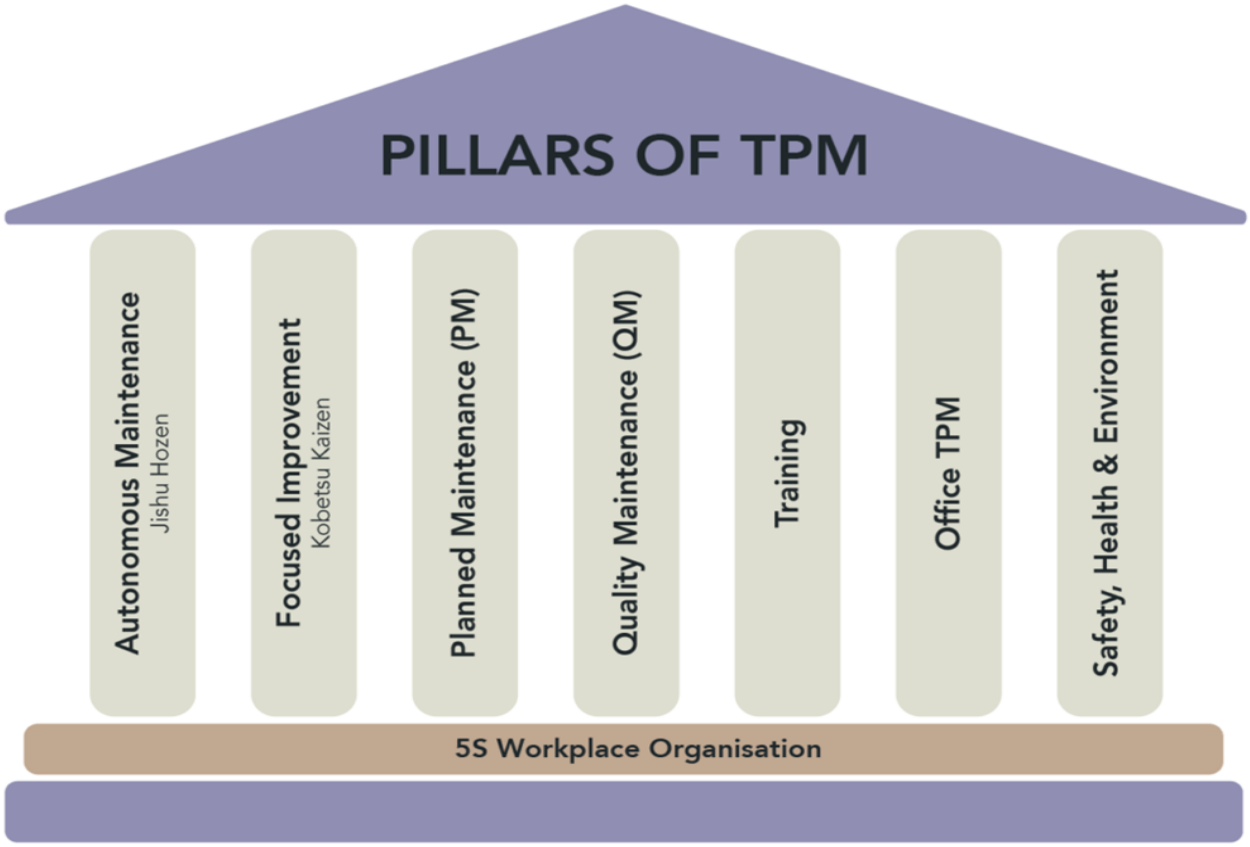

Fig: Pillars of TPM

Pillar 4- Planned Maintenance

It is aimed to have trouble free machines and equipments producing defect free products for total customer satisfaction

With planned maintenance we evolve our efforts from a reactive to a proactive method and use trained maintenance staff to help train the operators to better maintain their equipment.

Pillar 5-Quality Maintenance

It is aimed towards customer delight through highest quality through defect free manufacturing. Focus is on eliminating non-conformances in a systematic manner, much like Focused Improvement. We gain understanding of what parts of the equipment affect product quality and begin to eliminate current quality concerns, and then move to potential quality concerns. Transition is from reactive to proactive (Quality Control to Quality Assurance).

QM activities are to set equipment conditions that preclude quality defects, based on the basic concept of maintaining perfect equipment to maintain perfect quality of products. The condition is checked and measure in time series to very that measure values are within standard values to prevent defects. The transition of measured values is watched to predict possibilities of defects occurring and to take counter measures before hand.

Pillar 6- Training

It is aimed to have multi-skilled revitalized employees whose morale is high and who has eager to come to work and perform all required functions effectively and independently. Education is given to operators to upgrade their skill. It is not sufficient know only "know-how" by they should also learn "know-why". By experience they gain, "know-how" to overcome a problem what to be done. This they do without knowing the root cause of the problem and why they are doing so. Hence it become necessary to train them on knowing "Know-why". The employees should be trained to achieve the four phases of skill. The goal is to create a factory full of experts.

Pillar 7- Office TPM

Office TPM should be started after activating four other pillars of TPM (JH, KK, QM, and PM). Office TPM must be followed to improve productivity, efficiency in the administrative functions and identify and eliminate losses. This includes analyzing processes and procedures towards increased office automation.

ISSN 2394 - 7780

Pillar 8

In this the focus is on,

- Zero accident,
- Zero health damage
- Zero fires.

In this area focus is on to create a safe workplace and a surrounding area that is not damaged by our process or procedures. This pillar will play an active role in each of the other pillars on a regular basis. A committee is constituted for this pillar, which comprises representative of officers as well as workers. The committee is headed by senior vice President (Technical). Utmost importance to Safety is given in the plant. Manager (Safety) is looking after function related to safety. To create awareness among employees various competitions like safety slogans, Quiz, Drama, Posters, etc. related to safety can be organized at regular intervals.

(iv) Institutional stage

By all their activities one would has reached maturity stage. Now is the time for applying for PM award. Also think of challenging level to which you can take this movement.

CONCLUDING OBSERVATIONS

TPM concept has changed the way manufacturing organizations do things. Some of the TPM concepts are completely opposite to traditional ways of thinking. It is human nature to resist change, and the implementation of TPM system is typical of this. People resist these new ideas and call them risky. But it is important to realize that TPM will not work if it has to be forced against everybody's will. Voluntary participation and training is necessary.

Being a philosophy, TPM does not restrict itself to high technology manufacturing environments which make extensive use modern technologies like flexible manufacturing systems (FMS) or computer integrated manufacturing (CIM). TPM philosophy is valid in any manufacturing environments, regardless of the level of automation in the technology hardware. Similarly, the philosophy is not limited to any specific type of industry nor does the size of the organization matter. Organizations of different sizes, in a variety of industries, have successfully implemented TPM philosophy. Indeed, some applications have shown that TPM is eminently suited to non- manufacturing situations as well as, such as in service and administrative work situations. There are very less studies conducted on TPM in Indian industries. There is need to carry more studies of Indian industries with focus on potential benefits and implementation aspects of TPM. Some survey based studies of Indian industries may be conducted to collect the data on extent of use of TPM in industries, problems in implementation etc. Data can be analyzed and appropriate models can developed in Indian context. Some case studies may be conducted to get some useful insights into the relevance of TPM in Indian industries.

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NEED OF HUMAN VALUES FOR THE EMPLOYEES IN THE WORKPLACE

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ABSTRACT
The present paper focuses on the employment ability skills among the students of Engineering and Management.To stay with this present scenario one has to cope with the business abilities. One has to depend on one or the other earnings as it has become hectic to get his or her bread and butter.It is not an easy task to earn bread and butter.For these only being physically strong is not enough, one should have any kind of profession in hand so that the life can be easily led forward.To fit in today's world one has to follow some skills in their workplaces which are very much required.Some abilities are must to have in business field. The abilities and skills that are to be followed in the work premises are called Employability skills.In this paper, we will discuss on the communicative english,one of the employment skills for the students of Engineering and Management.Communicative english plays a vital role in every field of life.These skills are to be taught to the students in their academics, so that it helps to get them good jobs and to retain the job that is already in their hands.The confidence level how they carry themselves along the status should become habitual. To make it habitual one has to practice in their academic learning process.

INTRODUCTION
In this contemporary global arena communication skills plays a key role.There is a lot of demand in work places.There are four important skills which can lead to achieve the key of success.They are-Listening, Speaking , Reading, and Writing. Most of the companies prefer candidates who are good in these skills.The managers of the companies always look for employees who have a manner of appealing in english. The employees should have good written communication.they have to maintain documentation without any grammatical mistakes.They also prefer a person one who has an ability to cope with his colleagues.There are so many other skills that are to be acquired by the employers to generate a positive environment.Let us see one by one the essentials is communication skills in the workplace,which is nothing but employability skills.

English communication skills
Every living being tends to communicate using verbal or non verbal cues.Most of the people make mistakes while communicating eachother.Now a days people communicate to explore innovative things implementing new ideas.Still the importance of this skill is not clear in the minds of the illiterate parents what their wards need in future.English language is a borrower, it never stands on its own.Everyday new words are getting added to the dictionary. The person specialized in this field also should upgrade to reach to the particular level.Even in workplace we should follow some concepts.Some highlighted concepts are as follows:

Open mindedness
One should always think positive.The culture of positive communication leads to resolve some misunderstandings among the employees.It also helps to resolve some conflicts by positive approach.One should be ready to accept the feedback and move forward.The open mindedness leads to bring forth the productivity. It also builds a creative mind to think divergently.It strengthens the bondage among each other.Team work always leads to implement innovative ideas to progress.The project work assigned will be completed in the stipulated time given.

Clarity
While communicating with each other, one should be more conscious about the words they use.Poor communication may lead to misunderstanding.Do not swallow or express the words in low voice.The words used should be simple, so that the person communicating with you should easily grab the message that you want to transmit.Be clear in expressing your thoughts and ideas.Analyse your words whether the word used is proper according to that particular situation.Always pay attention to the words that you choose.Sometimes you have repeat the messages to make your communication clear.

Self esteem
Give respect to the co-workers and obviously you gain respect.One should know how to handle his/her qualities.The behaviour of a person carries their own personality.Mutual respect leads to good working environment. Today's generation people are highly aggressive and adopt negative way of approach.Being calm makes the work to go on in a very smooth manner.One should lead as a leader,and make others to follow him/her.For that the qualities that we possess should be admired.One should be a role model.Respect comes

ISSN 2394 - 7780

when you have some special good qualities.Showing courtesy,being one among co-workers, irrespective of the Age,caste and creed.Always have a successful approach.

Honesty

One should be honest to his colleagues.He has to maintain his level and status in his working environment.One has to be honest to exhibit leadership qualities to gain trust among employees.As a leader, trusting employees is required value ,if not the culture of the company may be distructive.If a person is not honest then the whole environment is spoiled and the confidence level of all the employees is lost.Once the trust and confidence is lost, no hopes of being good and will be ignored and will be ill-treated by employees. Even the subordinates does not care, though you are right.Honesty always makes you trustworthy, loyal, faithful, sincere and fair.

Respectable

The policy of "Give respect and take respect"should be followed in the workplace. Always respect your subordinates so that they get inspired and motivated to work.The productivity of the company depends and increases by team work.The members of the team should stand for each other, shoulder to shoulder by respecting each other.The work environment depends on the efficiency of the employees.The calibre of an employee should be appreciated.The ability, achievements, innovative ideas, quality of work must be valued and rewarded.The work of an employee should be recognized and treated in a good manner.There should not be place for conflicts or misunderstanding among the employees.that can be resolved by loving and respecting one another at workplace. Respectfulness reduces stress of work and makes place for success.There should not be any sort of discrimination among men and women.Each one share their immense knowledge and definitely the trust increases and the company leads towards success.

CONCLUSION

Human values thus play very important role in everyone's life.It lays a good foundation in the field of profession.One should be familiarized with the features of successful professional communication along with human values.Each and every person must be aware of the human values how to get settled in proper position. Every situation has various purposes for which communication is used, it depends totally on the way how one behaves and reacts according to the situation.One should get acquainted with values in an organisation. Professionalism includes human values.

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NEURON NETWORKS AND MACHINE LEARNING

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ABSTRACT
An artificial neural network learning algorithm, or neural network, is a computational learning system that uses a network of functions to understand and translate a data input of one form into a desired output, usually in another form. The concept of the artificial neural network was inspired by human biology and the way neurons of the human brain function together to understand inputs from human senses. Neural networks are just one of many tools and approaches used in machine learning algorithms. The neural network itself may be used as a piece in many different machine learning algorithms to process complex data inputs into a space that computers can understand. Neural networks are being applied to many real-life problems today, including speech and image recognition, spam email filtering, finance, and medical diagnosis, to name a few. Neural networks can be applied to a broad range of problems and can assess many different types of input, including images, videos, files, databases, and more. They also do not require explicit programming to interpret the content of those inputs.

INTRODUCTION

Machine Learning

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. The process of learning begins with observations of data, such as direct experience, or instruction in order to look for patterns in data and make better decisions in the future based on the examples that are provided. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

Machine learning algorithms are often categorized as supervised or unsupervised.

Supervised machine learning algorithms can apply what has been learned in the past to new data using labeled examples to predict future events. Starting from the analysis of a known training dataset, the learning algorithm produces an inferred function to make predictions about the output values. The system is able to provide targets for any new input after sufficient training. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly.

In contrast, unsupervised machine learning algorithms are used when the information used to train is neither classified nor labeled. Unsupervised learning studies how systems can infer a function to describe a hidden structure from unlabeled data. The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabeled data.

Semi-supervised machine learning algorithms fall somewhere in between supervised and unsupervised learning, since they use both labeled and unlabeled data for training – typically a small amount of labeled data and a large amount of unlabeled data. The systems that use this method are able to considerably improve learning accuracy. Usually, semi-supervised learning is chosen when the acquired labeled data requires skilled and relevant resources in order to train it / learn from it. Otherwise, acquiring unlabeled data generally doesn't require additional resources.

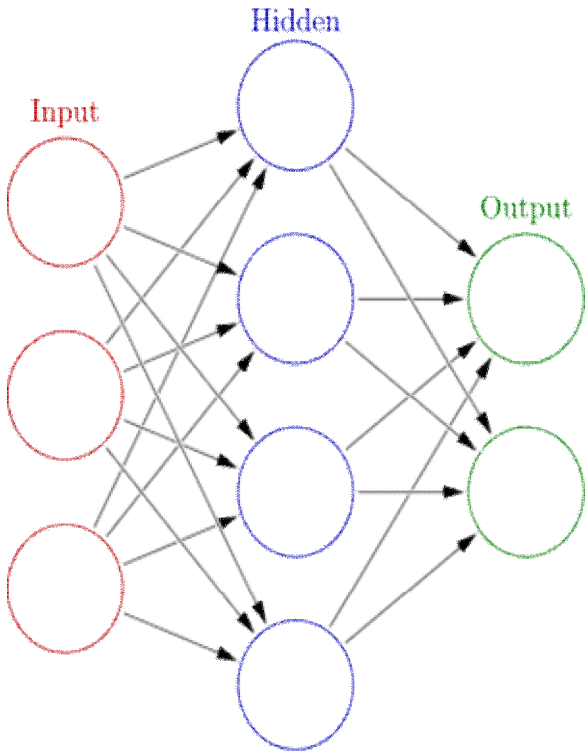
Reinforcement machine learning algorithms is a learning method that interacts with its environment by producing actions and discovers errors or rewards. Trial and error search and delayed reward are the most relevant characteristics of reinforcement learning. This method allows machines and software agents to automatically determine the ideal behavior within a specific context in order to maximize its performance. Simple reward feedback is required for the agent to learn which action is best; this is known as the reinforcement signal.

Neural Networks

Neural networks are an example of machine learning, where the output of the program can change as it learns. A neural network can be trained and improves with each example, but the larger the neural network, the more examples it needs to perform well - often needing millions or billions of examples in the case of deep learning. A network starts with an input, somewhat like a sensory organ. Information then flows through layers of neurons, where each neuron is connected to many other neurons. If a particular neuron receives enough stimuli,

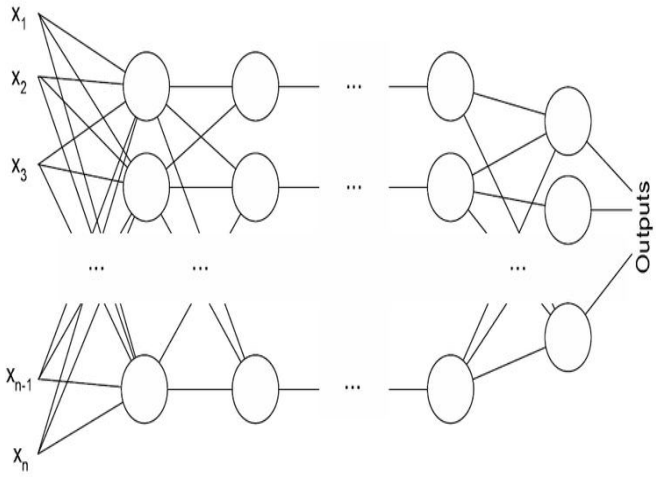
ISSN 2394 - 7780

then it sends a message to any other neuron is it connected to through its axon. Similarly, an artificial neural network has an input layer of data, one or more hidden layers of classifiers, and an output layer. Each node in each hidden layer is connected to a node in the next layer. When a node receives information, it sends along some amount of it to the nodes it is connected to. The amount is determined by a mathematical function called an activation function, such as sigmoid or tanh. Neural networks work in very similar manner. It takes several input, processes it through multiple neurons from multiple hidden layers and returns the result using an output layer. This result estimation process is technically known as Forward Propagation. Next, compare the result with actual output. The task is to make the output to neural network as close to actual (desired) output. Each of these neurons is contributing some error to final output. To reduce the error, to minimize the value/ weight of neurons those are contributing more to the error and this happens while traveling back to the neurons of the neural network and finding where the error lies. This process is known as Backward Propagation



Types of Neural Networks currently being used in Machines Learning

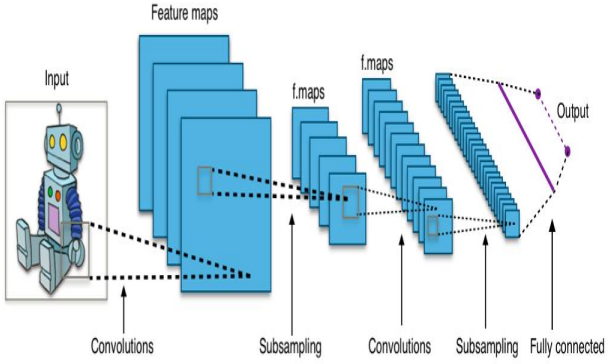
1. Multilayer perceptron (MLP)



A perceptron A multilayer perceptron (MLP) has three or more layers. It utilizes a nonlinear activation function (mainly hyperbolic tangent or logistic function) that lets it classify data that is not linearly separable. Every node in a layer connects to each node in the following layer making the network fully connected. For example, multilayer perceptron natural language processing (NLP) applications are speech recognition and machine translation.

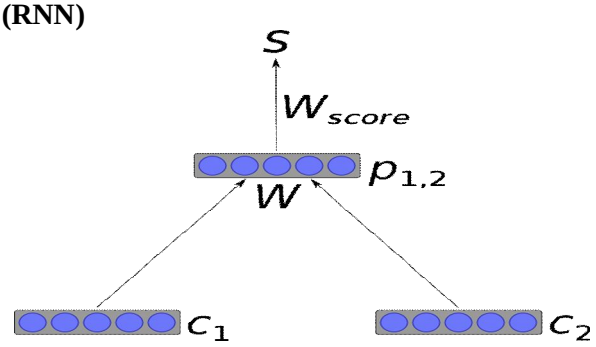
ISSN 2394 - 7780

2. Convolutional neural network (CNN)



Typical CNN architecture A convolutional neural network (CNN) contains one or more convolutional layers, pooling or fully connected, and uses a variation of multilayer perceptron's discussed above. Convolutional layers use a convolution operation to the input passing the result to the next layer. This operation allows the network to be deeper with much fewer parameters.

3. Recursive neural network (RNN)



A simple recursive neural network architecture A recursive neural network (RNN) is a type of deep neural network formed by applying the same set of weights recursively over a structure to make a structured prediction over variable-size input structures, or a scalar prediction on it, by traversing a given structure in topological order [6]. In the simplest architecture, a nonlinearity such as tanh, and a weight matrix that is shared across the whole network are used to combine nodes into parents.

4. Recurrent neural network (RNN)

A recurrent neural network (RNN), unlike a feed forward neural network, is a variant of a recursive artificial neural network in which connections between neurons make a directed cycle. It means that output depends not only on the present inputs but also on the previous step's neuron state. This memory lets users solve NLP problems like connected handwriting recognition or speech recognition. In a paper, Natural Language Generation, Paraphrasing and Summarization of User Reviews with Recurrent Neural Networks, authors demonstrate a recurrent neural network (RNN) model that can generate novel sentences and document summaries

PROBLEM DEFINITION

Neural networks are supposed to be able to mimic any continuous function. But many a times we are stuck with networks not performing up to the mark, or it takes a whole lot of time to get decent results. One should approach the problem statistically rather than going with gut feelings regarding the changes which should be brought about in the architecture of the network. One of the first steps should be proper preprocessing of data. Other than mean normalisation and scaling, Principal Component Analysis may be useful in speeding up training. If the dimension of the data is reduced to such an extent that a proper amount of variance is still retained, one can save on space without compromising much on the quality of the data. Also, neural networks can be trained faster when they are provided with less data.

Machine Learning and Artificial Intelligence have gained prominence in the recent years with Google, Microsoft Azure and Amazon coming up with their Cloud Machine Learning platforms. But surprisingly knowing it. The most primary use cases are Image tagging by Facebook and 'Spam' detection by email providers. Now Facebook automatically tags uploaded images using face (image) recognition technique and Gmail recognizes the pattern or selected words to filter spam messages. Let's take a look at some of the important business problems solved by machine learning.

ISSN 2394 - 7780

PROPOSED METHODOLOGY

Instead of writing a program by hand for each specific task, we collect lots of examples that specify the correct output for a given input. A machine learning algorithm then takes these examples and produces a program that does the job. The program produced by the learning algorithm may look very different from a typical hand-written program. It may contain millions of numbers. If we do it right, the program works for new cases as well as the ones we trained it on. If the data changes the program can change too by training on the new data. You should note that massive amounts of computation are now cheaper than paying someone to write a task-specific program.

Supervised learning uses classification and regression techniques to develop predictive models.

Classification techniques predict discrete responses—for example, whether an email is genuine or spam, or whether a tumor is cancerous or benign. Classification models classify input data into categories. Typical applications include medical imaging, speech recognition, and credit scoring. Use classification if your data can be tagged, categorized, or separated into specific groups or classes. For example, applications for hand-writing recognition use classification to recognize letters and numbers. In image processing and computer vision, unsupervised pattern recognition techniques are used for object detection and image segmentation. Common algorithms for performing classification include support vector machine (SVM), boosted and bagged decision trees, k-nearest neighbor, Naïve Bayes, discriminant analysis, logistic regression, and neural networks.

Regression techniques predict continuous responses—for example, changes in temperature or fluctuations in power demand. Typical applications include electricity load forecasting and algorithmic trading. Use regression techniques if you are working with a data range or if the nature of your response is a real number, such as temperature or the time until failure for a piece of equipment.

Unsupervised learning finds hidden patterns or intrinsic structures in data. It is used to draw inferences from datasets consisting of input data without labeled responses.

Clustering is the most common unsupervised learning technique. It is used for exploratory data analysis to find hidden patterns or groupings in data. Applications for cluster analysis include gene sequence analysis, market research, and object recognition.

CONCLUSION

It concluded that many data scientists solely focus only on neural network techniques. Neural Networks has much more advanced techniques. There are many algorithms other than back propagation. Neural networks particularly work well on some particular class of problems like image recognition. The neural network algorithms are very calculation machines. Large datasets take a significant amount of runtime on R. We need to try different types of options and packages. Currently, there is a lot of exciting research going on, around neural networks. Machine learning is quickly growing field in computer science. It has applications in nearly every other field of study and is already being implemented commercially because machine learning can solve problems too difficult or time consuming for humans to solve. To describe machine learning in general terms, a variety models are used to learn patterns in data and make accurate predictions based on the patterns it observes.

Neural networks have three layers: an input, hidden, and output layer. Each layer is made up of nodes. The layers are connected by vectors. Neural networks were one of the first machine learning models to be created, and many variations of neural networks have been explored.

Next, I consider deep neural networks. Where artificial neural networks have a single hidden layer, deep neural networks have multiple hidden layers. Because of the complexity multiple hidden layers adds to the model, deep neural networks are better at some tasks than simple neural networks. However, their added complexity makes them more difficult to train.

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PROTECTION, MONITORING, CONTROLLING AND LOAD SHARING OF 3-PHASE INDUCTION MOTOR USING IOT

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ABSTRACT
This paper presents a review of protection, monitoring, controlling and load sharing of 3-phase induction motor comparing different methods of implementation of this technique. Power is of main concern which needs to be monitored and controlled. The design contains Arduino connected to different sensors such as current and voltage measurement sensor, Wi-Fi module or monitoring and controlling a 3-phase induction motor problems. The design gives protection of induction motor from faults i.e. overcurrent, overvoltage, under-voltage and single phasing, monitoring for voltage and current, manual and automatic ways to control induction motor and load sharing also. Protection of these motors is very important because of inclusion in most of the industrial applications use induction from due to their high robustness, reliability, low cost, maintenance and high efficiency.

Keywords: Internet of things (IoT), voltage and current sensor, Wi-Fi module, contactor, relay, Arduino

INTRODUCTION
Within the advancement of electrical technology, the dc motors are broadly used in different industrial applications. After the innovation of ac motors particularly ac induction motors, the view of industries has changed due to the wide advantage of induction motors. An induction motor has two main parts- stationary part and rotating part. An induction machine is known as a rotating transformer since it works on the principle of transformer. The main advantages of the 3-phase induction motors are self-starting, rugged construction, good pf and low cost but without compromising the efficiency the speed cannot be controlled.

Different electrical faults may occur due to unbalanced 3-phase supply, over-voltage, under-voltage, over-current, single –phasing, mechanical faults: The mechanical faults occur due to broken rotor bar, air gap eccentricity, damage in bearing, rotor and stator winding failures.

To ensure the reliable operation of induction motors recent advancement techniques are used which include monitoring and controlling, automatically. Internet of Things (IoT) is the recent development to control and monitor the motor from remote location. This method provides easy control and reliability. The reliability of 3phase induction motor is obtained by continuous monitoring of electrical parameters. If any abnormal value of electrical factors is detected, the 3- phase induction motor is controlled automatically i.e. suddenly turns-off to reduce the various type of faults.

The aim of this paper is to make the control easy, fault detection, monitoring and load sharing. The technique is designed to allow easy use of a mobile phones to control industrial appliances like induction motor from any location. By using a mobile phone, the development of the control system will be carried out using android application. This will be communicating with Wi-Fi module, which in turn will control the device attached to microcontroller modules. When the action has been carried out, a response will be sent to the user by using application or site.

OBJECTIVES OF STUDY
1. To monitor and control an induction motor based on IoT for safer and economic data communication in industrial fields.
2. To start or stop the induction machine to avoid system failures by automatic and manual control methods.
3. To monitor and control the motors used in electric vehicles.

MOTOR PARAMETERS AND REFERENCES
The Parameters that are taken for protection of three phase Induction Motor are over-current protection, protection from unbalanced load, single-phasing fault protection, under-voltage protection and overvoltage protection. Motor reference values are taken as

Voltage=415V, Frequency=50Hz, Rated Current(I_s)=1.5A, RPM=1449, Power Factor=0.83, Rated Power=0.75KW.

ISSN 2394 - 7780

- **Overcurrent Protection**

The overcurrent protection helps to restrict or stop overcurrent flow to the motor above rated current of motor. Effects of overcurrent are heating motor winding and it may also damage motor winding. Causes of overcurrent are increase in load at motor side or decrease in power factor of motor which also decreases efficiency of motor.

- **Overvoltage protection**

Overvoltage protection helps to prevents over voltage at the motor terminal which prevents sudden increase speed of motor. Increase in voltage also leads to increase in current which leads to flow overcurrent and it may damage the winding of motor. Reason for overvoltage may be sudden removal of large load or due to fault in transformers.

- **Under-voltage protection**

Under-voltage protection leads to drop voltage at terminal side at limit set by the user. If the voltages go below limit the motor will lose its torque output capacity. In under-voltage condition occurs motor also run in unbalanced condition. The causes of under-voltage can be certain increasing in load or fault in line.

- **Single phasing fault**

A three phase motor runs on 3 phase supply due to which it runs in balance condition. If due to some fault a single phase gets disconnected due to which motor runs in unbalance condition and motor winding starts heating up which can damage the motor winding. The effect of single phasing in 3-phase induction motor is the motor runs with a decreased speed and it work with an uneven torque and delivered a hamming noise.

METHODOLOGY

The power supply is turn ON, the Arduino and all the interface components get the required supply. First the main supply pass to phase failure circuit which used to sense the phase failure, which sense the phase failure and open the power supply. Voltage sensor which sense the fault like over voltage and under voltage. Current sensor gives the current value of individual 3 phase induction motor. We have monitoring of 3 phase induction motor parameter like voltage, current, P.F., power. First we have connected individually every motor in connect switch as a contactor. And there in individual line fault occur so we have directly interconnected three induction motor for load sharing Arduino reads the data from various sensors and analyses according to the given instructions, Arduino reads the commands from internet and provides control signals to the relay via contactor, which will control the induction motor. The sensor information's are displayed visually in server. The Induction motor control is based on the sensed parameters and in manual mode the control is based on alert messages received from the web. The control is done by relay and contactor circuit. The motor is turn ON/OFF when abnormal value is detected.

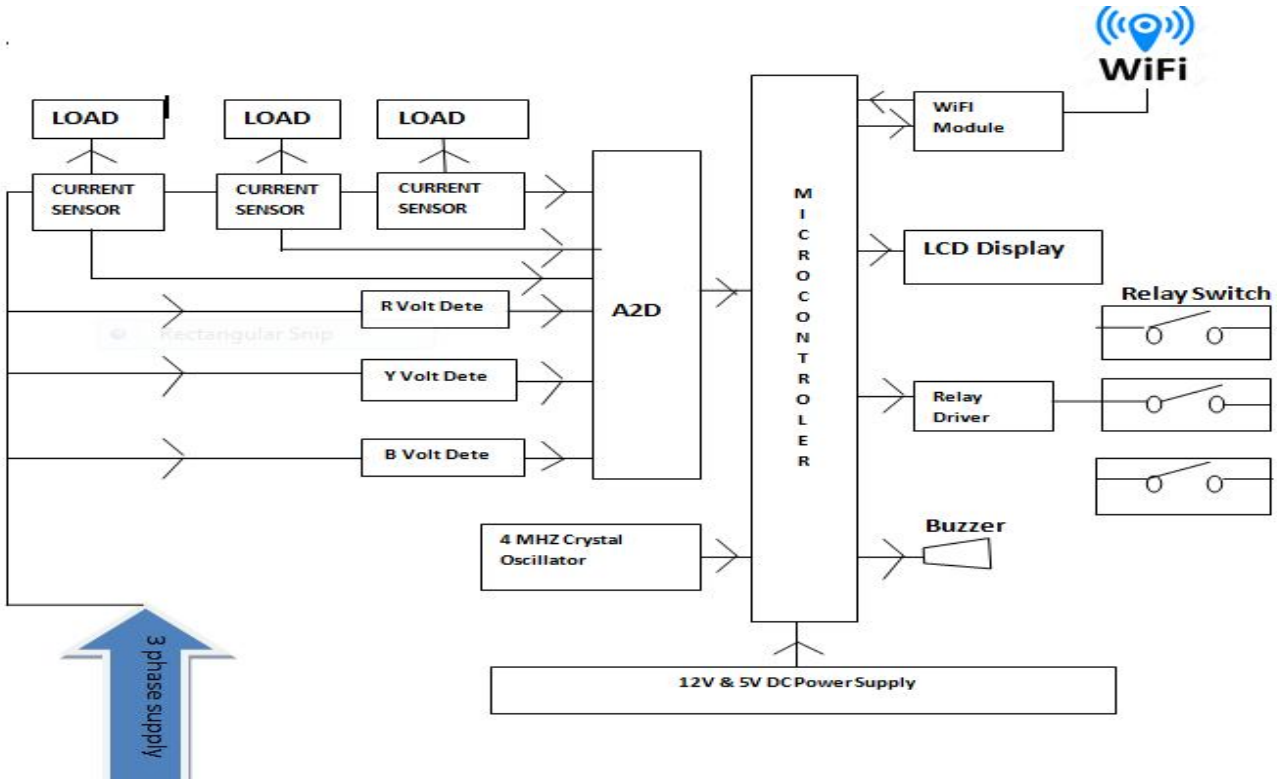

Fig-1: Block diagram

ISSN 2394 - 7780

COMPONENTS DESCRIPTION

- **Arduino**

Arduino is an open-source platform for prototyping projects used to build electronics. It comprises of both a programmable physical circuit board and a computer program or ide coordinates advancement environment running on your computer where you'll compose and transfer the code to the physical board. Arduino was gone for understudies without a foundation in gadgets and programming, however now, it is seen as an incredible device for individuals of all ability levels. The Arduino equipment and programming was intended for specialists, planners, specialists, programmers, amateurs, and anybody keen on making intelligent articles or conditions. The Arduino board began adjusting to the new needs and difficulties, separating it from straightforward 8-piece sheets to items for IoT applications, wearable, 3D printing, and installed conditions. Arduino can cooperate with catches, LEDs, engines, speakers, GPS units, cameras, the web, and even your advanced mobile phone or your TV.

- **Power supply**

Control supply is the circuit from which we get a craved de voltage to run the other circuits. The voltage we get from the most line is 230V AC but the other components of our circuit require 5V DC. Thus step-down transformer is utilized to induce 12V AC which is afterward changed over to 12V DC employing a rectifier. The yield of rectifier still contains a few swells indeed in spite of the fact that it could be a DC flag due to which it is called as Throbbing DC. To expel swell in output voltage the channel circuit is required. Here a capacitor is utilized. The 12V DC is appraised down to SV employing a positive voltage controller chip 705. In this way, a settled DC voltage of 5V is obtained.

- **LCD display**

In this work 16*2 LCD display is used for continuously display a data which is acquired from sensors. The display contains 16 pins. The supply of 5V is given across the Anode and cathode pins of LCD display. Pins 3, 4 and 5 are connecting to pot, for change the brightness of the LCD display. The LCD display contains 8data pins and 2 control pins. By programming the process, the data is continuously displayed in the LCD screen. To interface LCD display to Arduino, 4 data pins, 2 control pins and 2 supply wires (i.e. 5V and Ground) must be connect to Arduino. The processed data is displayed in the LCD display one by one. And also the additional requirement of smooth motor operation is displayed.

- **ESP8266 (WI-FI Module):**

ESP8266 could be a WI-FI Module, utilized for remote communication. It is interfaces with smaller scale controller (Arduino) by interfacing 5 pins. It needs two 3.3V supplies and one ground to function. Moreover, this module requires two delicate serial ports. The information obtained by the Arduino are prepared and send to server by utilizing ESP8266. ESP8266 require extra library record to function. By programming the microcontroller, the information is overhauled each moment. It has advantage over Bluetooth module the information is send to inaccessible areas. ESP8266 work depends upon the AT commands.

- **Relay**:

The 5V relay is utilized within the proposed work. 5V transfer is straightforwardly associated to the Arduino. Pulse from the Arduino is given to relay, the yield of relay is the input of contactor. In case any unusual condition is identified by the Arduino from obtained information the command is given to Arduino to relay to open the contactor. In this work single pole single throw switch transfer is utilized. The transfer has the 5pins NO (normally open), NC (normally closed),5V, GND and common pin. There’s no require of outside itself, Arduino is given sufficient supply to relay. The relay is work on the guideline of electromagnetism, when supply is given to relay it act as an electromagnet and alter the state of the switch. The supply given to Arduino is autonomous of the supply which to be turn ON and OFF.

- **Contactor**

The 3phase supply is given to motor through the 3phase contactor. The contactors are basically control the motors in industry. It has three input and yield way; the supply is given to motor through the contactors. Contactor may be an electrically controlled switch, utilized for exchanging the motor circuit. Other than transfer contactor is specifically associated to the high load current. The state of the transfer may have utilized both regularly open and closed applications. The contactor has the capacity to decrease the arc. The rating of contactor depends upon the load current per contact. The exchanging of 3phase contactor depends upon activating pulse from the 5V relay. In the event that programming the Arduino depends on the smooth operation motor, the exchanging flag is given to contactor. The information procured by the controlled is prepared and

ISSN 2394 - 7780

compare with the typical esteem and any abnormal condition is detected at that point an opening and closing command is given to Arduino

CONCLUSION

In this project the concept of Internet of Things for early fault detection, monitoring, controlling and load sharing of 3 phase induction motor. The system has the capacity to combine different detected parameters in real time and improve accurate detection of different faults happen in motor. The monitoring of the motor system presents the estimation of different parameters specifically speed, p.f, supply voltage and motor current. Hence, compared to other conventional methods this system has more number of areas which enables alarm, alarm messages and fast controlling. The concept of IoT is displayed here for farther monitoring and controlling the motor. The information is additionally shown serially. The work is upgraded to additional areas for valuable control. The application of the system is required nowadays for each electrical system (i.e. EV vehicle and automation of industries where greater safety is required).The system has the particular advantage of less maintenance, simple and speedy controlling and getting to of information remotely. Test comes about confirm the possibility of the execution of the system.

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OPTIMIZATION STUDY ON ELECTRICAL DISCHARGE MACHINING PARAMETERS FOR TUNGSTEN CARBIDE USING TAGUCHI TECHNIQUE

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ABSTRACTS
Recently powder mixed electric discharge machining (PMEDM) can be used for machining several electrically conductive hard materials with improvements in the process performance. This study is carried out to examine the result of silicon carbide powder mixed dielectric and tool rotary motion on material removal rate (MRR) of PMEDM process. For this study Tungsten Carbide with Cobalt bonded (WC-Co) is used as work-piece and copper tungsten (Cu-W) as tool electrode. Taguchi method with L27 orthogonal array has been utilised to investigate five factors with three levels. Finally, data is analyzed using S/N ratio analysis after experimentation and ANOVA to find optimum parametric setting for MRR and results are validated using confirmation experiments.

Keywords: PMEDM, Tungsten Carbide, Rotary Tool EDM, DOE, Taguchi, MRR, Copper Tungsten

1. INTRODUCTION

Electrical discharge machining (EDM) is also known as spark process. The difficulty associated with EDM is a low machining effectiveness and poor surface finish. To rise above these problems various techniques used in past includes: Electrode rotating, Electrode orbiting–planetary movement to any tool or workpiece, application of ultrasonic vibration and addition of powder into dielectric, etc. Suspension of powder in dielectric fluid is the latest advancement in EDM developments. This process is commonly known as PMEDM in which several improvements in the process performances were reported by varying powder type, powder size, powder concentration, etc. So, investigation of PMEDM for machining of cobalt bonded tungsten carbide seems to be promising.

1.1 Literature Survey

Jeswani [1] analyze the effect of fine graphite powder which added into kerosene for machining of tool steels. The machining process strength was improved by 60% in MRR. Wong et al. [2] analyzed that there is great impact of work piece properties and powder type on MRR. Chw et al [3] analyzed that suspension of Al and Sic powder to dielectric fluid as a kerosene improves the spark gap; resulting in higher material removal rate and debris removal. Kuldip Ojha et al. [4] carried out experimentation on PMEDM for EN-8 by analyzing the effect of Average current, duty cycle, angle of tool and concentration of a chromium powder which added into dielectric fluid. Gurule N. B. et al. [5] carried out an experiment with rotary tool on Die steel and result shows that MRR increases with tool rotation. F. Q. Huaet [6] carried out experiments on properties of SiCp/Al among moderate fraction of Silicon carbide particle reinforced Al-matrix composites in EDM and PMEDM. In conclusion they have mentioned that the PMEDM is having a potential for applications in MMC machining field. Shriram Y. Kaldhone et al. [7] has carried out experimental study on PMEDM of tungsten carbide which shows addition of SiC improves MRR.

2. Experimental work

This experimentation was carried on SMART ZNC (S50) electrical discharge machine. Some modifications such as powder mixed dielectric circulation system and tool rotary system were done on existing EDM to fulfil present requirements of study. WC-Co workpiece of size 100mmx50mmx10mm and Cu-W electrode of ϕ 12.0 mm were used for this experimental study. Taguchi method with L_{27} orthogonal array is selected for five process variables as Peak Current, Pulse on time, duty factor, tool rotation and powder concentration at three levels.

Table: 1 Values of fixed input parameters

Sr. No.	Machining Parameters	Values
1	Open circuit voltage	80V
2	Tool Polarity	Straight
3	Machining Time	30 Minutes
4	Type of Dielectric	EDM Oil
5	Powder	Silicon Carbide

ISSN 2394 - 7780

Table 2: Factors and their levels for experiments

Sr. No.	Process parameter and Units	Code	Level 1	Level 2	Level 3
1	Peak Current (A)	Ip	4	8	12
2	Pulse on Time (µs)	Ton	100	150	200
3	Duty Factor (%)	DF	7	9	11
4	Tool Rotation (RPM)	Trpm	0	75	150
5	Powder Concentration (g/lit)	Pc	4	8	12

2.1 Measurement Technique for MRR

MRR is considered using equation (1) by taking difference of weights of workpiece before and after machining using digital balance.

$$MRR = \frac{wi-wf}{\rho x t} \text{ x } 1000 \text{ mm}^3/\text{min} \quad \text{----------} \quad (1)$$

w_i = Initial weight of work piece material (grams),

w_f = Final weight of work piece material

t = Experimental time of trials in minutes,

ρ = Work piece density in grams/mm^3

2.2 Experimentation and data analysis

Each experiment was performed twice and average values of MRR are taken for analysis. As Taguchi analysis uses S/N ratios; therefore, all experimental values were transformed into S/N ratios and listed in Table 3. The S/N ratio equation used for calculations is as follow:

$$(S/N)\ HB = -10 \text{ x } \log (\Sigma\ (1/Y_i^2)/n) \quad \text{----------} \quad (2)$$

Where n- no. of number of repeated experiment, in this case n= 2, Y_i- is the value of response measured to the i^{th} time.

Table: 3 Experimental data using L_{27} Orthogonal Array

Expt. No.	PMEDM Process parameters						MRR S/N ratio (dB)
	Ip (A)	Ton (µs)	DF (%)	Trpm	Pc (g/lit)	MRR (mm^3/min)	
1	4	100	7	0	4	0.5589	-5.0533
2	4	100	7	0	8	0.7824	-2.1314
3	4	100	7	0	12	1.0040	0.0347
4	4	150	9	75	4	0.6706	-3.4707
5	4	150	9	75	8	1.0060	0.0520
6	4	150	9	75	12	0.8942	-0.9713
7	4	200	11	150	4	0.6706	-3.4707
8	4	200	11	150	8	1.2295	1.7946
9	4	200	11	150	12	1.0040	0.0347
10	8	100	9	150	4	1.6767	4.4891
11	8	100	9	150	8	2.2356	6.9879
12	8	100	9	150	12	3.0181	9.5947
13	8	150	11	0	4	1.2295	1.7946
14	8	150	11	0	8	1.6767	4.4891
15	8	150	11	0	12	1.7885	5.0498
16	8	200	7	75	4	0.6706	-3.4707
17	8	200	7	75	8	2.2356	6.9879
18	8	200	7	75	12	2.3474	7.4117
19	12	100	11	75	4	2.0120	6.0726
20	12	100	11	75	8	3.0181	9.5947
21	12	100	11	75	12	3.8005	11.5968

ISSN 2394 - 7780

22	12	150	7	150	4	3.0181	9.5947
23	12	150	7	150	8	3.8005	11.5968
24	12	150	7	150	12	3.7558	11.4940
25	12	200	9	0	4	1.6767	4.4891
26	12	200	9	0	8	1.6767	4.4891
27	12	200	9	0	12	3.0181	9.5947
Average value $\overline{T}$						1.8695	3.4759

3. Results and discussion

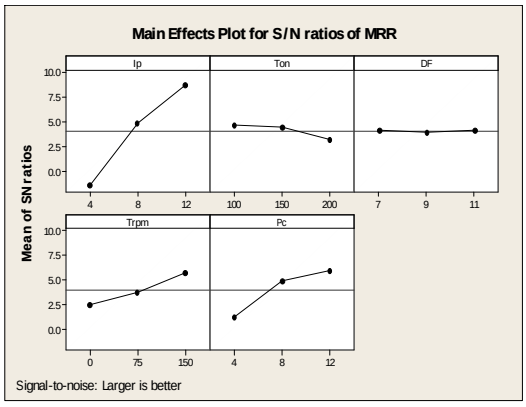
Response table of S/N ratios for MRR is prepared as shown below. As MRR is 'Higher the Better' type quality characteristic, therefore, greater S/N ratios are considered to be optimal.

Table 4: Means of S/N ratios for MRR

Level	Ip	Ton	DF	Trpm	Pc
1	-1.465	**4.565**	4.063	2.528	1.219
2	4.815	4.415	3.917	3.744	4.873
3	**8.725**	3.096	**4.095**	**5.802**	**5.982**
Delta	10.189	1.469	0.178	3.274	4.763
Rank	1	4	5	3	2

From the above table it is observed that for higher MRR optimal combination of factors is as:

I_p3-T_{on}1-DF3-T_{rpm}3-P_c3. The values in the table 4 are graphically shown in graph 1.



Graph 1: Effect of various factors on MRR

To determine which parameters significantly affect the performance characteristics, ANOVA is performed and results are as:

Table 5: Analysis of Variance for MRR

Source	DF	SS	MS	F	P	Remark
Ip	2	475.625	237.813	72.02	0.000	S
Ton	2	11.796	5.898	1.79	0.199	NS
DF	2	0.170	0.085	0.03	0.975	NS
Trpm	2	48.865	24.433	7.40	0.005	S
Pc	2	111.797	55.898	16.93	0.000	S
Error	16	52.833	3.302			
Total	26	701.086				
S = 1.81716 R-Sq = 92.46% R-Sq(adj) = 87.75%						

From this analysis, it is clear that the pulse current, pulse on-time, tool rotation and powder concentration are statistically significant and pulse current has most significant influence on MRR among the selected variables. R^2 = 92.46% indicate that the model is able to predict the response with high accuracy. The standard deviation error in the modeling is 1.81716. Quality characteristics for the conducted experiments are examined by conformation experiments as this is a final step in Taguchi method. The estimated mean of MRR can be computed as follows (Roy 1990):

η_{opt} = Average performance + Contribution of significant factors at optimum levels

ISSN 2394 - 7780

$\eta_{opt} = \overline{T} + (I_p3 - \overline{T}) + (T_{rpm}3 - \overline{T}) + (P_c3 - \overline{T})$

$\eta_{opt} = I_p3 + T_{rpm}3 + P_c3 - 2\,\overline{T}$

$\eta_{opt} = 13.5461$

So, the corresponding value of optimal MRR is given as:

$(MRR_{opt})^2 = (1/\ 10^{(-\eta opt\ /10)})$

$(MRR_{opt})^2 = 22.6262$

$\therefore MRR_{opt} = 4.756\ mm^3/min$

To verify this enhancement in MRR at the optimal level of cutting parameters, three confirmation experiments are performed and the data from the confirmation runs and their comparisons with the predicted value for MRR is listed in the table 6.

Table 6: Optimal MRR Confirmation Tests and their comparison with results

MRR Optimal condition	Predicted MRR	Experimental Avg. MRR
I_p3-$T_{on}1$-DF3-$T_{rpm}3$-P_c3	4.756	4.550

The experimental values agree reasonably well with predictions and show enhancement in the machining performance.

4. CONCLUSIONS

Following conclusions are drawn for the present work from the selected range of parameters:

a) PMEDM with tool rotation show potential of machining WC-Co with Cu-W tool.

b) Current, tool rpm and powder concentration significantly affect the MRR.

c) The suspension of SiC powder into dielectric enhances MRR of WC-Co.

d) Max. MRR 4.55 mm^3/min is obtained at Ip3-$T_{on}1$-DF3-$T_{rpm}3$-P_c3 i.e. at 12A current, 100µs T-on time, 11% duty factor, 150 tool rpm and 12g/lit powder concentration.

Finally, it has been concluded that SiC powder and rotary tool have impact on MRR

5. ACKNOWLEDGEMENT

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POWER QUALITY ENHANCEMENT USING UNIFIED POWER FLOW CONTROLLER IN SINGLE PHASE AC LOAD

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ABSTRACT
As the technology is advancing, our electricity consumption is also rising as we are completely dependent on electricity. From our day to day work to all industrial applications are dependent on electricity consumption. To fulfil this electricity demand, power engineers are working hard to match this electricity supply and electricity demand.To reduce this power consumption, power engineers have to ensure that the consumers must get an uninterrupted power supply. Therefore for generating power, power industry has switched onto the new power generation sources like solar photovoltaic , wind energy, hydel power etc. Out of these power generation sources, solar photovoltaic is the efficient one.

In this paper, we are using solar photovoltaic and it is connected to ac load through various components. Here we will study the effects of high solar penetration on the ac load. Various power quality issues like load variation, voltage fluctuation, system unbalance, abrupt change in active and reactive power,voltage unbalance, frequency fluctuation etc. arises due to high solar penetration. So to mitigate all these issues, a FACT device called UPFC has been used. UPFC is Unified Power Flow Controller, has 2 back to back converters, one is series connected and other is shunt connected through series and shunt transformers respectively. Series converter of UPFC injects ac bus voltage into the system, so it enhances the voltage profile of the system and also removes the power oscillations from the system.

Keywords– FACTS technology, high penetration, Power System, power oscillation mitigation, Solar Photovoltaic, UPFC, voltage profile.

I. INTRODUCTION

Electricity's ever-increasing demand has set new trends in electricity generation, including the abundant use of renewable energy resources. New techniques for providing access to distributed generation have been proposed by the substantial increase in load demand. The power engineers have also pioneered the use of green energy tools, taking into account environmental concerns. Such tools include solar photovoltaic, wind, tidal, hydro, etc. [1]. Solar photovoltaic construction is growing rapidly throughout the globe. The global annual growth rate of the solar photovoltaic system is about more than 40%. In the conventional power plant, solar power systems are integrated [2,7]. High solar penetration will result in the power system's operational and reliability challenges. Operational difficulties also arise from system balancing issues, the cause being the intermittent nature of solar power The major impacts of penetration include voltage problems, network issues, safety issues, overvoltage problem, reverse power flow, voltage increase and fluctuation, reactive power fluctuations, and increased power loss. Reconductring was the possible mitigation measures that were adapted conventionally, on load tap changers and fixed condensers. In view of their disadvantages, however, the engineers eventually switched to new mitigation measures, including VAR control of PV inverters, distributed energy storage systems, dynamic voltage restorer, distributed static compensator and FACTS devices. UPFC (Unified Power Flow Controller) was used in this paper to reduce the power oscillations and voltage unbalance resulting from the integration of solar PV with the traditional grid.

Although traditional UPFC topology uses two series and one parallel transformer, only one transformer is used in the proposed UPFC topology. As a result, expense and installation spaces of the new UPFC can be reduced in comparison with traditional UPFC. Simulations are conducted in the future to confirm the proposed topology. The traditional UPFC is a combination of static synchronous compensators (STATCOMs) and static series synchronous compensators (SSSCs) that share a common dc connection capacitor and consist of series and parallel transformers and inverters as shown in Fig.1. The series inverter controls power flow by controlling steady state voltages and increases transient state dynamic stability. The parallel inverter also compensates for reactive power and provides power to the inverter series [6,13]. The series of connected devices such as the transformer and the inverter, however, carry out high transmission line currents so that they would be bulky and expensive sizes [14]. Also, because it requires high-power rating, the conventional UPFC does not use high-speed switch. The conventional UPFC is therefore difficult to cope with the erratic power from renewable sources and control the sensitive flow of power. As a result, traditional UPFC use was reduced and the market for topology of low-cost and smaller size increased.

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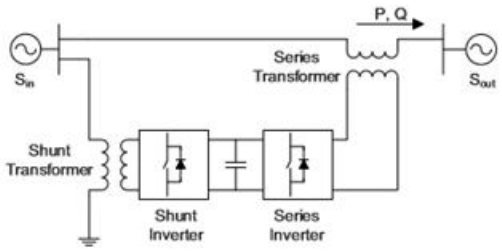

Fig.1. Conventional UPFC

This paper presents a single-phase UPFC topology using an autotransformer structure, a half-bridge single-phase converter, and an IGBT-based inverter. Just one transformer will be used in the proposed topology. And by using a high turn-ratio transformer, the voltage ratings of the switches in the converter become much smaller. The power conversion system can cope with the erratic power due to high-speed switching by using IGBT-based power converter. And it is possible to reduce production costs so construction spaces by using only one transformer.

II. PROPOSED SYSTEM DESCRIPTION

A. PV system

Solar PV penetration into the end power has increased tremendously over the past few years. The inverter is powered by the boost converter's output. For that the voltage levels from the PV unit, the boost converter is used. The MPPT algorithm is used to monitor the solar PV module's maximum power. Essentially, the P&O-based MPPT algorithm is used to improve the performance of the PV generation system. The boost converter uses a DC / DC converter boost chopper circuit. The boost converter raises the low solar voltage to the required PV power level. To reduce the high frequency harmonics, a capacitor is connected between the PV module and the boost converter. The MPPT system determines the boost converter's duty cycle. This normally ranges from 0 to 1.

B. Problems Arising From Solar PV Penetration

Solar PV integration also leads to voltage unbalance, voltage spike, reverse power flow, voltage and frequency fluctuation, feeder failure, etc. The voltage and current dips during the circuit's described switching moment in the model shown above. During that particular time, the value of the voltage dips down and the issue of the voltage spike is also seen at the end of system. At the end, the active and reactive power changes abruptly, causing a system imbalance. A FACTS device called UPFC is placed in the line to alleviate all these problems.

III. PROPOSED UPFC TOPOLOGY

Configuration of the proposed UPFC system and features Fig. 2 Displays the proposed UPFC system diagram. This consists of the transformer N:1 attached as the framework of the autotransformer and the unit of the power converter. And the power converter unit is made up of a half-bridge single-phase converter and an inverter. The power semiconductor shift voltage ratings of the power converter unit may be reduced in proportion to the transformer's turn ratio.

In the Fig. 1 Although the topology of the power converter module is depicted as a two-level topology for simplicity, given voltage levels, appropriate multi-level topologies may be adopted. Due to the reduced voltage levels, the number of switches in the proposed system can be reduced compared to conventional UPFC. And it is possible to implement the power converter based on IGBT medium-voltage modules. Since the converter's DC link voltage is divided by two condensers, suitable voltage balancing techniques are required. The converter regulates the voltage of the DC link and also controls the balancing of the DC voltage. Additional voltages for power flow control are synthesized by the inverter. In later chapters, comprehensive control schemes will be discussed. The power passes through the by-pass circuit when the UPFC is faulty or unused.

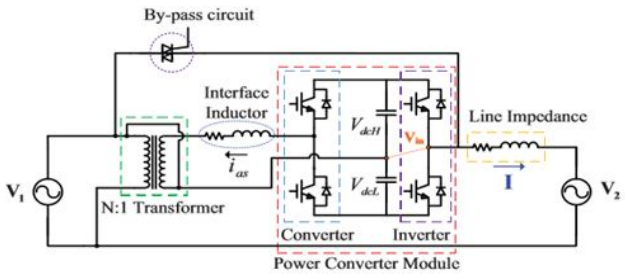

Fig.2. Configuration Of The Proposed UPFC Topology

ISSN 2394 - 7780

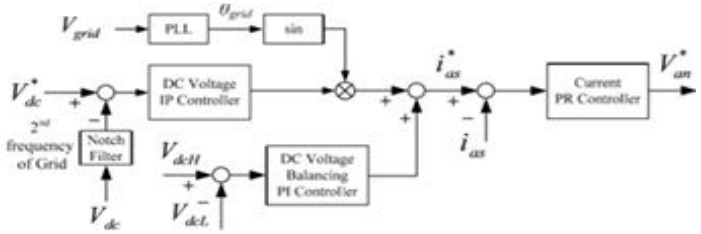

Fig.3. Control Block Diagram Of Converter

A. Converter control

Fig. 3 Display the converter control block diagram. As described above, the converter plays a role in the control of the DC contact voltage and the control of the voltage balance. As the traditional voltage control scheme consisting of an integral-proportional(IP) controller, voltage control can be implemented. And the end voltage phase angle can be measured using the phase-locked-loop (PLL) single stage [6]. For the DC voltage balancing control, the proportional-integral (PI) controller is used. By adding appropriate DC current to the phase current reference, the DC link voltages can be balanced. The new controller is designed for monitoring the current AC reference with a proportional-resonant (PR) sensor.

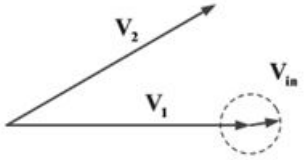

Fig.4. Phasor Diagram Of Proposed UPFC Operation

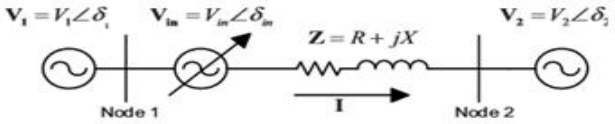

Fig.5. Equivalent Model Of Grid Proposed UPFC

B. Inverter control

a) Apparent power flow control method

Fig. 4 Displays the UPFC process phasor diagram. By synthesizing correct Vin at the endpoint of V1, it is possible to control the apparent power between two nodes. The magnitude of an apparent controllable power depends on the magnitude of the impedance of the circle and line.

b) Determination of Injection voltage, Vin

Fig. 5 Shows the UPFC's proposed parallel model. Assume that when the injection voltage is equal to zero, the apparent power, S0, flows. Vin can be inserted between two nodes to increase apparent power, sufficient injection voltage.

The line current I can be expressed as (1). And it can be defined as (2) the apparent power at node 1. Sref means the apparent energy that UPFC regulates. The terms of active power and reactive power can be described respectively as (3) and (4) using (1) and (2). Assume the installation of the UPFC system next to node 1. The V1, 1 phase is measured to allow 1 to be set to zero. Use (3) and (4) to describe the injection voltage as (5) and (6) by reference to active and reactive power. And it is possible to calculate the magnitude and phase of the injection voltage using these equations, Vin according to the desired apparent power.

$$V_{in}\cos\delta_{in} = \frac{R\cdot P_{ref} + Q_{ref}\cdot\omega L}{V_1}.$$

$$V_{in}\sin\delta_{in} = \frac{\omega L\cdot P_{ref} - R\cdot Q_{ref}}{V_1}.$$

$$\mathbf{I} = \frac{V_1\cos\delta_1 + V_{in}\cos\delta_{in} - V_2\cos\delta_2 + jV_1\sin\delta_1 + jV_{in}\sin\delta_{in} - jV_2\sin\delta_2}{R + j\omega L}. \quad (1)$$

$$\mathbf{S}_0 + \mathbf{S}_{ref} = (\mathbf{V}_{in} + \mathbf{V}_1)\cdot\mathbf{I}^*. \quad (2)$$

ISSN 2394 - 7780

$$P_0 + P_{ref} = V_1 \frac{R(V_1 \cos\delta_1 + V_{in} \cos\delta_{in} - V_2 \cos\delta_2) + \omega L(V_1 \sin\delta_1 + V_{in} \sin\delta_{in} - V_2 \sin\delta_2)}{|Z|^2} \quad (3)$$

$$Q_0 + Q_{ref} = V_1 \frac{-R(V_1 \sin\delta_1 + V_{in} \sin\delta_{in} - V_2 \sin\delta_2) + \omega L(V_1 \cos\delta_1 + V_{in} \cos\delta_{in} - V_2 \cos\delta_2)}{|Z|^2}. \quad (4)$$

CONCLUSIONS

This paper presents a UPFC topology using a structure of the autotransformer and the power converter. Using a high turn-ratio transformer, only one transformer is used in the proposed system and the voltage ratings of the switches in the converter are much lower than the end voltage. The power conversion system can handle the volatile power due to high-speed switching by using IGBT-based switches in the conversion circuit. And it is possible to reduce production costs so construction spaces by using only one transformer.

The paper concludes that when load is connected to a PV system, major power quality issues such as voltage problems, network problems, protection issues, overvoltage problems, reverse power flow and fluctuation, reactive power fluctuations and increased power losses can arise in the system. Therefore, UPFC is connected in the transmission line to improve the power quality issues. The UPFC increases the system's active power with the help of the dc connect condenser and also provides reactive power to the system under any defective conditions as needed. With the help of UPFC, total harmonic distortions are reduced.

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HEAT GENERATION IN SUPER-FINISHING LATHE ATTACHMENT AND IN SLIDING AND ROTATING COMPONENTS

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ABSTRACT
Friction and friction factors are very important factors specially in machine components. In superfinishing lathe attachment heat generated due to piston oscillates in to sleeve and sleeve gets deformed due to heat and friction in the contacting surfaces of piston and sleeve

But it can be reduced with the help of some lower thermal conductivity material coat. in rotary components like axle-shaft arrangements, friction and slip are important factors. In the case of a heat exchanger, the friction factor is important because the heat transfer depends on it. Research has also been reported on the effect of stop the machine attachment because of expansion. of the sleeve. researchers also suggested various models for predicting the coefficient of friction based on their research related to the factors affecting the coefficient of friction and the nature and severity of their effect on friction

Keywords: friction, energy, heat, coefficients lathe attachment

1.1 INTRODUCTION

During grinding, extreme heat and aggressive stock removal often alters micro structure and base metal hardness. This creates slight dimensional and surface imperfections such as smeared peaks, waviness and chatter. Super finishing, a low temperature, low stock removal process, improves part geometry and surface finish by removing the amorphous layer formed during the grinding process. This dramatically improves these imperfections, which can compromise part quality and performance turbulence by roughening the surface and introducing the inserts for increasing heat transfer coefficient. The friction becomes important in the rotating devices. The study on reducing friction by using appropriate lubricant or coating is also important aspect. The current review is aimed at emphasizing the importance of friction and friction factors in various fields and summarizing the research carried out to study factors affecting the friction in various applications and to improve friction characteristics according to the requirement. Also, some study related to modeling and analytical computations of friction factor and related parameters is reported.

1.2 Friction Factor and related Parameters

Increase in load may effects on the local hardness of the mating metals in two main ways. It may induce a hardness increase by strain hardening (with a decrease in μ), or it may induce a hardness decrease by thermal softening (with an increase in μ). These two effects may cancel out, or one may be prevailing. Friction coefficient is seen to increase with load and this may be attributed to the softening effect due to the heat generated at the contacting asperities. This is further confirmed by the observation that friction increases also with sliding speed that also contributes to local heating.

They freedom mathematical model of a friction-induced vibration system) by PID controller. friction coefficient in hot compression of cylindrical sample [2].

They carried out compression tests in order to analyze the evolution behavior of friction coefficients during large strain hot forging processes. Also they compared the simulated results for friction factors with experimental results. The simulation results also indicated that the friction coefficient is not a factor for shape of deformed sample. Instantaneous friction coefficient and the strain had exponential relationship. An investigation was carried out on development of low-friction factor sliding isolation device by Hamaguchi and Higashino by using Poly Tetra Fluoro Ethylene (PTFE) [3].

They developed some new additives and coating materials with heat-stiffened resin. The friction coefficient of new material was 0.03, less than pure PTFE. Newly developed epoxy resin adhesive between PTFE and steel plates was weather resistant and durable. Hargreaves and Tang carried out investigation on friction factor characteristics of liquid lubricants [4].

Reducing friction is very important from energy point of view. It also essential to measure friction characteristics of lubricating oils. During their investigation it was observed that the lubricants exhibit reducing friction coefficient with increase in the temperature. They observed that the mineral oil exhibited lowest friction coefficient. An investigation on friction coefficent of rough in-house materials was carried out by Ezzat et.al [5].

ISSN 2394 - 7780

According to their investigation, friction coefficient of rubber decreased with increasing surface roughness for dry sliding. Friction coefficient decreased down to minimum and then increased with increasing the surface roughness for bare foot and polymeric socks. With applied load, friction factor decreased. At water and detergent sliding, the friction coefficent decreased with with roughness. An investigation on estimates of non-ideal effects on the friction coefficient of agglomerates was carried out by Shin et.al [6].

As the agglomerate size increases from the free molecular regime into the transition regime, 15 percent decrease in scaling exponents for friction coefficient (η) was observed.Chaudhary et.al. investigated experimentally the effect of sliding speed and normal load on friction and wear property of an aluminum disc sliding against stainless steel pin [7].

They carried out experiments under normal load (10-20 N) and 500-2500 rpm. According to their investigation, the friction coefficient decreased with increase in the speed and load. Also wear rate increases with the increase of normal load. They also observed that coefficient of friction decreases with normal load. In their study, Ogugbue and Shah investigated the effect of eccentricity, flow-behavior index, and diameter ratio [8].

They used the results from a series of numerical simulations for the fully developed laminar flow of non-Newtonian power-law fluids in this study. It was confirmed, during the investigation that friction losses reduce with increase in eccentricity. Lower frictional loss was predicted by CFD at high eccentricities than predicted by other models. Nyarko carried out studies on effect of heat load on friction factor in corrugated pipes [9].

They used energy balance and momentum balance equation to estimate the heat loss. They observed for the fully developed flow, periodizing of temperature doesn't have any significant effect. With heat load, the drastic transition from laminar to turbulent flow was observed and friction factor reduced with heat load. The friction factor of non submerged vegetation for river flow was determined by Fathi-Moghadam et.al [10].

The aim of their research was to develop a relationship for estimation of non-submerged vegetation roughness in the flood plains and river banks. They conducted close to 200 experiments for this purpose. They observed that roughness coefficient decreased with flow velocity. It increased linearly with flow depth. Rao and Kumar studied various aspects related to friction factor in pipes with turbulent flow [11].

For all three regimes i.e. smooth, transition and rough, they proposed a universal resistance equation. Their equation predicted friction factors for turbulent flow accurately. The values estimated were in agreement with other data.Zehsaz and Shahriary carried out investigation on the effect of friction coefficient and interference on the freight fatigue strength of railway axle assembly [12].

This was very significant research considering the importance of the axle and its exposure to repeated cyclic loads. They carried out finite element analysis for railway using computer code. They divided the analysis into two steps one applying interference and second load. They observed that the relative sleep between the wheel hub and axle occurs when the frictional shear traction equals the contact pressure times the coefficient of friction. Micro slippage increases the friction wear than other places. It was also concluded that, increase in friction coefficent reduces the amplitude of slip. But it intensifies the fretting wear damage.Wallman and Astrom carried out literature review on Friction measurement methods and the correlation between road friction and traffic safety [13].

This was very significant study considering the relation between friction and the accidents. They concluded that the relation between friction and accident rate is certainly no easy problem to explain. This problem is more complex at winter conditions. They also found that the surveys of winter accidents provided varying results, but always with higher risk than normal bare road conditions. Stelmakh et.al investigated the nanoscale polished surface in boundary lubrication conditions for reduction of friction and wear by grooves applied on them [14].

According to them, when the orientation of grooves coincides with the direction of sliding, reduced wear and friction was observed. They proposed a new compressive-vacuum hypothesis of friction force nature under a condition of boundary lubrication. Their results were useful in developing optimized roughness profiles of friction surfaces.Al-sarkhi et al developed two correlations predict the effect of drag- reducing polymers, DRP on friction factor of two- phase flow for any pipe diameter [15].

In order to verify the results, they added DRP to air–liquid annular flow and for oil–water flows with any flow pattern at the asymptotic state. These correlations assume significance as such correlations are not available in literature.Pawar et.al studied the Nusselt number and friction factor for solar air heater duct [16].

The duct had diamond shaped rib roughness on absorber plate. Creating artificial roughness on absorber plate increases thermal efficiency of solar air heater. They also compared the heat transfer from smooth and

ISSN 2394 - 7780

roughened surface. It was observed that Nusselt number increased with Reynolds number. The Nusselt number and friction factor was a very strong function of roughness parameters (pitch and height.Gao used lactic acid for reduction of friction between two solid surfaces, silica glass against silicon nitride [17].

They achieved the sliding friction coefficent as low as 0.02. The surface adsorption combined with the surface hydroxylation was predicted reasons for the low friction.

Rajesh and SivaPrakash performed the ring compression test under different lubricants for analyzing friction factors [18].

They observed that the friction coefficient was very sensitive to surface geometry.They observed that friction coefficient decreases with reduction in height and outer radius; with inner radius, it increases. Friction reduction of automotive engines was tried by Morita et. al by a computational chemistry approach [19].

In their study, they analyzed the low-friction mechanisms of carbon films using molecular dynamics simulations and density functional theory calculations. They observed that the termination of OH groups on the surface of the diamond substantially reduced the friction coefficient from 0.07 to 0.01. The weakened interaction between Fe and C atoms was predicted to be reason for this.Shivamani et.al investigated the impact of hydration and moisturizer on skin friction [20].

It was observed that the application of water increased the friction and application of isopropyl alcohol decreased it. Also the friction coefficient increased with fast acting moisturizers .Sudip et al carried out review on use of nanomaterials in reducing friction and wear [21].

Kiolene,nanoclay,nanodimonds, Polytetrafluoroethyle ne(PTFE),graphite,Molybdenum disulphide as lubricants in various applications were discussed by them. According to their discussion,addition of inorganic nanoparticles significantly improves their lifetime and performance. Most energy loss in piped system is due to friction. An investigation on flow and friction for internally grooved pipe was done by Sunu et.al [22].

They observed that as the size of vortices formed were greater than groove widths, reduction in friction factors for fluid flow was observed. The reason for this was formation of larger vortices than groove widths. They concluded that the choice of appropriate number of grooves is important in reducing the energy losses. Steinke and Kandlikar carried out studies on friction factor in microchannels [23].

They reviewed available literature for single phase flow and also presented new experimental data. The pressure drop components were also analyzed. They inferred that not accounting the entrance and exit losses might be the reason for the deviating results in some investigations. According to them the components contributing to total pressure drop across microchannel heat exchanger are inlet and outlet losses, the developing flow losses, and the fully developed flow losses.

1.3 CONCLUSION

Friction studies, the friction factor are very important in many material applications. Aspects such as noise in rotating parts, slippage, energy loss, lifetime of materials, heat transfer and the effect of heat on friction are very important elements of the studies and research in this area. Various lubricants have been suggested to reduce friction. Many non-materials have been used successfully to improve the friction properties. For energy loss through grooved pipes, it is very important to choose the appropriate number of grooves to reduce energy loss.

The investigations also reiterate that the coefficient of friction depends on the geometry of the surface. Research has also been reported on the effect of submerged vegetation on the friction of the river. The coefficient of friction was a function of the depth and the speed of flow.

Sliding contact. Real surfaces are not perfectly flat and when two surfaces are pressed together contact spots occur at their asperities. In most cases, like in metals, such contacts are predominantly plastic. If two bodies in contact are subjected to sliding with a velocity v, the junctions tend to continuously break off and then reform in other points. A dynamic equilibrium is thus reached characterized by the same rate of formation and breaking of the junctions. Such a shearing process is necessary because of adhesion and it is also associated to the plastic deformation at the asperities.

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REVIEW ON SIGN LANGUAGE RECOGNITION SYSTEM USING CNN

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ABSTRACT
America has a deaf population of an estimated 10 lakhs people. The method of communication amongst the deaf community is sign language. The American Sign Language encompasses static and dynamic signs. This paper describes the method to capture the static signs (Which are the alphabets) and then translate that signs into texts. Image processing techniques are applied on these captured images.Upon the completion of the various image processing techniques, the features are classified by three different techniques: namely template matching, blob detection and PCA(Principal Component Analysis).For training of dataset convolutional neural network is used. Finally, the interpreted text output for that sign in the English Language is displayed.This paper provides an insight into the existing sign language recognition system and it gives an overall summary of the existing work.

Keywords: Image Processing, Convolutional Neural Network, Sign Language Recognition(SLR), American Sign Language(ASL), Indian Sign Language(ISL).

1. INTRODUCTION

Sign language is widely used by people who are unable to speak and hear or people who can hear but unable to speak. A sign language is composed of various gestures formed by different hand shapes, movements and orientations of hands or body , or facial expressions. There are various sign languages across the world , each with its own vocabulary. These include American Sign Language(ASL) in Northern America , British Sign Language(BSL) in Great Britain, Japanese Sign Language(JSL) in Japan, South African Sign Language(SASL) in South Africa, Indian Sign Language(ISL) in India, etc.

Gestures are used by the deaf people to express their thoughts. But the use of these gestures are always limited in the deaf - dumb community, normal people never try to learn the sign language. This causes a big gap in communication between the deaf - dumb people and the normal people. Usually deaf people seek the help of sign language interpreters for translating their thoughts to normal people and vice - versa. But these systems are very costly and does not work throughout the life period of a deaf person. So , a system that automatically recognizes sign language gestures is necessary.

2. LITERATURE SURVEY

For the American Deaf Community, the usage and learning of Sign Language is restricted to a handful. In order to make translation from sign language to text a reality, without any extravagant hardware requirements, the technique of image processing is used.

Basically there are two approaches for sign recognition vision - based and sensor - based gesture recognition[3].Lots of study has been done on sensor based approaches like gloves, wires, helmets etc[4][5][6]. But due to the disadvantage of wear it continuously is not possible, therefore further work is concentrated on Image based approaches[1].

Some previous work has been done on image based approaches for hand gesture and sign recognition in the last few years[7].There has been various methodologies for gesture recognition like HMM(Hidden markov model)[8], ANN(Artificial neural network)[9], Eigen value based[10], perceptual color based[1][11].In [12] authors proposed gesture recognition algorithm using GMM and HMM. Techniques like SVM(Support vector machine) proposed for classification and particle filtering[13].

Indian Sign Language(ISL) consists of word level signs as well as fingerspelling. Fingerspelling is used for letter by letter signing. It is used to code a word for which the sign does not exist or to emphasize a particular idea or thought. This paper proposes a method for automatically recognizing the fingerspelling in Indian Sign Language. Sign language recognition methods are mainly classified into two broad categories: device-based methods and vision-based methods. Device-based approach needs special hardware devices to extract the physical features of the hand sign such as dimension, angle, motion and colour. In comparison, vision-based methods use image processing algorithms to detect, track and interpret hand signs. This approach has the advantage that the user does not have to wear clumsy devices.

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Color Models:

RGB Values

R > 95 and G > 40 and B > 20 and Max{R, G, B} > 15 and mod(R - G) > 15 and R > G and R > B YCbCr Values:

Using the following equations:

Y = 0.299R + 0.587G + 0.114B,

Cb = 128 - 0.168R - 0.331G + 0.5B, Cr = 128 + 0.5R - 0.418G - 0.081B.

The contour based potential energy is calculated as follows: Extract the boundary of segmented binary image. Column vector C, where each element in this vector is the weighted sum of the pixel values in the corresponding column of the contour image. The row vector and the column vector are the potential energy to the bottom and left border and is known as the two-dimensional potential energy[2].

Optical Character Recognition by using Template Matching is a system prototype that is useful to recognize the character or alphabet by comparing two images of the alphabet. Optical Character Recognition is the process whereby typed or printed pages can be scanned into computer systems, and their contents recognized and converted into machine-readable code. Template matching is one of the Optical Character Recognition techniques. Template matching is the process of finding the location of a sub image called a template inside an image. Once a number of corresponding templates is found their centers are used as corresponding points to determine the registration parameters. Template matching involves determining similarities between a given template and windows of the same size in an image and identifying the window that produces the highest similarity measure. It works by comparing derived image features of the image and the template for each possible displacement of the template[14].

In [15],The Sign Language Recognition system capable of recognizing 26 gestures from the Indian Sign Language by using MATLAB. The aim of this project is to recognize the gestures with highest accuracy and in the least possible time and translate the alphabet of Indian Sign Language into corresponding text and voice in a vision-based setup. There are 5 major steps in the paper which are as follows:1) Data Acquisition,2) Image Pre-processing and segmentation,3) Feature Extraction,4) Sign recognition,5) Sign to text and voice conversation. The runtime images for test phases are captured using web camera with white background to avoid illumination effects. Otsu algorithm is used for image segmentation. For sign recognition the mathematical model of Principal Component Analysis (PCA).

This paper presents a technique to acknowledge 32 American Sign Language distinctive letters and numbers from image signs, independence of signer and environment of image capture. Sign Language Recognition (SLR) systems are technological contributions that enhance the lives of the hearing impaired. An ideal SLR system can enable its user to communicate with other users, computers and the Internet in their natural environment, while minimizing user constraints and bandwidth usage. Accuracy of 99% was achieved when user wore coloured gloves and 92% was obtained without coloured gloves when Hidden Markov Model (HMM) used to recognize American Sign Language. Using Principal Component Analysis (PCA) 98.4% offline recognition rate, for recognizing signer-dependent sign images from real-time video was achieved. There are 3 major steps in the paper which are as follows:1) Image processing, 2) Principal Component Analysis and Feature Extraction,3) Classification. The image is transformed from RGB to YCbCr colour space. For training of American Sign language dataset Multiclass-Support Vector Machine (SVM) is used. Using PCA approach 100% accuracy is achieved for signer-dependent signs and 78.46% accuracy is achieved for signer-independent signs[16].

Aiming at the feature of signer-independent sign language recognition the training data complexity caused by mass data and noticeable distinctions between different people data, the weighted KNN/HMM model is presented in this paper. This model is made of two blocks, which is part of sign language classification and recognition. KNN (K-Nearest Neighbour) is used to learn the training samples. In recognition part, weighted KNN classification result is taken as the state-input of HMM (Hidden Markov models) to implement sign language recognition, combine with the ability to temporal data modelling and fuzzy inference of HMM model. In this paper there are 2 major modules, which are as follows:1) HMM (Hidden Markov models) and 2) The weighted KNN (K-Nearest Neighbour) module. Using weighted KNN recognition model 46.48% of accuracy is achieved and using HMM recognition model 29.33% of accuracy is achieved when the value of k is 30. The best accuracy is for weighted KNN recognition model when the value of k is 25 which is 51.17% and for HMM recognition model when the value of k is 20 the accuracy is 34.42% which is best in all the tests[17].

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The focus of this work is to create a vision-based application which offers sign language translation to text thus aiding communication between signers and non-signers. The proposed model takes video sequences and extracts temporal and spatial features from them. then used Inception, a CNN (Convolutional Neural Network) for recognizing spatial features. Then used RNN (Recurrent Neural Network) to train on temporal features. There are 2 major modules in this paper which are as follows:

1) Gesture recognition and 2) Gesture classification. The problem faced by this proposed model is with facial features and skin tones. While testing with different skin tones, the model dropped accuracy. The model also suffered from loss of accuracy with the inclusion of faces, as faces of signers vary, the model ends up training incorrect features from the videos. The model also performed poorly when there was variation in clothing[18].

3. RESEARCH GAP

Above mentioned papers contain systems which recognizes a particular type of characters of sign language like one system only recognizes the alphabets of sign language, other system only recognizes the numbers of sign language but some of the systems recognizes the alphabets as well as special characters of sign language. None of the system recognizes the alphabets, numbers and special characters at the same time. Sign Language systems have issues in terms of their accuracy. Though some systems have good accuracy results but most of them have precision issues.

4. PROPOSED SYSTEM

The Approach to solve the quandary is to build an efficient system which can recognize all types of characters of sign language including alphabets, numbers and special characters. The system should be accurate enough to recognize each character precisely. The dataset used should be benchmark dataset in which all characters should be covered including alphabets, numbers and special characters. The dataset should contain every possible combination of light, camera angle for every character of sign language. The image processing methods should be culled in such a way that it should give best results in terms of accuracy. The best possible coalescence of image processing methods should be used such that the results obtained will be best in terms of precision and efficiency.

5. CONCLUSION AND FUTURE WORK

The American Sign Language is the only communication method between auditorily impaired people of america with the mundane people of america. From the analysis it’s ended that, sign language plays a consequential role in auditorily impaired people life and they have to use sign language for their communication purposes. In the above paper we have studied various image processing techniques applied to american sign language as well as indian sign language, also we have seen various types of recognition system for american sign language and indian sign language.There are many possible improvement that could be explored to improve accuracy of the recognition system and to recognize all kinds of characters of indian sign language including alphabets, numbers, special characters. Due to time limitations, the following research/work needs to be performed for future and would like to make use of different image processing techniques such as Principal Component analysis, Contour Detection and to explore various ways using which a indian sign language recognition and american sign language recognition system is built which recognizes all the alphabets, numbers and special characters of american sign language for american sign language recognition system and of indian sign language for indian sign language recognition system.

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SAFETY HELMET FOR TRACKING COAL MINERS USING IOT

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ABSTRACT
Working in the earth presents manydifferent security and health dangers.Frequently the underground environment is shaky or unpleasant. The mines thatare deeper, the more dangerous it could be to be running jobs. There's oxygenleak that is restricted, and there are challenges related to leaving a mine if a crisishappen.So here we propose a mining tracking as well as safety system for the miningindustry using microcontroller based circuit on the worker helmet. We use rfbased circuitry to detect workers moving through the entire mining site. Thehelmet is integrated with an rf based tracking system which in coordination withthe tracker rf systems help provide data over IOT. The system makes use ofAtmega microcontroller based rf tracker circuitry to receive the data transmittedby worker helmet nodes. This helps map the current location of workers throughthe entire mining site. Moreover each worker helmet circuit is integrated with apanic/emergency button. This button when pressed shows an emergency signover the IOT web interface about the worker emergency. This can be used for anyemergencies like – toxic gas inhalation, cave ins, physical injury etc. Thus thesystem ensures mining worker safety using IOT.

Keywords: IoT(Internet of Things),Wi-Fi(Wireless Fidelity).

1. INTRODUCTION
India is a country, which is renowned for its extensive and distinct minerals reserves and big mining businesses. India produces about eighty eight minerals, out of which it has four minerals to fuel ,ten minerals that is of kind metals ,fifty minerals that is of nonmetallic in nature and remaining twenty four includes minor minerals .Generation of coal in the year 2012 and 2014 remained at five hundred and forty Million Tonnes and five hundred and fifty seven Million Tonnes respectively. Personnel casualty of workers is common. Supervisors will be held accountable for all the wounds that take place below their management. Assure extra safetyalertness among mine workers. At the point while they are on job with machinery which produces loud noise, being alert to ones surroundings will typically be difficult. The mining helmet is one of the safety accessories which they never tend to remove.The mining helmets have no intelligence adjoined to it to let workers know when he or is his associate workers have experienced a dangerous event. The motivation of the project is to specialize a current protective helmet for mine workers to make it still safer and technologically advanced by including a sensors, microcontrollers and wireless communicating capabilities. We have designed a helmet which is working on three parameters. It consists of two main sensors which are used to detect carbon monoxide and temperature inside the coal mine. For wireless communication, transmitter and receiver section is used. The display screen is used to read these parameters. The buzzer is used to give alert indication under harmful and dangerous condition. The role of the IoT in the context of mining, there are differences between the Internet that consumers know and the Internet that makes machines smart both conceptually and technically.

2. LITERATURE SURVEY.
Beena M Varghese, Binisha Balan, Reshma ganghadharan projected at International Journal of engineering and innovative technology (IJEIT) on two015 on Intelligence Safety System for Coal Miners in this they need designed a system on sensible helmet supported ZIGBEE module in this system it's 2.4GHz module they will live temperature, humidness in mining and cut back safety drawback in coal production.

Pranjal Hazarika projected at first international conference of IEEE on 2016 on Implementation of sensible safety helmet on coalpit staff during this they need designed a system supported X-BEE Module and that we understand XBEE is far higher than zigbee and what zigbee will perform all are often performed by xbee and as several options that proves xbee is best like if your project is hungry for LAN you must use xbee which may sense the harmful gases like paraffin and CO gas concentration is on the far side the essential level , controller within the room triggers AN alarm ANd keeps the plant and staff safe by preventing an future accident.

Sunil Waghmare, Prof. Ashish Manusmare , Prof. Vijay Roy projected a world journal of science, engineering and technology analysis (IJSETR) on 2017 and designed a system on MICROCONTROLLER based mostly sensible helmet for mineworker safety during this they have targeted on the miners management system, that supported wireless network real time watching with intial warning intelligence on harmful gases ,collision detection in mining space and RF module used for info transfer to cut back safety issues in coal mining areas .If they crosses predefined limit, then the removed device gets alert because the buzzer can mechanically activate with show|LCD|digital display|alphanumeric display} display shows the standing.

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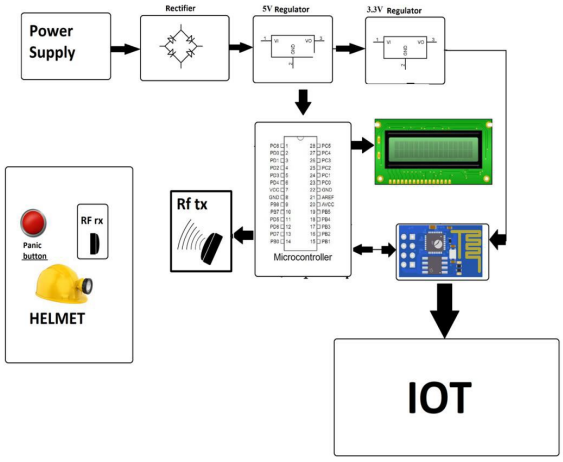
3. DIAGRAM



The below diagram shows in figure the connections and necessities for the protection helmet. The sensors and regulators square measure connected to the MICROCONTROLLER and power provide is given. The ESP8266 is to be connected to two.4GHz information measure Wi-Fi, then the sensors can begin sensing the surroundings and therefore the gas and temperature reading are taken. As temperature exceeds the miners receive a message.

4. HARDWARE NECCESITIES

ATmega328P Microcontroller

The Atmel ATmega328P may be a 32K 8-bit microcontroller supported the AVR design. several directions square measure dead in an exceedingly single clock cycle providing a turnout of virtually twenty MIPS at 20MHz. The ATMEGA328-PU comes in AN PDIP twenty eight pin package and is appropriate to be used on our twenty eight pin AVR Development Board.

The pc on one hand is intended to perform all the final purpose tasks on one machine such as you will use a pc to run a code to perform calculations otherwise you will use a computer to store some multimedia system file or to access web through the browser, whereas the microcontrollers square measure meant to perform solely the particular tasks,

for e.g., switch the AC off mechanically once temperature drops to a precise outlined limit and once more turning it ON once temperature rises higher than the outlined limit.

There square measure variety of well-liked families of microcontrollers that square measure utilized in totally different applications as per their capability and practicableness to perform the required task, commonest of those square measure 8051, AVR and PIC microcontrollers. during this we are going to introduce you with AVR family of microcontrollers.

ESP8266 LAN MODULE

ESP8266 offers an entire and self-contained Wi-Fi networking resolution, permitting it to either host the applying or to dump all Wi-Fi networking functions from another application processor. When ESP8266 hosts the applying, and once it's the sole application processor within the device, it is able to boot up directly from AN external flash. it's integrated cache to enhance the performance of the system in such applications, and to reduce the memory necessities. Alternately, serving as a Wi-Fi adapter, wireless web access are often another to any microcontroller-based style with easy property through UART interface or the C.P.U. AHB bridge interface. ESP8266 on-board process and storage capabilities enable it to be integrated with the sensors and alternative application specific devices through its GPIOs with stripped development up-front and stripped loading throughout runtime. With its high degree of on-chip integration, which has the antenna switch balun, power management converters, it needs stripped external electronic equipment, and therefore the entire resolution, as well as front-end module, is intended to occupy stripped PCB space. refined system-level options embrace quick sleep/wake context switch for energy- economical VoIP, adaptive radio biasing for low-power operation, advance signal process, and spur cancellation and radio co-existence options for common cellular, Bluetooth, DDR, LVDS, digital display interference mitigation.

EM-18 RFID MODULE

- Radio frequency Identification (RFID) may be a wireless identification technology that uses radio waves to spot the presence of RFID Tags.

ISSN 2394 - 7780

- Just like Universal Product Code reader RFID technology is employed for identification of individuals, object, etc. presence.
- In barcode technology, we want to optically scan the barcode by keeping it before of reader, areas in RFID technology we tend to simply got to bring RFID tags in vary of readers. Also, barcodes are often broken or undecipherable, that isn't within the case for many of the RFID.
- RFID is employed in several applications like group action system during which every body can have their separate RFID tag which is able to facilitate establish person and their group action.

5. SOFTWARE REQUIREMENT

IOT GECKO- the net of Things — like true mobile wallets or Internet-connected low manufacturers — is on the horizon. It awaits U.S., a world wherever all of our devices area unit connected and communicate with one another in some style of artistic movement circle of life. The Scope on IOT development grows day by day. the very fact that web of things permits you to regulate quite simply digital objects puts forward a brand new dimension on the net. Develop your own IOT primarily based system to scan detector values, get monitorised machines, monitor stop and do a great deal additional exploitation IOT lizard. Cloud platform opens your door to the present dimension with API support over Arduino, raspberry pi, microcontroller and alternative controllers. Bring your web of things programming skills to measure with IOT lizard GUI Builder and tailor-made applications created systems. build desired IOT systems exploitation this open supply web of things development platform. Setup your device and run them in your IOT cloud these days ,it’s free.

6. CONCLUSION AND FUTURE WORK

A model of intelligent mine safety helmet is developed that's competent to acknowledge varied types of unsafe things within the mining industries like monoxide gas accumulation, labourer removing the helmet, and crash detection (situation wherever mines is collided by one thing on his head). associate degree IR detector is employed to envision whether or not the labourer has removed his helmet or not. Another unsafe event is set as associate degree accident wherever mine employee is collided by associate degree item against his head with a pressure surpassing price|a worth|a price} of thirty four psi (Head and Neck Injury Criteria value of 1000). A pressure detector was wont to verify the force intimate with on the miners head. If the detector price exceeds that of thirty four psi, then it indicates a labourer has intimate with a severe collision on his head. And thence with the assistance of pressure detector we are able to verify the severity of the impact or collision on head. so as to evolve that the system works in step with the necessities such, it had been loosely tested. a handful of attributes of the system will be increased. to extend additional human interference and to boost the signal vary and signal strength a further antenna will be supplementary. to permit quicker detector processing, the system process speed will be increased. The infrared detector will be tweaked to figure simply within the protection helmet by not agitative because of internal reflections. The system will be increased by adding further activity instrumentation to envision the worker’s rate and force per unit area.

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SAR MEASUREMENT TECHNIQUES OF MICROSTRIP PATCH ANTENNA- A SURVEY

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ABSTRACT-
SAR is a value describing how much power absorbed in biological tissue when the Body is exposed to electromagnetic radiation. The use of microstrip patch antenna for measuring SAR in human tissues leads to various effects such as thermal effect, cancer, cognitive effects, MRI biological effects, etc. Because of these biological effects, there is a need of measuring the SAR. To measure SAR, very costly hardware equipments/softwares are required. Literature gives various SAR measurement techniques which are simple and cheap. This paper discusses these various SAR measurement techniques such as SAR measurement using RMS value of induced electric field, electric conductivity, and density of human tissues. In hyperthermia, SAR can be measured by using specific heat capacity and change in temperature when exposed in electromagnetic field per unit time. SAR can also be measured using power absorbed by the tissue. SAR can also be measured by electric and magnetic field distribution using FDTD method.

Keywords- Biological Effects, Human Tissues, Microstrip Patch, Power Absorbed, Sar.

I. INTRODUCTION

Specific absorption rate (SAR) measures how much radiation is absorbed by the human body under the worst possible circumstances. Technically speaking, SAR is a measure of the rate at which radio frequency (RF) energy is absorbed by our body from a cell phone. SAR provides a straightforward method for evaluating the radiation exposure to our bodies from cell phones in order to ensure that they are within the safety guidelines set by regulatory bodies, such as the FCC in the US. In mobile telephony, the SAR value indicates the energy absorbed by a particular mass of human tissue in a certain amount of time. SAR is measured in units of power per mass (W/kg).

There are various SAR measurement techniques. Different techniques use different formulas for SAR measurements. Value of SAR can be varies with different parts of body. As mentioned earlier, SAR evaluation is done under the worst-case scenarios. Thus, the SAR value that you find should not go beyond its safety guidelines. As can be seen from Table 1 [1] and Table 2 [1], in the United States, phones need to have a SAR value below or at 1.6 W/kg, taken over the volume containing 1 gram of tissue mass. In Europe, the SAR limit is 2 W/kg, but it takes into consideration a sample size of 10 grams of tissue.

II. DIFFERENT SAR MEASUREMENT TECHNIQUES

There are various methods available in literature for measuring SAR. The SAR can be measured using electric field induced, power absorbed, temperature variation, etc.

Table 1. IEEE Standards of SAR [1]

SAR Limits recommended by IEEE (W/kg in 1 g of tissue) (Frequency Range: 100 kHz – 6 GHz)			
Exposure characteristics	**Hands, Wrists, Feet, ankles**	**Partial Body**	**Whole Body**
General public exposure	4	1.6	0.08
Occupational exposure	20	8	0.4

Table 2. ICNIRP Standards of SAR [1]

SAR limits recommended by ICNIRP (W/kg in 1 g of tissue) (Frequency Range: 100 kHz – 10 GHz)			
Exposure characteristics	**Whole body average SAR**	**Local head/trunk SAR**	**Local limb SAR**
Occupational	0.4	10	20
General public	0.08	2	4

1. SAR Measurement using RMS Value of Induced Electric Field [2]

SAR is usually averaged either over the whole body, or over a small sample volume (typically 1 g or 10 g of tissue). SAR can be calculated from the electric field within the tissue as: SAR can be related to the electric field at any point by,

ISSN 2394 - 7780

$$SAR = \frac{\sigma E_{rms}^2}{\rho} \quad (1)$$

Here, σ = Electrical conductivity

E_{rms} = RMS value of the induced electric field

ρ = density of the human tissue

Internal electric field can be detected by insertion of micro antennas or probes into the tissues. There are some standard values for mass density and dielectric properties as given in Table 3.

Table 3. Standard values for mass density and dielectric properties. [3]

Tissues	ρ (kg/m^3)	900 MHz		1800 MHz	
		σ	ε_r	σ	ε_r
Skin	1020	1.5	50.5	1.35	47.80
Brain	1130	0.12	4.83	0.11	4.48
Bone	1050	1.11	41.7	1.09	39.50

2. SAR Measurement using Temperature Variation

In hyperthermia we are interested primarily in thermal effect. The rate of temperature rise and final temperature distribution and the determining factors of a successful treatment. Engineers and physicists in hyperthermia research have adopted the SAR from bio electromagnetics research to quantify rate of energy deposition or SAR patterns in tissues. Both absolute and relative SAR patterns have been reported. SAR is calculated according to the formula [4]:

$$SAR = 4186\, c \frac{\Delta T}{\Delta t} \quad (2)$$

Here, c = specific heat capacity of tissue ($\frac{KCal}{kg}.^{\circ}C$)

ΔT = the change in temperature when exposed for the time change to Δt

In the analysis of the influences of mobile phone towards human head, thermal imaging camera is used to measure the local temperature at the side of the face and near ear-skull region. Thermal imaging camera is capable to accurately measure two dimensional temperature fields with high thermal, temporal and spatial resolutions [5]. Insertion of miniature thermal probe inside the tissue detects the rise in temperature inside the human body [2].

3. SAR Measurement using Power Absorbed by The Tissues [6]

The human arm is modeled in HFSS considering the electromagnetic properties of biological tissues. The block diagram of the SAR measurement setup is shown in the Fig.1.

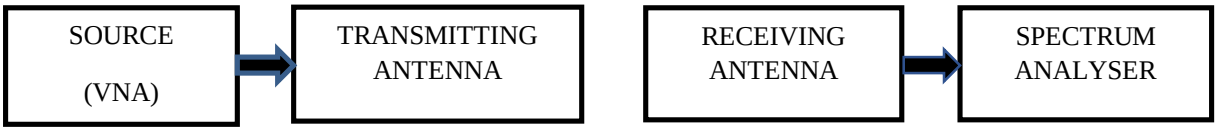

Fig-1: Block diagram of SAR measurement setup

The antenna under test is connected as a receiver and the transmitting antenna is connected to VNA (PNA N5230A, Agilent Technologies). The total power absorbed by the body has been calculated in two steps. First the antenna is placed in the space and the power (P_m (free space)) received by the antenna at the desired frequency is measured with the help of the spectrum analyzer. Next the antenna is placed on the arm and again the power (P_m (arm)) received by the antenna is measured. The difference in the power is the power absorbed (P_m) by the arm and is given by

$$P_m = P_{m(free\ space)} - P_{m(arm)} \quad (3)$$

where, P_m= power absorbed by the arm,

$P_{m(free\ space)}$= power absorbed when antenna place in free space,

ISSN 2394 - 7780

$P_{m(arm)}$= power absorbed when antenna place at the arm.

Finally, the SAR is calculated using

$$SAR = \frac{P_m}{V_R} \tag{4}$$

where, V_R is the volume of human body tissue illuminated by electromagnetic energy, also known is SAR averaging volume and is given by

$$V_R = \rho \times patch\ area \times \delta. \tag{5}$$

Here ρ is the average density of skin, fat, muscle and bone. δ is the depth of penetration of electromagnetic field in the human body tissue, also known as skin depth

$$\delta = \sqrt{\frac{1}{\pi f \mu \sigma}} \tag{6}$$

Here, δ= skin depth, ρ = average density of skin, fat, muscle, bone,

μ = relative permeability, and f = operating frequency.

4. SAR Measurement using Electric and Magnetic Field Distribution (FDTD Method)

Finite-Difference Time-Domain (FDTD) method is used to calculate the Specific Absorption Rate distribution in a human head near a hand-held cellular phone. The simulation region must be divided into Yee Cells as shown in Fig. 2 in order for the FDTD method to be applied. Illustration of a standard Cartesian Yee cell used for FDTD, about which electric and magnetic field vector components are distributed (Yee 1966), visualized as a cubic voxel, the electric field components form the edges of the cube, and the magnetic field components form the normal to the faces of the cube. [3]

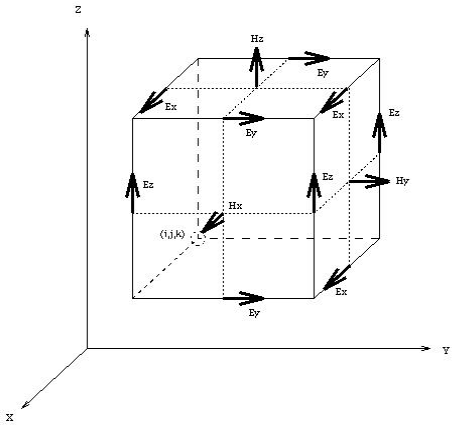

Fig. 2. Standard Yee Cell

In the Cartesian coordinate system, each Yee cell contains six field components, Ex, Ey, Ez, Hx, Hy and Hz. The fields are all offset by half a space step as shown in Fig. 2.

For 2D TM mode,

$$SAR(i,j,k) = \frac{\sigma_z(i,j,k)}{2\rho} E^2_{Zmax}(i,j,k)$$

For 2D TE mode,

$$SAR(i,j,k) = \frac{1}{2\rho}[\sigma_Y(i,j,k).E^2_{Ymax}(i,j,k) + \sigma_X(i,j,k).E^2_{Xmax}(i,j,k)]$$

For 3D mode,

ISSN 2394 - 7780

$$SAR(i,j,k) = \frac{1}{2\rho}[\sigma_X(i,j,k).E^2_{Xmax}(i,j,k) + \sigma_Y(i,j,k).E^2_{Ymax}(i,j,k) + \sigma_Z(i,j,k).E^2_{Zmax}(i,j,k)]$$

The actual locations of *Ex, Ey*, and *Ez*, are (*I* + ½, *J, K*), (*I, J* + ½, *K*), and (*I, J, K* + ½), and the corresponding values of *Ex, Ey*, and *Ez* are assumed to be located at the same respective locations. In 2D mode E field is calculated by Bessel function expansion. In 3D mode E field is calculated by Spherical Bessel function expansion. ρ is consider as a constant value ($10^3\ kg/m^3$) ε and σ varies as the boundaries of the tissue changes. Since computer time and space requirements increase only linearly with the number of cells for the FDTD method, a man model is well within the capabilities of a CRAY II supercomputer [7].

III. COMPARATIVE STUDY OF SAR MEASUREMENT TECHNIQUES

Table 4 shows the comparative study of all these SAR measurement techniques. Though in FDTD method, the electric field can be measured easily using Bessel function expansions, it requires supercomputer due to time and space complexity. The technique of SAR measurement using temperature variation is very simple and cheap. The remaining techniques of SAR measurement require either costly hardware and/or softwares.

Table 4. Comparative study of different techniques of SAR measurements

Sr. no.	Measurement Technique	Instrument/Device used to measure SAR	Applications
1	SAR Measurement using RMS Value of Induced Electric Field [2]	Micro antenna or probe	Dosimetry and bioactivity assessment.
2	SAR Measurement using Temperature Variation [4]	Thermal imaging camera or probe	Hyperthermia
3	SAR Measurement using Power Absorbed by The Tissues [6]	Spectrum analyzer	ISM, HYPERLAN, WLAN
4	Using Electric and Magnetic Field Distribution (FDTD Method) [7]	CRAY II supercomputer.	3D scan

IV. SUMMERY AND CONCLUSIONS

SAR is a value describing how much power absorbed in biological tissue when the Body is exposed to electromagnetic radiation. SAR is measured in units of power per mass (W/kg). There are some biological effects of SAR on human beings such as thermal effect, cancer, cognitive effect, effect on sleep, etc. Various SAR measurement techniques have been discussed in this paper along with their advantages and drawbacks. Most of the SAR measurements techniques mainly depend upon change in induced electric field and change in temperature. Sometimes power absorbed by the tissue can be used to measure SAR. SAR can also be measured by electric and magnetic field distribution using FDTD method. The technique of SAR measurement using temperature variation is very simple and cheap. Most of the SAR measurement techniques require either costly hardware and/or softwares.

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ISSN 2394 - 7780

SIMULATION OF DIRECT TORQUE CONTROL OF INDUCTION MOTOR BASED ON SPACE VECTOR MODULATION

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ABSTRACT
Induction motor (IM) speed control is comparatively difficult, since the torque produced and flux are inter-dependent. Through the conventional PI regulation, torque error can lead to undesirable change in angle between rotor and stator flux vectors. In this paper, space vector modulation (SVM) based direct torque control (DTC) is applied on induction motor. DTC is a closed-loop speed control technique to control a motor with the help of flux and torque vectors. It constitutes of hysteresis-band flux and torque controllers. The undulations in current and torque occur in the traditional DTC technique. Reason for unwanted torque and current undulation is less voltage vectors applied to the machine, which means less accuracy. Ripples are reduced using the SVM-DTC technique. SVM techniques have a number of superiority features that offer finer DC bus utilization, minimum torque undulations, lesser total harmonic distortions (THD) in the AC motor current, minimal switching losses, and simpler to adapt in the digital systems. Simulations for the SVM based DTC are performed in MATLAB/Simulink and the results are studied thoroughly.

Keywords — Motor, SVM, DTC, Torque error, Flux error

INTRODUCTION
Motors are one of the electric machines most widely used in industrial, commercial and domestic applications as they are simple, rugged, low cost and easy to maintain. The drive control system is necessary for IMs, since they demand good performance control: accurate and quick flux and torque response, higher torques at low speed, wide range of speed.

Direct torque control (DTC) method came in spotlight because instead of controlling the torque indirectly through flux or current, it directly controlled the torque. To obtain precision, DTC uses the difference between reference values and calculated values of flux and torque to control the machine. Although a well-accepted method, but DTC has some disadvantages like – at low speeds, control becomes difficult; high undulations in torque and current; more noise and variable switching frequency issues.

Space Vector Pulse Width Modulation (SV-PWM) is a technique introduced to improvise DTC in order to overcome the drawbacks of conventional DTC.

The usual three phase PWM generation technique involves a high frequency carrier wave intersecting with three sinusoidal waves as reference. The major drawback of this intersection method is that it includes automatic redundant computational efforts, since the intersection points of each of the three phases is computed independently [5].

On the other hand, the SVM strategy generates the waveforms simultaneously for all the three phases in a two-dimensional frame of reference, excluding the chances of considering each waveform intersection as an independent variable.

In this paper, MATLAB simulation of SVM based DTC of IM is performed and results are analysed. An attempt is made to minimise the general limitations of conventional control schemes and conventional DTC as well.

OBJECTIVES
1. To control the torque of induction motor using space vector modulation.
2. Space vector modulation (SVM) based direct torque control is applied on induction motor

OVERVIEW- Direct Torque Control (DTC)
Direct Torque Control (DTC) makes use of an induction motor model to acquire preferred output torque. By using solely cutting-edge and voltage measurements, it is viable to estimate the immediate stator flux and output torque. The simple configuration of DTC scheme is as shown in Fig. 1. It consists of a two torque and flux controller alternatively of PI controllers in DTC scheme and flux and torque estimator.

In DTC, it is possible to immediately manage stator flux linkage and electromagnetic torque by means of resolution of finest inverter switching modes. The selection is such that flux and torque blunders are restrained within respective flux and torque hysteresis bands to obtain fast torque response.

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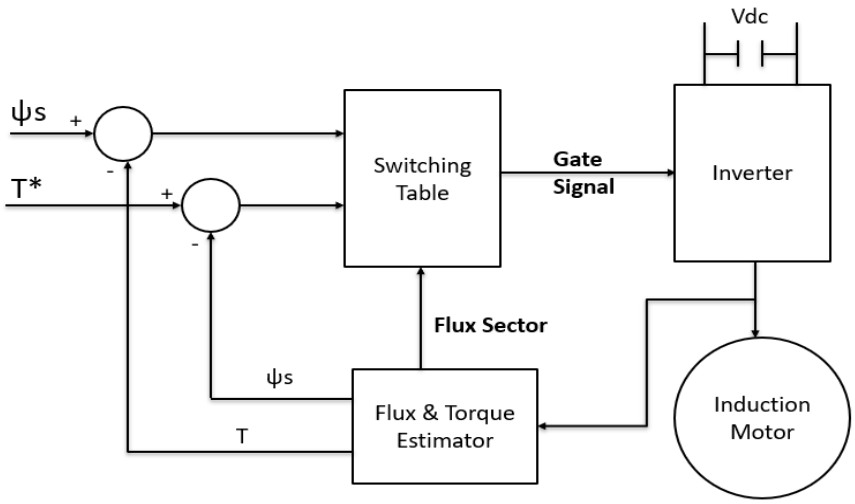

Fig. 1. Block Diagram Of DTC

Induction motors, provided through a VSI inverter, stator linkage flux and electromagnetic torque are controlled straight forwardly and autonomously by the way of preference of inverter switching modes. The choice is made to confine the flux linkage and torque error inside their hysteresis bands to get a rapid torque reaction. The output commands of the flux and torque hysteresis comparators are used to pick up inverter switching states from the lookup table, below equation indicates torque equation of induction motor (IM) with wide variety of poles 'P'.

$$T_e = \frac{3}{2} P \frac{L_m}{L_s L_r} \psi_s \psi_r \mathrm{Sin}\theta \quad \text{.....(1)}$$

Where, Ψs is stator flux linkage house vector, Ψr is rotor flux linkage house vector, θ is the perspective between Ψs two and Ψr.

METHODOLOGY

Space Vector Modulation

The SVM technique determines the duration of conduction of each voltage vector applied to the inverter via the projection of the V_s^* on two contiguous vectors in every sector. The value of this projection decides the favored switching times - T_n and T_{n-1} and corresponding to two none-zero inverter switching states. To preserve a consistent switching frequency, in the case of $T_n+T_{n+1}<T_{SW}$, space vector modulation refers to a distinctive switching sequence of the upper three power switches of a three-phase power inverter.

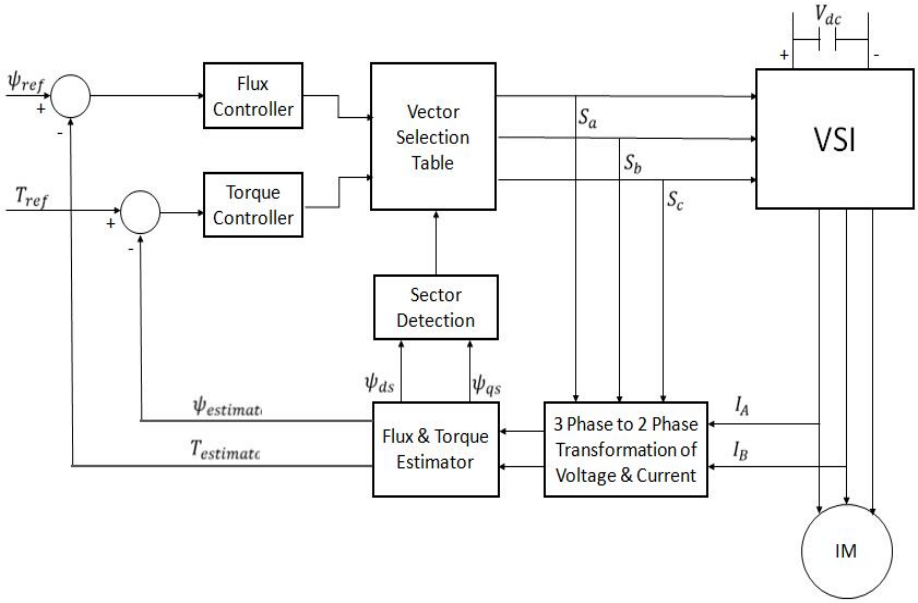

Fig. 2. Block Diagram Of SVM-DTC

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In the SVM algorithm, aim is to determine the period of conduction of every adjoining voltage vector in each and every sector in order to generate a voltage at the inverter output, which has a common cost equal to the suggest value of the reference voltage vector at the input. The space vector airplane is separated into six areas via voltage vectors.

$$(i-1)\frac{\pi}{3} < N_i < i\frac{\pi}{3}, i = 1, \ldots, 6 \quad \ldots\ldots\ldots(2)$$

the position of the reference voltage vector where it lies can be determined.

$$\theta_{V_s^*} = \tan^{-1}\left(\frac{V_{s\alpha}^*}{V_{s\beta}^*}\right) \quad \ldots\ldots\ldots(3)$$

Two phase variables are obtained from three phase values using the following matrix:

$$\begin{bmatrix} V_d \\ V_q \end{bmatrix} = \frac{2}{3}\begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \quad \ldots\ldots\ldots(4)$$

zero inverter reputation is applied throughout a complementary period of the T_{SW} period, that is $T_0=T_{SW}-T_n+T_{n-1}$. It is properly known that the three phase inverter can produce eight output states. Switching state [1 0 0] means, top change in phase 'a' is closed and upper switch in section 'b' and 'c' are open. Thus, eight output states of inverter represent eight area vectors, two vectors V0[0 0 0] and V7[1 1 1] are null and remaining six are of equal magnitude and arranged 600 apart in space diagram as shown in fig. The table 1 shows the best voltage switching vector look-up table.

Switching Table

Table. 1. Swiching Vector Diagram

H_ψ	H_T	S(1)	S(2)	S(3)	S(4)	S(5)	S(6)
1	1	V_2	V_3	V_4	V_5	V_6	V_1
	0	V_0	V_7	V_0	V_7	V_0	V_7
	-1	V_6	V_1	V_2	V_3	V_4	V_5
-1	1	V_3	V_4	V_5	V_6	V_1	V_2
	0	V_7	V_0	V_7	V_0	V_7	V_0
	-1	V_5	V_6	V_1	V_2	V_3	V_4

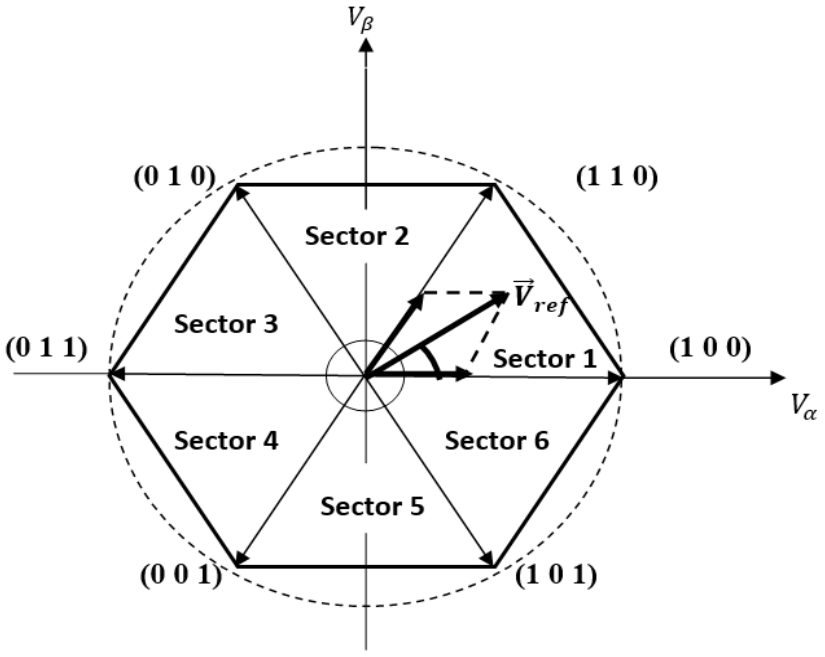

Fig. 3. Switching Vectors & Sectors

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SIMULATION MODEL

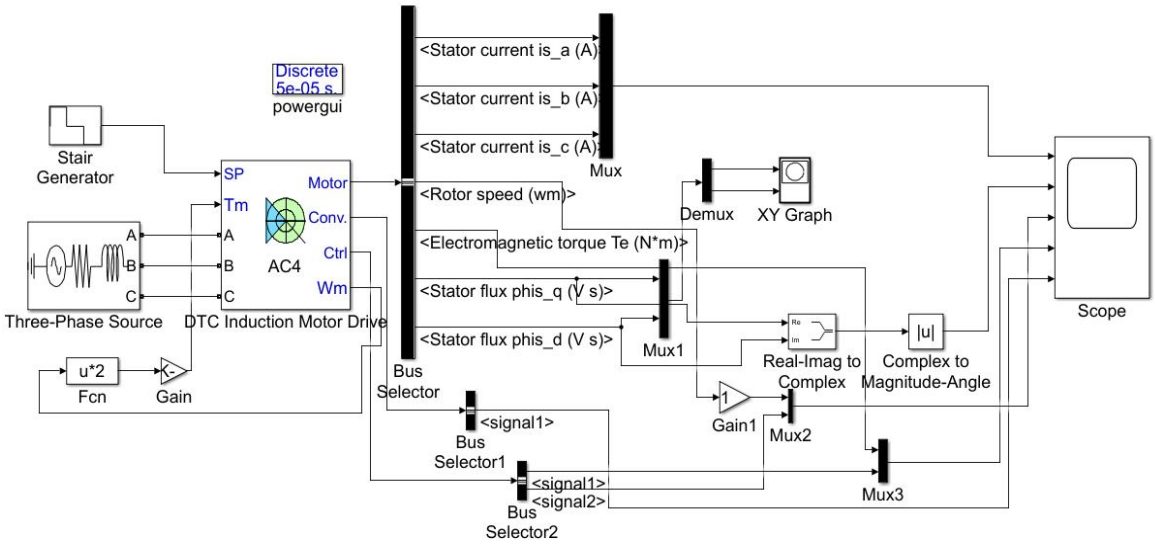

Fig. 4. Simulation Model Of DTC

The simulation of DTC was once executed in the discrete environment. The inverter switching pulses are acquired from the switching table which decides to the pulse from the error indicators of flux and torque. The flux function is also decided in the flux and perspective calculation block. The estimation of flux and torque is carried out from the motor measurable factor such as phase voltage and phase currents

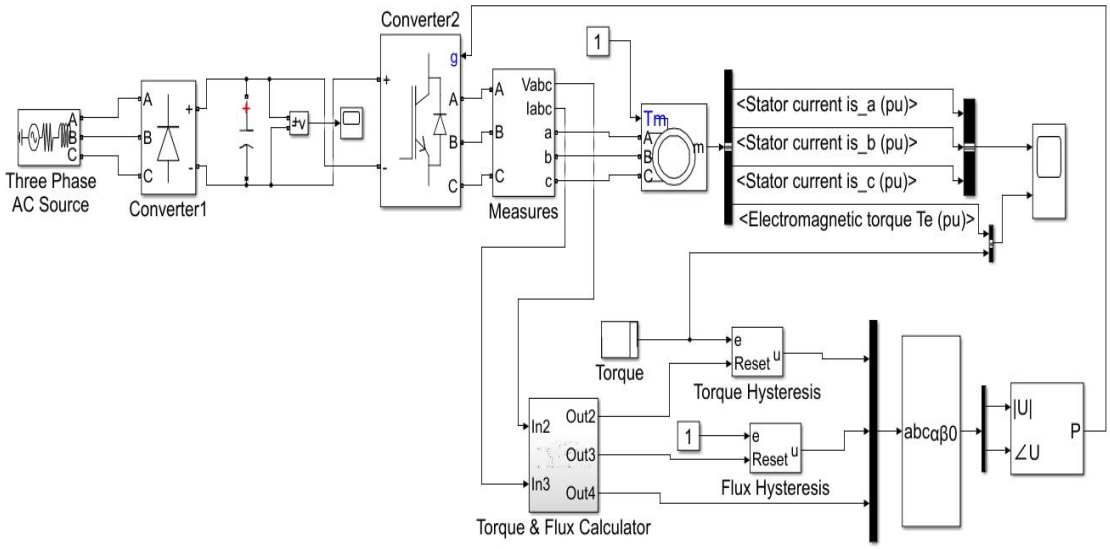

Fig. 5. Simulation Model Of SVM-DTC

The simulation model of the DTC-Space Vector Modulation manipulate scheme. The system is composed of the motor, three phase voltage provide inverter, PI controllers, reference frame transformation blocks. Space vector modulation approach is used to control IGBT switches.

CONCLUSION

Here, the simulation and analysis of SVM with DTC of IM is being performed. An evaluation and simulation study of the usage of MATLAB models for two different DTC schemes- general DTC scheme and SVM- DTC scheme is done. As per the analysis, it can be concluded that - both the schemes are having less ripples in contrast to DTC. Also by making use of SVM technique the changing frequency can be maintained a constant. But in overall performance, sensible SVM- DTC scheme is superior in phrases of robustness to parameter editions due to the usage of sliding mode principles.

For the analysis of two schemes stated above the observer used, is to be an open loop kind which is much less robust compared to a closed loop observer. So in future it is planned to replace the open loop flux observer by using a closed loop observer.

ISSN 2394 - 7780

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SMART IRRIGATION SYSTEM BASED ON SOIL MOISTURE AND WATER LEVEL DETECTOR

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ABSTRACT
Agriculture is essential occupation of our country. India's significant pay source is relying upon agriculture therefore the development of agriculture is significant. When considering technology which is deployed in this field, we find the development is not enormous. Presently there is a huge improvement in advancements (technologies) that significantly affect different fields like agriculture, healthcare etc. In today also most of the irrigation system are operated manually. The available traditional techniques are like drip irrigation, sprinkler irrigation etc. These techniques are need to be combined with IoT so that we can make use of water very efficiently. IoT helps to access information and make major decision making process by getting different values from sensors like soil moisture, water level sensor, water quantity etc. This paper focuses primarily on reducing the wastage of water and minimizing the manual labor on field for irrigation so that you can save time, money and physical work of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation, the human intervention can be minimized.

INTRODUCTION
Internet of Things represents a simple concept for the ability of network device to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purpose. Internet of Things is very quickly becoming a reality. The proof of it is our devices are getting smarter each day from smart phones to smart tv to smart car to smart kitchen. Every thing is now getting connected to internet. Internet of things (IoT) describes a network of physical objects that connect to each other through internet. Objects, or „things" can transfer information wirelessly without requiring human interaction.

Internet of things is an architecture that consists of specialized hardware boards, software system, web API"s, protocols which together creates a seamless environment which allows smart embedded device to be connected to internet such that sensory data can be accessed and control system can be triggered over internet. And the devices can be connected to internet using a various means like wifi, Ethernet and so on.

The strength of Indian Economy is agriculture. As the population growth is increasing day by day across the world therefore it is essential to improve farm yield to meet a growing demand of food. By considering and predicting environmental circumstances, farm yield can be improvedand increased. The quality of crop is based on data collected from field such as soil moisture, humidity, temperature. Advanced tools and technology can be used to increase farm production.

Generally, the current irrigation systems are manually operated. Those systems are replaced with the automated techniques suggested an automated concept of irrigation to use the water efficiently and effectively. Sensor based automatic irrigation system is based on soil moisture sensor that will measure the level of moisture in the soil and sends the signal to the micro-controller and accordingly it will irrigate the crops. This micro-controller will compare the values received from the moisture sensor with predefined moisture levels already stored in the system. Based on the values rerceived from the sensors the micro-controller will turn the irrigation system ON/OFF.

Agriculture IoT helps in increasing crop productivity by way of managing and controlling the activities like crop water management- Adequate water supply is essential for agriculture and the crops can be damaged in either of situation of excess of water supply or in shortage of water supply. In regions of drought conditions, IoT can be used to be a great value as it manages the limited water supply smartly with least wastage of water resources.

RELATED WORK
Plenty of research work has been done to improve the performance of agriculture field.

In [1] the system uses arduino technology to control watering and roofing of the green house. It uses statistical data acquired from sensors (like temperature, humidity, moisture and light intensity sensors) compared with the weather forecast for decision making. Kalman filter is used to eliminate noise from the sensors.

In [2] uses temperature, pH, humidity sensors and the fuzzy inference to input the data from sensors. The system monitors the sensors information on LCD and PC.

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In [3] Proposed a simple approach to "Automatic Irrigation control problem using Artificial Neural Network Controller". The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand ANN based approach has resulted in possible implementation of

better and more efficient control. These controllers do not require a prior knowledge of system and have inherent ability to ANN based systems can save lot of resources (energy and water) and can provide optimized results to all type of agriculture areas.
In [4] Proposed "Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose" was developed and successfully implemented along with flow sensor. Salient features of the system are: Closed loop automatic irrigation system, temperature and water usage monitoring. User can easily preset the levels of the Moisture and is regularly updated about current value of all Parameters on LCD display. In future, other important soil parameters namely soil pH, soil electrical conductivity will also be incorporated in thesystem.

In [5] Wireless sensing Network with ZigBee technology helps to control air humidity, soil moisture and temperature. System is implemented with components as soil moisture sensor, humidity sensor, temperature sensor, water pump, fan, relay and buzzer.

In paper [6], wireless sensor network is integrated with ZigBee to transmit soil moisture level and temperature values. The data is transmitted to a web server using GPRS through cellular network. The data monitoring can be achieved via internet using graphical application.

In [7] proposed "The Automated Wireless Watering System" is a user friendly system, which notifies the user about its status. The 2 modes of operations provide the user with the option of automatic and manual process. The system also provides the log file of the events carried out.

In [8] the paper explains wireless sensor network for sensing soil moisture level, temperature and relative humidity values. Network lifetime of the node is increased by using sleep - wake up plan. The system in this paper implements clustering of nodes. Graphical user interface (GUI) is designed in MATLAB for data handling.

All the systems discussed above are similar in the context of wireless sensor node. The difference lies regarding the communication technologies and the storage of data collected from the nodes. Generally systems use one or more servers to store the collected data. When the quantity of nodes is increased, servers will need more space for storage, resulting in increased cost.

PROBLEM STATEMENT
Throughout India, farming is the requirement of life for most Indians, and it is one of the main sources of income. Agriculture also has a huge impact on the country's economy. Water consumption is rising day by day, which can lead to water scarcity problem. Now a day not only becomes quite difficult for them to grow outdoor plants at home.

A. Conventional methods for irrigation Conventional irrigation methods such as overhead sprinklers, flood type feeding systems usually wet the lower leaves and plant stem. The entire surface of the soil is moist and often remains wet long after irrigation has been completed.On the contrary, drip or trickle irrigation is a form of modern irrigation technique that slowly applies small quantities of water to part of the root zone of the plant.

Water is regularly supplied, often weekly, to maintain a good state of soil moisture and to avoid moisture pressure in the crop utilizing water resources properly. Drip irrigation saves water as moisture is only obtained in the root zone of the crop. When the correct amount is added, no water is lost to deep percolation. Drip irrigation is common because it can increase yields and reduce both water and labor demands.

Drip irrigation uses around half of the sprinkler or surface irrigation water needed. Higher operating demands and flow rates lead to lower energy costs. You can achieve a higher degree of water control. With more reliable amounts of water, plants can be supplied. Risk to pests and diseases is reduced due to the dryness of the plant foliage. Operating costs are usually reduced. During the irrigation cycle, federations will continue because the rows between plants remain dry.

B. Problems with traditional systems
Farmers manually irrigate the conventional irrigation system. Because the water is irrigated directly in the soil, plants experience high stress due to variability in soil moisture, the growth of plants is therefore reduced. The lack of automated system control results in an inadequate method of water control. The main reason for these

ISSN 2394 - 7780

limitations is population growth that is increasing at a faster rate. There is already an ongoing global water crisis where it has become a difficult job to manage water scarcity. For countries that lack water resources and are economically disadvantaged, this development can be seen. So in the conventional irrigation system, this is the serious problem.

Limitations of existing system:

- Farmers physical work in regulating drip irrigation.
- Lack of energy
- Wastage of time

When water sits in the channels of irrigation, malaria mosquitoes are able to grow.

C. Smart Irrigation System

Smart irrigation systems offer a variety of advantages compared to traditional irrigation systems. Smart irrigation systems, based on things like soil moisture and weather predictions, can maximize water levels. This is achieved using wireless moisture sensors that communicate with the smart irrigation controls and help inform the device whether water is needed in the landscape or not. Furthermore, the regulated smart irrigation

You will save substantial amounts of money on your water bills because your smart irrigation system optimizes energy through intelligent control and automation so that everything gets what it needs without waste.In addition, we have all seen many areas in the world where droughts have occurred and we know our water supplies are precious. We will be good stewards of our land with smart irrigation systems, which is great for the environment.

The ability to save significantly, have better control and be more environmentally friendly while preserving a lush and beautiful landscape are just a few of the benefits that a smart irrigation system offers and would make a wonderful addition to any household.

To toggle irrigation on and off, the Smart Irrigation System uses switches. Using sensors and solenoids, these valves can be easily programmed. Automating field or nursery irrigation enables farmers to apply at the right time the right amount of water, irrespective of the availability of labor to turn on and off valves.

The benefits of smart irrigation are:

- Save fuel and water
- Save money from your customers
- Make the yard easy and convenient to maintain.
- Minimize water storage and transportation infrastructure
- Secure water resources for generations to come

This paper suggests irrigation system explaining the combination of IoT communication technology and cloud server to achieve device and data storage efficiency. The system proposed provides remote monitoring and automatic irrigation control with real-time sensing of ambient and soil

receives local weather information that can help determine when to water a landscape.

The Smart Irrigation System is an IoT-based device that can automate the irrigation cycle by measuring soil moisture and climate conditions (like raining). The sensor data will also be shown on the BOLT cloud site in graphical form. conditions such as air temperature, humidity, and soil moisture.

PROPOSEDSYSTEM

In this Proposed System, both the sensors water level sensor and soil moisture sensors are connected to the input pins of Arduino Uno R3 microcontroller board. The Analog values produced from the sensors are converted to a digital output value by the Arduino Uno R3 microcontroller. The sensed values are displayed in the mobile application. The water motor gets switch-off/on automatically based on the sensed value with respect to an already fixed thresholdvalue.if the moisture is less than the value then the motor gets turn on automatically and if the moisture is high then there is no need to switch on the motor. The main disadvantage here is if there is no water in the tank to pump then the motor cannot pump the water so we use water level sensor to detect the level of the water in tank.if the water in tank is assumed to be low then the message is displayed on the mobile phone noting that there is no water in the tank .

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ALGORITHM

The steps that the system undergoes:

Step 1: Soil moisture sensor senses the moisture level of thesoil (less than or more than).

Step 2: If the moisture sensed value is greater than the fixed threshold value than no need to switch on the motor.

Step 3: If the Moisture level is less than the threshold value, then the water motor is switch-on automatically.

Step 4: Once moisture level comes equal to the threshold value, it moves to its initial state (switch-off the water motor).

Step 5: The water level sensor checks the level of water in the Tank .

Step 6: if the water in the tank is below the average level then the message is sent and displayed on the mobile phone of the owner

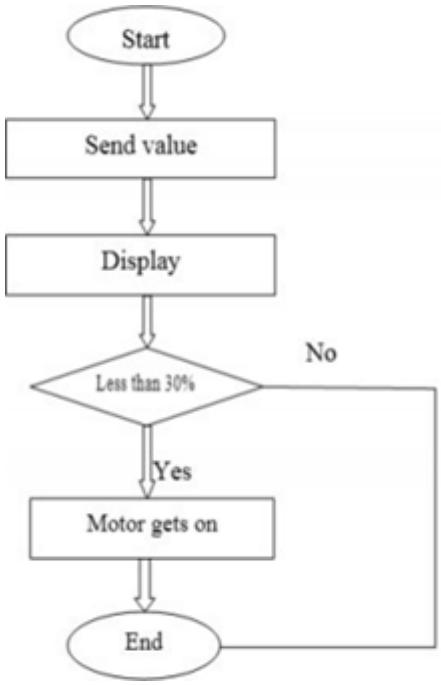

Fig. 1: Flowchart of proposed smart irrigation system

COMPONENTS DESCRIPTION

Arduino UNOR3

The Arduino Uno R3 (also called ATmega328) is a dual- inline- package (DIP) microcontroller AVR microcontroller. In total, it has 20 I/O digital pins. Arduino computer programs can be easily loaded on it Arduino Uno R3 is the latest revision of the Arduino Microcontroller.

Fig. 4: Soil moisture sensor

Soil moisture sensor:

Soil moisture sensor has two probes which are used to sense the water level of the plants. The current is passed from these two probes them it estimates the resistance value of the moisture level. If the water level of the soil is then the resistance value is less and viceversa.

ISSN 2394 - 7780

Table 1: Soil moisture sensor specification

Water level sensor:
The water level sensor is used to detect the level of water. The advantage of using the water level sensor is the limits the use of water and wastage of water.

Fig. 5: water level sensor

The specifications of water level sensors are 0utputs: 4-20 mA or 0.5 to 2.5 VDC

Supply Voltage: 3.3 to 5 VDC, Dimensions: 60 x 20mm,

contacts 45mm, when the water level is low then the digital output goes high and Adjustable sensitivity.

SOFTWARE USED
Arduino IDE 1.8.9

It is the open source Arduino Software which is used to Arduino based code and upload it to an Arduino board. It can run on any platform like on Windows, Mac OS X, and Linux. Its environment is written in Java and other open source software.

Bluetooth terminal android application

Table 4: Bluetooth terminal android application

Platform	Android
Version/Release Date	1.0/21-4-2014
Requirement	Android 2.2 and above

Input voltage	3.3-5v
Output voltage	0-4.2v
Input Current	35mA
Output Signal	Both Analog and Digital

RESULTS:

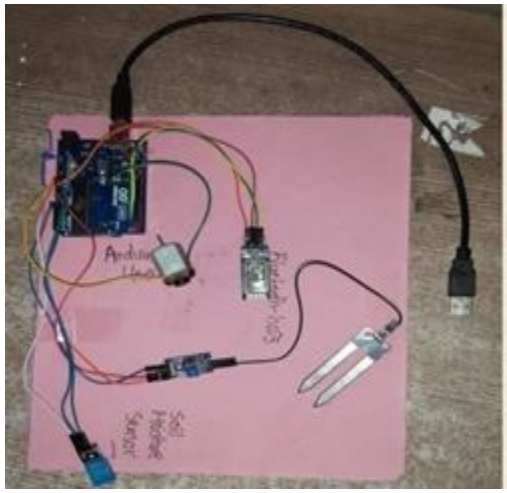

Fig. 8: Proposed system of smart irrigation system using IoT.

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The main aim of the project is that the soil moisture sensors senses the moisture if it is found below the threshold value then the motor automatically turns on and if case there is no water in the tank then the water level sensor Detects the water level in the tank if it is found to be less than the average level then the message is displayed on to the users mobile phone to fill the water tank.

CONCLUSION AND FUTURE SCOPE

This automated Smart Irrigation System using IoT is found to be cost-effective for enhancing the techniques to preserve water resources and to optimize them for agriculture production. This system helps the farmer by working automatically and smartly. With placing multiple sensors in the soil, water can be only provided to the required piece of land. This system requires less maintenance so it is easily affordable by all farmers. This system helps to reduce water consumption. With using this system the crop production increases to a greatextent

As per future perspective, this system can be the more intelligent system which predicts user actions, nutrient level of the plants, time to harvest, etc. With using Machine Learning algorithms more advancements can be done in the future which will help farmer a lot and water consumption can also be reduced in agriculture.

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SMART WATER MANAGEMENT SYSTEM

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ABSTRACT
This Project Proposes a system, that system performs water quality monitoring and management of water supply operation. This paper presents an IOT device which help to manage and plan the usage of water. This system can be easily installed in residential societies. Sensors placed in the tank which continuously informs the water level at the current time. This information will be updated on the cloud and using a web application, user can visualize the water level on a Smartphone from anywhere that is connected to Internet. According to the level of water in the tank the motor functioning will be automatically controlled, at low level of water motor will automatically turn on and when tank is about to fill up it will cut off. so this system controls the wastage of water as well as save the electricity. There are some sensors are used for this system like temperature sensor, Turbidity sensor, flow sensor etc. In this proposed system all the records can monitored using real time monitoring system from any location.

Keywords: IOT Devices,Water Management,Sensors, Cloud.

I . INTRODUCTION
Water is an important resources for all the living on the earth, but unfortunately huge amount of water is wasted because of uncontrolled used and exploration of water resources. People are storing the water in tanks but conventional water tanks can neither monitor nor control the water level in the tank. In that some people are not getting sufficient amount of water because of unequal distribution. The proposed system is fully automated. Here human work and time are saved. In this project we have implemented the design of IOT base water monitoring and distribution system that monitors the quality of water and also equally distribute the flow. Water level sensor, automatic water pump ON/OFF, temperature sensor, flow sensor, water meter are carried out by this project. The IOT enable water management solution like use sensor to collect data and share data to the cloud.

II . RELATED WORKS
In this project we will implement the design of IOT base water quality monitoring system that monitors quality of water. This system consist of some sensors like turbidity sensor, temperature sensor, water flow sensor, water level monitoring sensor and automatic ON/OFF motor which measure the water level of water in the tank. Here automatic ON/OFF motor is depend upon data provide by water level sensor if tank is empty then motor start automatically and fill the tank else once the tank is full motor automatically off. Temperature sensor check the temperature of the water. Turbidity sensors measure the amount of light that is scattered by the suspended solids in water. All the records can be monitored using real time monitoring system from any location.

III . HARDWARE IMPLEMENTATION

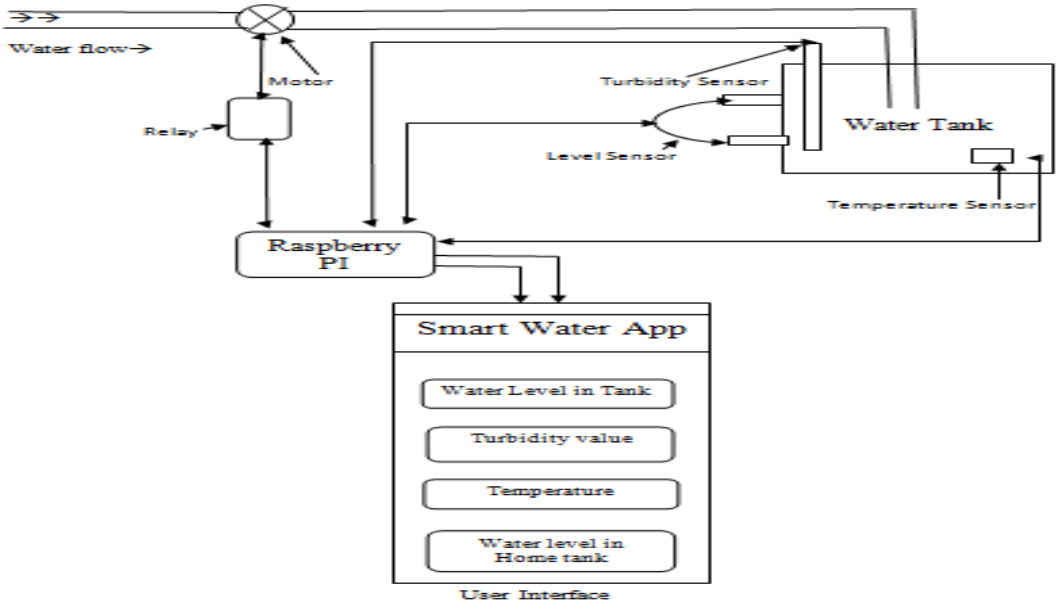

Fig.3.1 Proposed Architecture

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Raspberry Pi: The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

Fig. Raspberry Pi

Water Level Sensor: Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Level measurements can be done inside containers or it can be the level of a river or lake.

Fig. Water Level Sensor

Flow Controller: Flow controller is a simple water saving device which, when fitted onto water tap or shower, can help you reduce water consumption.

Fig. Flow Controller

Turbidity Sensor: Turbidity sensors measure the amount of light that is scattered by the suspended solids in water. As the amount of total suspended solids (TSS) in water increases, the water's turbidity level (and cloudiness or haziness) increases.

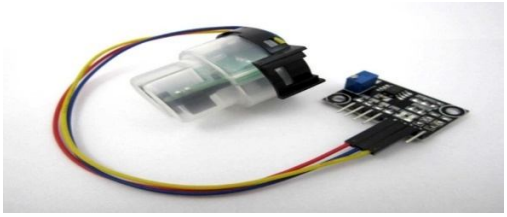

Fig. Turbidity Sensor

Temperature Sensor: A temperature sensor is a device, typically, a thermocouple or RTD, that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature.

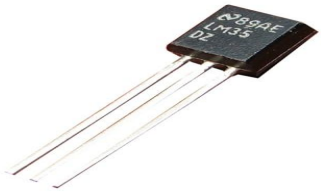

Fig. Temperature Sensor

Dc Motor: Pumps is that they can operate directly from an electricity, making them more convenient and portable. They are easier to operate and control, since AC systems typically require a controller to manage speed. DC pumps also tend to be more efficient.

ISSN 2394 - 7780

Fig. Dc Motor

IV . WORKING

The Prototype Model of Water Control and Management System has been develop using Raspberry Pi and various sensor. The Water level sensor is applied on water tank which automatically ON and OFF the water motor and Turbidity sensor is fitted in the tank which monitor the Turbidity level of water and notify user. all the sensors will provide corresponding output to the user.

V. ADVANTAGES

1. This System is more reliable. It can detect the quality of water.
2. The System in which lot base devices helps to manage & plan the usage of water.
3. The proposed System is fully automated & robust.
4. This System saves human work, time and energy.
5. Real time IOT base System which provide accurate information & access from any location at any time.

VI. FUTURE SCOPE

As this system can be used for society further it can be used for industrial levels. In this model we used ultrasonic sensor so in the future it could be replaced by Laser water level sensor, so that system can perform more reliability& gives higher accuracy of water level detection reading. This System ensures water is not wasted, gives water quality& provide water consumption.

VII. CONCLUSION

This will demonstrate the successful implementation of an internet-based approach to measuring water quality and usage on a real-time basis. A flow sensor for measuring of quantity supplied, eliminating the drawbacks of traditional water metering systems. Future enhancements can include automatic treatment of water based on the nature of contamination. This novel idea can be further extended to other areas like oil and natural gas monitoring systems.

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SOLAR POWERED DRIP IRRIGATION SYSTEM USING MOISTURE SENSOR AND WIRELESS NETWORK TECHNOLOGY

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ABSTRACT
Agriculture is the primary occupation in India. In rural areas people living there are mainly farmers whose life depends on farming hence major source of income is agriculture. Agriculture in India is not that easy city of unavailability of adequate water and electricity. To overcome this farmer can use an alternative source of energy by using solar power drip irrigation system and some advance sensing equipment with it like (Soil moisture sensor, temperature sensor, etc.) this will helps the farmer to manage proper amount of water as per their need and increases the productivity of crops.

Keywords: Automated drip irrigation, Solar panel, Soil moisture sensor, Micro controller, Wireless network, Energy saving.

INTRODUCTION
Agricultural irrigation is very necessary for crop production around the world. Whereas in India, the economy is dependent upon it and contribute nearly upon 17% to 18% of its GDP base on agriculture, and also the atmospheric condition. The more reason is the lack of rain and unavailability of land reservoir water. Therefore, economical water management is necessary for irrigated agricultural cropping systems. The demand for modern water-saving techniques in irrigation is increasing rapidly day by day. Within the traditional drip irrigation systems, the foremost important advantage is that water is equipped close to the root of the plants drip by drip which saves the water. These days, the farmers are mistreatment irrigation approach in India through the manual control the farmers irrigate the land on the ordinary intervals. This method typically consumes extra water or generally the water reaches past due to which plants get dried. to conquer this trouble farmer can used solar-powered automatic drip irrigation technology which helps them to manage the proper flow of water for crops and it also gives an additional backup power supply by using the solar panel due to which when there is a lack of electricity it can use to store the solar energy into the battery cell and when needed it can use to drive the pump motor. Mostly this system can be used where there is a shortage of electricity and water.

OBJECTIVES OF STUDY
1. To minimize the amount of water wastage in irrigated areas.
2. To developed an irrigation system in field of agriculture by using solar energy.
3. To provide user friendly control using GSM technology.

METHODOLOGY
To investigate the achievements of practical testing of a solar-powered drip irrigation system using moisture sensor and wireless network technology and dependent on the plan, the approach engaged with testing automatic irrigation of the field.

Selection of land (5mx 2m) =10m2

The ratio of land area =1:1

Amount of water require of farming

Considering the average amount of water require (rainfall) =250l/m2

The total amount of water requires cultivation =250×10=2500 liter.

To supply 2500 liter water to the field submersible pump is chosen with the capacity of delivering 500lph with a power consumption of 50w. The power required for this pump will be (6hrx50w) =300Wh. According to its power demand, solar panel and battery capacity are choose. Solar panel and battery capacity should be 25% to 40% higher than pump rated capacity i.e. solar panel 2nos of each having generating power capacity up to 75watts and battery 4nos of each having rated power capacity of (12Vx1.5A=18W) which are all connected in series-parallel.

ISSN 2394 - 7780

SOLAR POWER GENERATION

We have used an automatic irrigation system using solar-powered which driven the pump motor to feed the water to the crop from the reservoir and it is an automatic control system using micro controller with soil moisture sensor and also can control pump motor using GSM technology generally all this setup work on ac supply from the power grid but if their lack of electricity or power failure then these setup works on solar power which has been stored in a battery. Then inverter is used to deliver ac power as this setup is used while power failure occurs. Whereas the main objective of this device is to conserve electricity by means of using it into an efficient manner and to reduce the useless wastage of water.

SOFTWARE AND HARDWARE USED

1. Software:

- Arduino IDE (Integrated Development Environment)

2. Hardware:

- Arduino mega 2560 micro controller, submersible pump, solar panel, batteries, inverter, soil moisture sensor, solar charge controller, GSM bluetooth module,

SYSTEM MODELING:

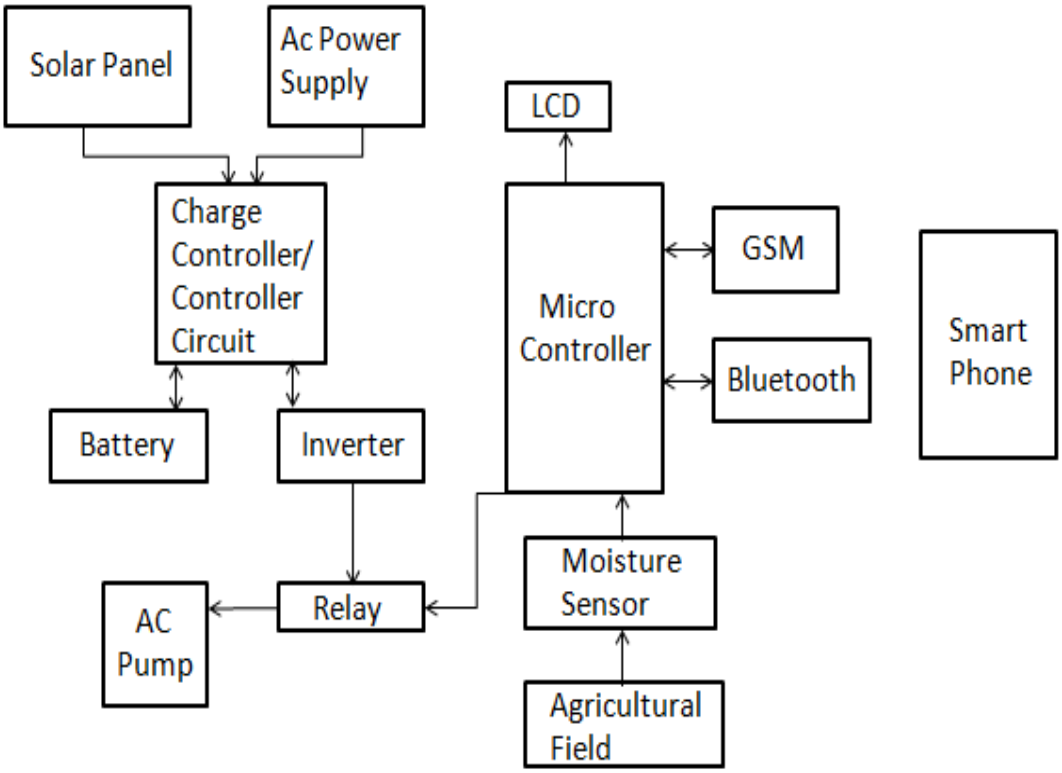

Figure-1: Block Diagram

The concept of our project is to perform an irrigation system by controlling it manually and automatically by using GSM module and soil moisture sensor. This system gets electricity from sources like from the main grid, battery and solar panel. So, the system is supplied by another source of energy which makes the system work during a power failure. The pump is controlled by a micro controller which sends the command to the relay switch of the pump to turn it on/off. While during automatic control of the operation, soil moisture sensor is used to measure the soil moisture content in it. By checking the resistivity of the soil, to check its sensor will produce voltage 4v to 5v when the soil is dry, the voltage level decrease with an increase in soil moisture and when the soil gets wet its voltage will be 0.9v to 2v.

Hence, depending upon the output voltage of the soil moisture sensor micro controller can turn on and turn off the pump by interfacing a relay switch with a pump motor drive. For wireless manual control, a GSM module is interfaced with a micro controller which gives the farmer to have remote access of the farmland and control the watering of their crops by operating the pump at the right time. GSM module contains a SIM number from where the farmer can communicate by giving a missed call or SMS, for example, two missed calls for the pump on and one for off this way amount of water can be control of the field.

ISSN 2394 - 7780

OBSERVATION TABLE

Sr.no	Humidity of soil in %	Moisture sensor output in volts	Status of pump
1	1%	4.7V	ON
2	44%	2.9 V	ON
3	50%	2.5 V	ON
4	69%	2.0 V	OFF
5	77%	1.7 V	OFF

Table-1: Automatic control of pump motor

CONCLUSION

In the present scenario, Automatic drip irrigation system using solar powered is developed for irrigating the farm land by measuring the soil moisture. The sub components consist of Arduino micro controller, GSM module, solar panel, battery, solar charger controller, inverter and other accessories which include submersible pump, water tank and drip irrigation kit. This present irrigation system might be an effective solution for the farmers who will be able to conserve water and also not face energy scarcity at the places where sufficient sunlight is convenient. With the help of this system, the pump can run up to 5 to 8 hours per day with the help of solar panel and store energy in the battery. Pump status details can be seen on cell smartphone with the help GSM module or Bluetooth module. Pump can also be controlled manually by sending command with the help micro controller using GSM technology.

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SPEED DETECTION USING COMPUTER VISION

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ABSTRACT
Vehicle speed detection is used to estimate the speed of the moving vehicle using image and video processing techniques. Without any camera calibrations video is captured and analyzed for speed in real time by using Computer Vision.

By employing frame subtraction and masking techniques, moving vehicles are segmented out. Speed is calculated using the time taken between frames object traversed in that frames.

Finally frame masking is used to differentiate between one or more vehicles. With an average error of +/-2 km/h speed detection was achieved for different video sequences.

INTRODUCTION
Computer vision is an interdisciplinary scientific field that deals with how computers can be made to gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to automate tasks that the human visual system can do.

Computer vision tasks include methods for acquiring, processing, analyzing and understanding digital images, and extraction of high-dimensional data from the real world in order to produce numerical or symbolic information, e.g. in the forms of decisions.
Understanding in this context means the transformation of visual images (the input of the retina) into descriptions of the world that can interface with other thought processes and elicit appropriate action.

The scientific discipline of computer vision is concerned with the theory behind artificial systems that extract information from images. The image data can take many forms, such as video sequences, views from multiple cameras, or multi-dimensional data from a medical scanner. The technological discipline of computer vision seeks to apply its theories and models to the construction of computer vision systems.

Sub-domains of computer vision include scene reconstruction, event detection, video tracking, object recognition, 3D pose estimation, learning, indexing, motion estimation, and image restoration.

Definition of Computer Vision
Computer vision is an interdisciplinary field that deals with how computers can be made to gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to automate tasks that the human visual system can do.

Computer Vision tasks include methods for acquiring, processing, analyzing and understanding digital images, and extraction of high-dimensional data from the real-world in order to produce numerical or symbolic information, e.g. in the forms of decision

Requirements:
Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object- oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains.[6] It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems, and supports web development with Django as well as Data Science with Anaconda

OpenCV (Open source computer vision) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez (which was later acquired by Intel). The library is cross- platform and free for use under the open-source BSD license.

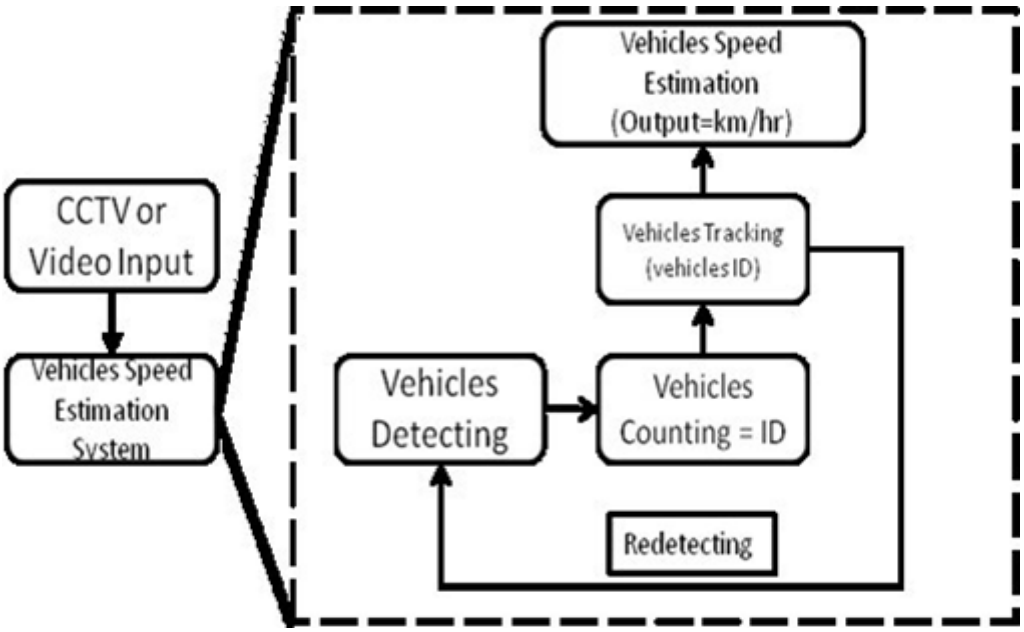
A Camera is an optical instrument used to capture still images or to record moving images, which are stored in a physical medium such as in a digital system or on photographic film. A camera consists of a lens which focuses light from the scene, and a camera body which holds the image capture mechanism.

ISSN 2394 - 7780

YOLO (You Only Look Once) is a state-of-the-art, real-time object detection system. On a Pascal Titan X it processes images at 30 FPS and has a mAP of 57.9% on COCO test-dev.

YOLOv3 is extremely fast and accurate. In mAP measured at .5 IOU YOLOv3 is on par with Focal Loss but about 4x faster. Moreover, you can easily tradeoff between speed and accuracy simply by changing the size of the model, no retraining required!

Architecture



E XPLANATION

The Live video or just a video is converted into images and then the vehicle detection is performed using YOLOV3 on the images of the video. After detection of the vehicle a particular ID is given to that vehicle and that ID is upgraded in every images of the video.

And when the vehicle crosses a particular line that is made by the OpenCV the actual speed Calculation is being performed there by the universal formula of speed. Speed = distance / time.

And with the help of ffmpeg.exe the images are converted into a video as the final output.

After that the video is stored in the Database for further use.

C ONCLUSION

Since number of accidents on highways increases day by day so it is necessary to check speed of the vehicles on highways so as to remove accident cases and to provide a safe journey by controlling high speed of the vehicle. It also minimizes the difficulties of traffic police department and make ease to control the rash driving on highways. The police can perform their duties while sitting in control room and can provide their service with more ease and accuracy.

This concept can be extended in future by integrating a camera with the system which could capture the image of the number plate of the vehicle to send that to traffic authorities.

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TECHNOLOGIES, APPLICATION DOMAINS AND ISSUES OF INTERNET OF THINGS (IOT)

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ABSTRACT
The Internet Of Things (Iot) Represents A Vision In Which The Internet Extends Into The Real World And Connecting Everyday Objects. Physical Items Are No Longer Disconnected From The Virtual World, But Can Be Controlled And Can Act As Physical Access Points To Internet Services. This Paper Discusses The Basic Technological Building Blocks, Challenges, Application Domains Of The "Internet Of Things". In Particular, The Paper Has Considered Important Technological Developments Such As Ip Addressing For Everyday Objects. It Concludes With A Discussion Of Social And Political Issues That Are Likely To Arise As The Vision Of The Internet Of Things Becomes A Reality.

Index-Terms: Biometrics, Rfid, Sensor Networks, Autoidlabs, Ip For Things.

I. INTRODUCTION

The Internet of Things (IOT) is a world where "Things" (devices or sensors) are connected and able to share data. In the internet of Things (IOT) paradigm, many of the objects that surround us will be on the network in one form or another. Radio Frequency Identification (RFID) and Sensor network technologies will become handy to meet this new challenge, in which information and communication systems are invisibly embedded in the environment around us. This result in the generation of vast amount of data which have to be stored processed and presented in easily interpretable form. Technology experts for decades have anticipated a world of billions of smart, connected devices. The Internet of Things (IOT) is what happens when everyday ordinary objects have inter-connected microchips inside them. These microchips help not only keep track of other objects, but many of these devices sense their surrounding and report it to other machines as well as to the humans. Also called M2M, standing for Machine to Machine, Machine to Man, Man to Machine or Machine to Mobile, the IOT intelligently connects humans, devices and systems. Analysts describe two distinct modes of communication in the IOT: thing to person and thing-to-thing communication. Thing-to-person and person-to-thing communications encompass a number of technologies and applications, wherein people interact with things and vice versa, including remote access to objects by humans, and objects that continuously report their status, whereabouts and sensor data. Thing-to thing communications encompasses technologies and applications wherein everyday objects and infrastructure interact with the human. Objects can monitor other objects, take corrective actions and notify or prompt humans as required.

II. TECHNOLOGIES

A. RFID

Radio-frequency identification (RFID) uses radio waves to identify items. They track items in real-time to collect important information about their location and status. Early applications of RFID include automatic highway toll collection, keeping track of entire inventory, supply-chain management for large retailers, and for patient monitoring in e-health. RFID tags are being implanted under the skin for medical purposes, e-government applications such as in drivers' licences and passports and RFID-enabled phones are some of the applications.

B. Sensor networks

To detect changes in the physical status of things is also essential for recording changes in the environment. In this regard, sensors play a pivotal role in bridging the gap between physical and virtual worlds, and enabling things to respond to changes in their physical environment, generating information and raising awareness about the context. Sensor networks need not be connected to the Internet and often reside in remote sites, vehicles and buildings having no Internet connection.

C. Microcontrollers

Microcontrollers are computer chips that are designed to be embedded into objects. Embedded intelligence in things distributes processing power in the network, and empowers things and devices in the network to take independent decisions.

D. Biometrics

Biometrics enables technology to recognise people and other living things, rather than inanimate objects. Connected everyday objects could recognise authorised users by means of fingerprint, voice print, iris scan or other biometric technology.

ISSN 2394 - 7780

E. Actuators
Actuators detect an incoming signal and respond by changing something in the environment. Actuators such as motors, pneumatics and hydraulics can move objects and pump fluids. A relay, for example, is an actuator that toggles a mechanical switch, and can thus cause a good number of responses to occur such as enabling illumination, heating system, audible alarm and so on.

F. Location Technologies
Location technology helps people and machines find things and determine their physical whereabouts. Sensors play a role, but that approach does not satisfy practical needs for geo-location resulting in the rise of wireless approaches including GPS and cellular towers. Radar and sonar can detect relative location of things, depending on their electromagnetic, optical and acoustic properties. Some things transmit their own radio, light and/or sound in order to disclose their whereabouts to people and machines. In the automatic identification of tagged products in order to quickly look up information or initiate a specific action, using bar codes for linking real-world objects to virtual information has a number of drawbacks when compared to an RFID-enabled feature with corresponding mobile RFID readers, such as Near Field Communication (NFC)-enabled mobile phones. Near Field Communication is a short-range wireless connectivity standard that enables communication between devices when they are brought within a few centimetres of each other through magnetic induction.

G. Bar Codes
A bar code is an optical representation of machine-readable data and can be seen on the majority of products that are on sale in the retail industry to speed up the checkout process. These one-dimensional (1D) barcodes represent data in vertical parallel lines with varying space and line width. A lesser well-known two-dimensional (2D) barcode or matrix code is also an optical representation resembling something like a crossword puzzle of even more machine readable data and can normally be seen on larger packaging containers to assist with warehouse logistics and quality control. Examples of matrix codes include QR Code, Data Matrix code and Semacode. QR Code is derived from Quick Response as the creator intended to allow its contents to be decoded at high speed. A Data Matrix code is made up of a two-dimensional matrix code consisting of black and white square modules arranged in either a square or rectangular pattern. The information to be encoded can be text or raw data. The code can be read quickly by a scanner which allows the media to be tracked, e.g., on a parcel. Semacode is machine-readable ISO/IEC 16022 data matrix symbols which encode URLs. It is primarily aimed at being used with cellular phones which have built-in cameras. A URL can be converted into a type of barcode resembling a crossword puzzle, which is called a “tag”. Tags can be quickly captured with a mobile phone’s camera and decoded with a reader application to obtain a web site address. This address can then be accessed via the phone’s browser.

III. TECHNOLOGICAL CHALLENGES

A. Massive Scaling
An Internet of Things potentially has a larger overall scope than the conventional Internet of computers. The current trajectory of the numbers of smart devices being deployed implies that eventually trillions of things will be on the Internet. How to name, Authenticate access, maintain, protect, use, and support such a large scale of things are major problems. Will IPv6 suffice? Will entirely new standards and protocols emerge? How will the massive amounts of data be collected, used, and stored? What longitudinal studies will be performed? How will the real-time aspects be supported? How will devices including mobile devices be discovered? Will the emergence of a utility model, if it occurs, mean entirely new standards? How will such a utility be achieved? It is unlikely that any solution immediately becomes the norm. Many protocols and variations will coexist. What will be the architectural model that can support the expected heterogeneity of devices and applications?

B. Interoperability
Since the world of physical things is extremely diverse, in an Internet of Things each type of smart object is likely to have different information, processing and communication capabilities. Different smart objects would also be subjected to very different conditions such as the energy available and the communications bandwidth required. However, to facilitate communication and cooperation, common practices and standards are required. This is particularly important with regard to object addresses. These should comply with a standardized schema if at all possible, along the lines of the IP standard used in the conventional Internet domain.

C. Robustness
If our vision is correct, many IOT applications will be based on a deployed sensing, actuation, and communication platform (connecting a network of things). In these deployments it is common for the devices to know their locations, have synchronized clocks, know their neighbour devices when cooperating, and have a coherent set of parameter settings such as consistent sleep/wake-up schedules, appropriate power levels for

ISSN 2394 - 7780

communication, and pair-wise security keys. However, over time these conditions can deteriorate. The most common (and simple) example of this deterioration problem is with clock synchronization. Over time, clock drift causes nodes to have different enough times to result in application failures. While it is widely recognized that clock synchronization must re-occur, this principle is much more general. For example, some nodes may be physically moved unexpectedly. More and more nodes may become out of place over time. To make system-wide node locations coherent again, node re-localization needs to occur. Note that control of actuators can also deteriorate due to their controlling software and protocols, but also due to physical wear and tear. In other words, how can a long-lived, dynamic, and mobile IOT are maintained? The required coherence services must combine with many other approaches to produce robust system operation.

D. Discovery

In dynamic environments, suitable services for things must be automatically identified, which requires appropriate semantic means of describing their functionality. Users will want to receive product-related information, and will want to use search engines that can find things or provide information about an object's state.

E. Architecture and dependency

As trillions of things (objects) are connected to the Internet it is necessary to have an adequate architecture that permits easy connectivity, control, communications, and useful applications. How will these objects interact in and across applications? Many times, things or sets of things must be disjoint and protected from other devices. At other times it makes sense to share devices and information. One possible architectural approach for IOT is to borrow from the Smartphone world. Smart phones employ an approach where applications are implemented and made available from an app store. This has many advantages including an unbounded development of novel applications that can execute on the Smart phones. Various standards and automatic checks are made to ensure that an app can execute on a given platform. For example, the correct version of the underlying OS and the required sensors and actuators can be checked when the app is installed. A similar architectural approach for IOT would also have similar advantages. However, the underlying platform for IOT is much more complicated than for smart phones. Nevertheless, if IOT is based on an underlying sensor and actuator network that acts as a utility similar to electricity and water, then, different IOT applications can be installed on this utility. While each application must solve its own problems, the sharing of a sensing and actuation utility across multiple simultaneously running applications can result in many systems-of-systems interference problems, especially with the actuators. Research is needed to develop a comprehensive approach to specifying, detecting, and resolving dependencies across applications. This is especially important for safety critical applications or when actuators can cause harm.

Let's consider a few examples of dependencies. Assume that we integrate several systems responsible for energy management (controlling thermostats, windows, doors, and shades) and home health care (controlling lights, TVs, body nodes measuring heart rate and temperature, and sleep). If information can be shared, this would allow the energy management system to adjust room temperature depending on the physiological status of the residents as detected by the home health care system. Also, integration will allow avoiding negative consequences. For example, the integrated system will not turn off medical appliances to save energy while they are being used as suggested by the home health care system. In addition to these advantages, all the systems can share sensors and actuators, which will reduce cost of deployment, improve aesthetics of the rooms, and reduce channel contention. However, integrating multiple systems is very challenging as each individual system has its own assumptions and strategy to control the physical world variables without much knowledge of the other systems, which leads to conflicts when these systems are integrated without careful consideration. For example, a home health care application may detect depression and decide to turn on all the lights. On the other hand, the energy management application may decide to turn off lights when no motion is detected. Detecting and resolving such dependency problems is important for correctness of operation of interacting IOT systems.

F. Creating knowledge and big data

In an IOT world there will exist a vast amount of raw data being continuously collected. It will be necessary to develop techniques that convert this raw data into usable knowledge. Main challenges for data interpretation and the formation of knowledge include addressing noisy, physical world data. The amount of collected data will be enormous. It can be expected that a very large number of real-time sensor data streams will exist, that it will be common for a given stream of data to be used in many different ways for many different inference purposes, that how data was processed must be known, and that privacy and security must be applied. Data mining techniques are expected to provide the creation of important knowledge from all this data. Consequently, uncertainty in interpreted data can easily cause users not to trust the system.

ISSN 2394 - 7780

Trust is one important aspect of the usefulness of big data. Security and privacy are essential elements of trust. However, as a basis for trust it is also necessary to develop new in-field sensor calibration techniques and reliable transport protocols.

G. Fault tolerance

The world of things is much more dynamic and mobile than the world of computers, with contexts changing rapidly and in unexpected ways. But we would still want to rely on things functioning properly. Structuring an Internet of Things in a robust and trustworthy manner would require redundancy on several levels and an ability to automatically adapt to changed conditions.

H. Interaction and short-range communications

Wireless communication over distances of a few centimetres will suffice, for example, if an object is touched by another object or a user holds their mobile against it. Where such short distances are involved, very little power is required, addressing is simplified (as there is often only one possible destination) and there is typically no risk of being overheard by others. NFC is one example of this type of communication.

IV. APPLICATION DOMAINS

A. Medical Technology

The IOT has many applications in the health sector. These may include staff support systems to locate both doctor and patient in a hospital at any point in time. It may also include IOT based knowledge systems to detect adverse reaction to drugs in patients. The combination of sensors, Wi-Fi, etc come handy in the monitoring of vital functions of the body such as temperature, blood pressure, heart rate, cholesterol levels and to stimulate the heart muscle in case of a heart attack, etc. IOT applications have an enormous impact on independent living and support for aging population by detecting daily living and support using wearable and ambient sensors and monitoring chronic disease. Things can send out regular alerts, e.g. the remote monitoring of patients with health problems such as heart disease, sugar levels, blood pressure.

B. Transport

The IOT offers a number of solutions in transport sector. Toll systems, screening of passengers and goods on aeroplanes to meet security requirements, monitoring traffic jams, and automated tracking of passengers and luggage are some of the application areas for IOT in transport. Applications in the automotive industry include the use of 'smart things" to monitor and report everything from pressure in tyres to the proximity of other vehicles. RFID technologies provide real-time data in the manufacturing and assembly of automobiles. Mobile users in vehicles are now able to communicate to other road users. Pilots can communicate directly to each other rather than depending on a centralized source from the earth There are applications to teach safe and comfortable driving by sensing the driver's behaviour and comparing it with the sensed behaviours of other motorists on the road. German researchers are working on car-to-car and car-to-infrastructure communication (C2X communications) to reduce road accidents. Adaptive speed devices obtain information through GPS-enabled smart phones and calculate the driver's speed (Goralczyk, 2008).

C. Insurance

In car insurance, electronic recorders are placed in cars to record speed, acceleration and communicate the information to the insurer to assess the risk. GPS-tracking devices are used to fight car theft. Early detection of hazards through sensors prevents water and fire damage. The ilab which is part of the Autoidlabs in Zurich is working on IOT applications related to insurance (Prevention within household insurance, 2012). The mobiliar emergency application allows customers to contact their insurer via their smart phone. E-bikes allow for continuous operation of GPS-based tracking devices. This tracking reduces bicycle theft and improves the safety of cyclists. Water claims caused by outdated or rusted pipes pause a problem. Early detection is the key in the prevention of water damages and related claims. Various sensors are able to detect small water leaks in rooms. SMS is sent to alert residents and automatic valves close the main water pipe.

D. Personal and Home

Control of home equipments such as air conditioners, Refrigerators, Washing machines etc, Will allow better home management. Home care System Allow us to monitor ill person of the house. It also allows doctor to monitor patients and the elderly in their homes thereby reducing hospitalization costs through early invention and treatment. Researchers are working on a home automation system that uses several technologies for connecting with in-house devices and an IP-based network for connecting the main home automation module with the rest of the managing and control components.

ISSN 2394 - 7780

E. Telecommunication
The IOT creates the possibility of merging different technologies such as Global System for Mobile Communications (GSM), Near-Field Communications (NFC), Bluetooth, Global Positioning Systems (GPS), sensor networks, etc to create new services.

F. Environment monitoring
Wireless devices increasingly used in today's applications and environmental conservation are a promising market in the future. Remote monitoring of forest fires, possibilities of earthquakes, potential floods and pollution reduce environmental risks. The wireless industry offers the opportunity to monitor petroleum personnel in critical situations, the tracking of containers and the detection of gas and oil leaks as a way of reducing the risk of accidents

V. IP FOR THINGS

If, in a future Internet of Things, everyday objects are to be addressed and controlled via the Internet, then we should ideally not be resorting to special communications protocols Instead, things should behave just like normal Internet nodes. In other words, they should have an IP address and use the Internet Protocol (IP) for communicating with other smart objects and network nodes. And due to the large number of addresses required, they should use the new IPv6 version with 128-bit addresses. The benefits of having IP-enabled things are obvious, even if the objects in question are not going to be made globally accessible but instead used in a controlled intranet environment. This approach enables us to build directly on existing functionality such as global interoperability, network-wide data packet delivery (forwarding and routing), data transport across different physical media, naming services (URL, DNS) and network management. The use of IP enables smart objects to use existing Internet services and applications and, conversely, these smart objects can be addressed from anywhere since they are proper Internet participants. Last but not least, it will be easy to use important application layer protocols such as HTTP. IPv6 also provides the interesting capability of automatic address configuration, enabling smart objects to assign their own addresses. Until recently, however, the prospect of full IP support for simple things appeared illusory due to the resources required (such as processor capacity and energy) and thus the costs involved. Instead, it was suggested to connect smart objects to the Internet indirectly via proxies or gateways. But the disadvantage of such non-standardized solutions is that end-to-end functionality is lost because standardized Internet protocols would be converted to proprietary protocols over the last few meters. Gateways would also generate added complexity, making installation, operation and maintenance time-consuming and costly.

VI. SOCIAL AND POLITICAL ISSUES

The Internet has long since changed from being a purely informational system to one that is socio-technological and has a social, creative and political dimension. But the importance of its non-technological aspects is becoming even more apparent in the development of an Internet of Things, since it adds an entirely new quality to these non-technological aspects. So in addition to the positive expectations mentioned above, several critical questions need to be asked with regard to possible consequences. Much of the public debate on whether to accept or reject the Internet of Things involves the conventional dualisms of "security versus freedom" and "comfort versus data privacy". In this respect, the discussion is not very different from the notorious altercations concerning store cards, video surveillance and electronic passports. As with RFID, the unease centers primarily on personal data that is automatically collected and that could be used by third parties without people's agreement or knowledge for unknown and potentially damaging purposes. And personal privacy is indeed coming under pressure. Smart objects can accumulate a massive amount of data, simply to serve us in the best possible way. Since this typically takes place unobtrusively in the background, we can never be entirely sure whether we are being "observed" when transactions take place. Individual instances of observation might seem harmless enough, but if several such instances were to be forwarded elsewhere, this could under certain circumstances result in a serious violation of privacy.Irrespective of the data protection issues, there is also the question of who would own the masses of automatically captured and interpreted real-world data, which could be of significant commercial or social value, and who would be entitled to use it and within what ethical and legal framework. Another critical aspect is that of dependence on technology. In business and also in society generally we have already become very dependent on the general availability of electricity – infrequent blackouts have fortunately not yet had any serious consequences. But if everyday objects only worked properly with an Internet connection in the future, this would lead to an even greater dependence on the underlying technology. If the technology infrastructure failed for whatever reason – design faults, material defects, overloading, natural disasters or crises – it could have a disastrous effect on the economy and society. Even a virus programmed by some high-spirited teenagers that played global havoc with selected everyday objects and thus provoked a safety-critical, life-threatening or even politically explosive situation could have very bad

ISSN 2394 - 7780

consequences. Remotely controlled things could also cause us to become dependent and lose our supremacy on a personal level. And even with no ill intent, our own smart objects might not behave as we would wish, but rather as they "believe" is best for us.It must be said that for an Internet of Things to be truly beneficial requires more than just everyday objects equipped with microelectronics that can cooperate with each other. Just as essential are secure, reliable infrastructures, appropriate economic and legal conditions and a social consensus on how the new technical opportunities should be used. This represents a substantial task for the future.

VII. CONCLUSION

In summary, one vision of the future is that IOT becomes a utility with increased sophistication in sensing, actuation, communications, control, and in creating knowledge from vast amounts of data. This will result in qualitatively different lifestyles from today. What the lifestyles would be is anyone's guess. It would be fair to say that we cannot predict how lives will change. We did not predict the Internet, the Web, social networking, Facebook, Twitter, millions of apps for smart phones, etc. New research problems arise due to the large scale of devices, the connection of the physical devices, localizing the objects, robustness, creating knowledge from vast amount of data and continuing problems of privacy and security. And political and social issues, It is hoped that there is more cooperation between the research communities in order to solve the problems

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TRANSFORMING PATIENT CARE IN THE 21ST CENTURY ROBOTIC SURGERY

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ABSTRACT
Robotic surgery is basically another way of doing laparoscopic surgery although with better technical inputs and technology. What is the one thing which has convoyed human since the beginning? Nonetheless, it is development. Human has experienced all sorts of development. Be it technical, economical or social; curiosity and need of humans have led to reliable discoveries and inventions. One of the prominent sectors where the need for development has always been felt in the sector of medical treatment. New and effective ways for diagnosis and treatment are being constantly worked on to reduce the risk, cost and enhance the overall results. Robotic surgery is one of the most advanced forms of surgeries that are surfacing in the medical sector. Robotic surgery has indeed marked the beginning of a revolution in surgeries.

INTRODUCTION
BACKGROUND AND HISTORY OF SURGICAL ROBOTS
Robots have occupied on progressively more importance in dreams and in realism. The Word Robot taken from the Czech (robota), meaning forced labor. Later spread by science fiction writer Isaac Asimov in the 1940s, robotics finally became reality in 1961 with the first industrial robot, UNIMATE, at a General Motors factory assembly line in Trenton, NJ, USA.

The first industrial robot UNIMATE

However industrial robots normally are used to operate in areas that are unsafe or not easily accessible by humans, medical-surgical robots were first presented in the 1980s to augment the medical staff by imparting superhuman abilities – high motion accuracy and enabling interventions that would be otherwise physically difficult.

Robotics was first introduced in urological surgery in the getting in the 1990s for both prostate and renal access. ProBot (prototype from Imperial College, London, UK) was a robotic resection device with seven degrees of freedom designed for automatic TURP for BPH. Meanwhile, PAKY-RCM (Percutaneous Access to Kidney–Remote Centre of Motion) and AcuBot were both established at Johns Hopkins University. These robots changed 2D biplanar fluoroscopy pictures into their own 3D robotic space for specific percutaneous renal access.

Initial surgical robots were computer-aided design/ industrialized (CAD/CAM) systems. These used pre-fixed anatomical landmarks as ideas of recognition and registration by the Computer or PC to allow movement within set limitations. The rigid and expected behavior of bone was first exploited. RoboDoc (Integrated Surgical Systems, Sacramento, CA, USA), first used in humans in 1992, incorporated prior two-dimensional (2D) fluoroscopic imaging to improve placement and dimensional accuracy of prosthetic implants by robotic drilling and bone preparation.

ISSN 2394 - 7780

RoboDoc

The US Food and Drug Administration (FDA) permitted NeuroMate in 1997 (Integrated Surgical Systems) to assist in stereotactic functional brain surgery based on preoperative head imaging. Differences in the CAD/CAM robots have been used in many subspecialties of medicine, combining various imaging methods with the precision of robotics. A 3D ultrasound-guided robotic needle placement can now even account for cardiac and respiratory motion reducing invasiveness and user preference.

Problem Definition

Need for Robotic Surgery

The requirement for robotic surgery was sensed when no working methods were found to challenge the limitations of minimally invasive surgeries which are allegedly more efficient than conventional surgeries. Robotic surgery is one of the most beneficial uses of robotics and is proving its worth every day. To be precise, robotic surgery is used to move the instruments while carrying out surgery. Instead of using the surgery instruments by hand, robotic arms are used which are controlled by proficient surgeons with the help of advanced computers. The movement of surgeons is interpreted to the robotic arms while observations are made through computer screens. Usually, it is also well-known as robotic-assisted or computer-assisted surgery.

Modern Robotics

The modern age of surgical robots began with robotic systems using constant input from surgeons to adjustment their movements according to input in real-time. In 1993, Automated Endoscopic System for Optimal Positioning (AESOP; USA) was the first FDA-approved endoscopic manipulator.

AESOP

AESOP plans the endoscopic a camera according to the surgeon's instructions communicated by either foot pedals or voice alone with advances in robotic engineering, the integrated master-slave systems were developed allowing very difficult minimally invasive surgery to be performed.

The Zeus system

The ZEUS robotic system (Computer Motion Inc.) joined an AESOP unit with two robotic manipulator arms. A surgeon seated at a console used polarizing glasses to view a flat-screen to advance a 3D image and manipulated handles to control the slave robot. Further abilities of voice control integration and telemonitoring were provided. FDA approval was granted in 2002. Nevertheless, Computer Motion Inc. was merged with Intuitive Surgical Inc. (Sunnyvale, CA, USA) and the ZEUS system was discontinued.

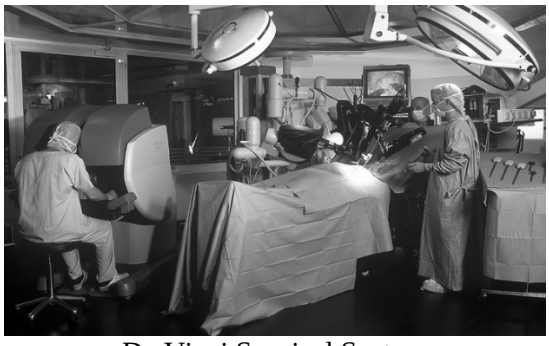
ISSN 2394 - 7780

Zeus system set up

Da Vinci system set up

The da Vinci Surgical System (Intuitive Surgical Inc.) appeared as the state-of-the-art telesurgical system. This master-slave robotic system copies the surgeon's exact movements on the master controls onto robotic apparatuses in the patient using their EndoWrist technology. A binocular lens and camera system transfers magnified 3D images to the surgeon console. In 2000, it was cleared by the FDA for use in general laparoscopic surgery, followed by clearances in 2001 for radical prostatectomy (RP) and 2005 for urological surgical dealings.

The most recent edition, the da Vinci Si, was launched in April 2009 presenting improved high-definition imaging and further streamlining of the complete system.



Da Vinci Surgical System

Indian SWARM

Indian SWARM

In India, Deshpande industrialized a native robotic system SWARM in 2004. Effort is going on for improvisation, indigenization, and economization that is needed to get a cost-effective and efficient Indian robot.

PROPOSED METHODOLOGY

PRACTICAL USES OF SURGICAL ROBOTS TODAY

In today's competitive healthcare marketplace, numerous organizations are interested in making themselves "cutting-edge" institutions with the most advanced technological equipment and the precise latest treatment and testing modalities. Doing so allows them to capture more of the healthcare market. Purchasing a surgical robot is, in essence, the entry charge into marketing an institution's surgical specialisms as "the most advanced." It is not rare, for example, to see a photograph of a surgical robot on the cover of a hospital's marketing brochure and yet see no word talk about robotic surgery inside. As far as ideas and science, surgical robotics is a bottomless, fertile soil. It may come to pass that the robotic system is used very slight but the technology they are making and the advances in ancillary products will continue. Already, the development robotics in routine

ISSN 2394 - 7780

surgeries exceptional. Whether this of robotics is driving interest in new tissue anastomosis techniques, improving laparoscopic instruments, and digital integration of already present technologies.

As stated, applications of robotic surgery are expanding rapidly into many different surgical disciplines. The cost of obtaining one of these systems remains high, however, making it improbable that an institution will acquire more than one or two. This low number of machines and the low number of surgeons trained to use them makes incorporation of changes with the passing of time remains to be.

What is the Robotic Technology

Robots are here to stay and have impacted the delivery of healthcare in a way that few technologies have in the history of surgery. Robotic technology has changed the fundamental foundations of surgery in the United States. There are now above 400 robots in the country and utilization rates are growing every year. In fact, it is estimated that in 2013 over 75% of all radical prostatectomies will be achieved with robotic assistance. Robotic technology has provided some important advantages for surgeons. It has allowed those not laparoscopically skilled to be able to offer their patients a minimally invasive alternative. For those who are laparoscopically trained it has given a stage for operating at a technically superior level. In India, the integration of robotic technology has already occurred but has not expanded or entered the majority. There remains a lack of access to technology and a deficit in educational opportunities. The reason unquestionably is not for a lack of utility of the instrumentation or the lack of benefit to the patient.

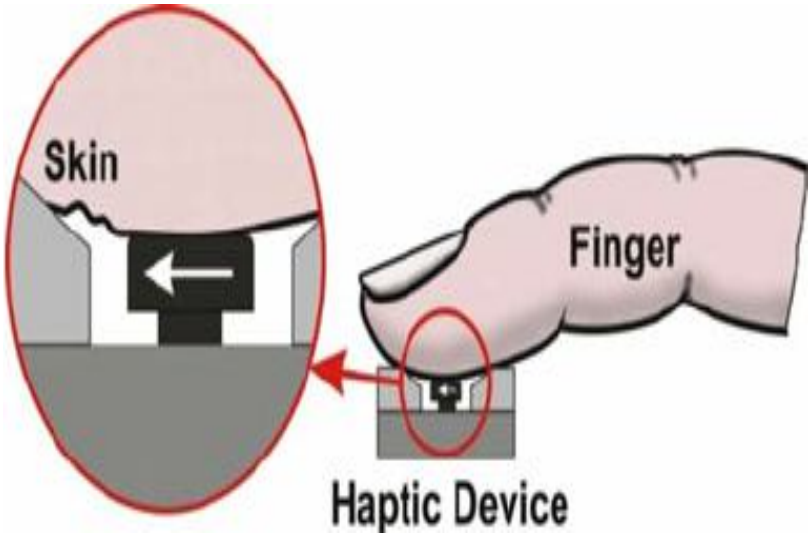
Robotic technology is costly and is showing no signs of becoming inexpensive.

Robotic technology is in India and will without question develop in the near future. The technology involves education and training for safe implementation. It also requires an economic backbone; the budget of this advanced technology must be taken on by either the hospital, surgeon or the patient. The best approach is likely an evidence-based evaluation of the technology at centers with expertise in laparoscopic procedures, at institutions where there are professionals in the field of prostatectomy and where the volume is considerable enough to allow frequent enough utilization to keep the surgeon and the team experienced. So the challenge for all Indian surgeons is to teach themselves first about the values of the next generation of technology, examine the alternatives and then selectively apply it in an evidence-based manner. This approach provides the most likely opportunity for patient safety and surgeon achievement.

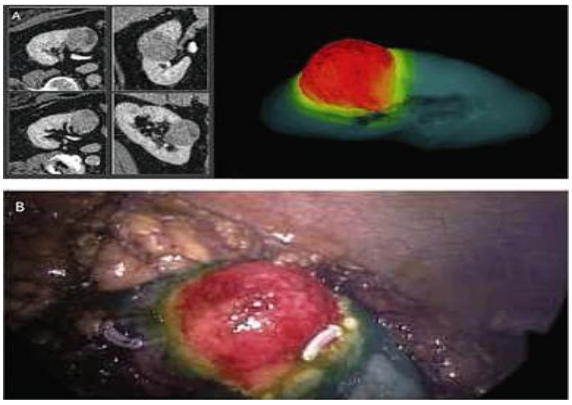
Future Developments

The future of robotic surgery will take this current stage forward by improving haptic (touch) feedback, improving vision beyond even the magnified eye, refining robot accessibility with a reduction of entry ports and miniaturizing the slave robot. Robotic arms let the surgeon to precisely maneuver surgical instruments with high-degree-of-freedom actions. A shortcoming frequently discussed is the lack of haptic feedback. Haptics defines touch feedback, which includes both kinaesthetic (forces and positions of muscles/joints) and cutaneous (tactile) feedback encompassing distributed pressure, temperature, vibration, and texture. Surgical techniques depend on precisely handling tissue. Sensory feedback of haptic cues is considered an essential part of open surgery.

Robotic surgeons have so far compensated using the enhanced visual feedback cues to estimate forces, but fine manipulation may still have cooperated with diminished haptic feedback



ISSN 2394 - 7780



High-definition robotic visualization continues to improve with better-quality resolution via shrinking electronic components. Further advances are underway to enhance surgical vision beyond even the magnified eye of the surgical robot. This can be accomplished through two approaches:

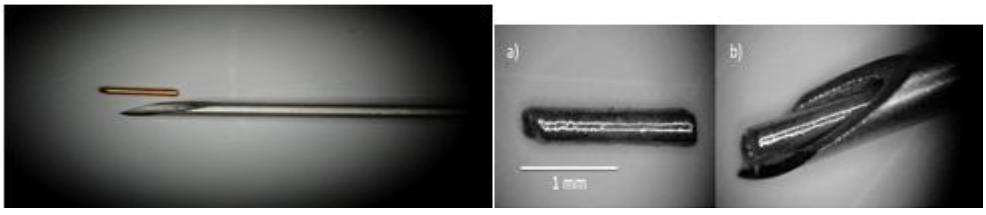
(i) Combining the surgical field with adjunct real-time imaging.

(ii) Refining visual resolution beyond the surface anatomy to visualize anatomical structures or small tumors difficult to see with the naked eye

Among the current problems of robotic surgery, availability to the patient remains a concern with the present da Vinci platform requiring a large sterilized field. Complex laparoscopic procedures request multiple trocar access for the endoscopic camera, two or three robotic instrument ports, as well as any extra assistant ports. Efforts have been made on many fronts to reduce and further mobilize the robotic platform and need to re-engineer this platform using current advances in laparoendoscopic single-site surgery (LESS) and orifice transluminal endoscopic surgery.

Single Insertion Surgery

Microbots



The introduction of the next generation of smaller robotic prototypes is underway to reduce the robotic platform. A magnetic anchoring and guidance system (MAGS) is a moveable magnet- or needle-lockable platform that is introduced by a single access port. These deployable cameras and instruments are placed intra-abdominally and stabilized by an external magnet placed on the abdominal skin making trocar-free surgery. Indifference to MAGS that are stabilized intraperitoneally on the abdominal wall, microrobots have also been technologically advanced to mobilize within the peritoneal cavity itself. The ViaCath system (EndoVia Medical) is a first-generation, teleoperated endoluminal device, consisting of a surgeon console and two flexible instruments located alongside a standard endoscope

CONCLUSION

Although still in its infancy, robotic surgery has at present proven itself to be of great value, particularly in areas unreachable to conventional laparoscopic procedures. It remains to be seen, however, if robotic systems will exchange conventional laparoscopic instruments in less technically demanding procedures. In any case, robotic technology is set to transform surgery by improving and expanding laparoscopic procedures, advancing surgical

ISSN 2394 - 7780

technology, and bringing surgery into the digital age. Furthermore, it has the potential to enlarge surgical treatment modalities beyond the limits of human capability. Whether or not the benefit of its usage overcomes the cost to implement it remains to be seen and much remains to be worked out.

The most important core technologies of the robotic surgical system are:

- A three-dimensional image of the surgical field filling the complete view in front of the surgeon with no disturbances.
- Articulation of the tips of the instruments related to conventional laparoscopic instruments.
- Total control of four robotic arms (telescope and three instruments) in a tremor-free environment with no pointless movements.

Superhuman movements, precision, and accuracy are what robotic surgery promises us today. Enhancements in the robotic surgical system are continuously being made to overcome the technical limitations found during the surgeries. It holds great promise for surgeons and patients alike. However, like any other technological advance, it too comes with a heavy price tag. Aggressive marketing by the manufacturers and surgeons may lead to unethical practices. At present, the scope for robotics in India is limited because of cost concerns. The future of robotic surgery in India also will depend on the same factor.

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UNIVERSAL TESTING MACHINE FOR NON-METAL

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ABSTRACT
Mechanical tensile testing plays an important role in evaluating fundamental properties of engineering materials as well as in developing new materials and in controlling the quality of materials for use in design and construction. If a material is to be used as part of an engineering structure that will be subjected to a load, it is important to know that the material is strong enough and rigid enough to withstand the loads that it will experience in service. Most common type of test used to measure the mechanical properties of a material is the tension test with the help of Universal Testing Machine (UTM). Tension test is widely used to provide basic design information on the strength of materials and is an acceptance test for the specification of materials. In tensile test, a specimen is prepared suitable for gripping into the jaws of the testing machine type that will be used. The specimen used is approximately uniform over a gauge length. The traditional UTM so many parts and drive on servo-hydraulic mechanism So the cost of machine is high. Here the horizontal UTM is introduced and load application mechanism includes a hand driven worm and wheel gearbox driving lead screw. In which user apply maximum load with minimum effort. This machine provides low cost solution for the engineering and engineering technology program.

INTRODUCTION
Universal tensile test is known as a basic and universal engineering test to achieve material parameters such as ultimate strength, yield strength, % elongation, % area of reduction and Young's modulus. These important parameters obtained from the standard tensile testing are useful for the selection of engineering materials for any applications required. The tensile testing is carried out by applying longitudinal or axial load at a specific extension. Mechanical testing plays an important role in evaluating fundamental properties of engineering material as well as in developing new materials and in controlling the quality of material for use in design and construction. A small-scale machine that fits on a benchtop and allows simple tensile tests of Non- metal specimens. The load application mechanism includes a hand-driven worm-and-wheel gearbox, driving a lead screw. These low-friction bearings, with the large handwheel allow the user to apply maximum load with minimum effort. They also give smooth and progressive operation, necessary to help the user apply a steady strain rate for best results.

The unit also has a smaller “quick advance” handwheel that allows the user to set the distance between the chucks simply and quickly before each test. The load measuring mechanism is a strain-gauged load cell that connects to a microprocessor-controlled digital display. A measuring scale measures the tensile displacement (extension) over the entire movement. A starter set of specimens with the machine, made of different Material like plastics, composite.

LITERATURE SURVEY
1. Year 2009, W. M. Banks and R. A. Pethrick did the tensile testing carried out project values for the mechanical properties have been obtained for natural fibers under various conditions. To understanding the structural behavior of the fibers under various environmental conditions.
2. Year 2010, J.E. Corona, and A.I. Oliva Works on The design, construction, calibration and compliance measurement of a universal testing machine for tension tests of materials in thin geometry.
3. Year 2016, Daudi S. Simbeye Improved the digital controller that is capable of achieving an industry-leading data acquisition rate, proved that the system has a precise motion control, high precision, high stability and powerful data analysis capabilities.
4. Year 2016, Baiju R Dabhi Improved gripping of the specimen with standard clamps with help of mechanical wedge gripper for better grip, suggested to develop the jaw grip by using stainless steel.

OBJECTIVE OF STUDY
1. The aim is to make the tensile testing machine for plastic and composite materials.
2. To reduce cost by replacing the hydraulic mechanism by simple manually operated mechanism with the help of gears.
3. To increase the accuracy by using strain gauge with digital display.

ISSN 2394 - 7780

4. To reduce complexity of machine and make economical.

METHODOLOGY

The process start with creating design of each part and done with final assembly in solid works then put into ansys software for determination of load. Next step is selecting appropriate material for each parts and assembled them accordance to the design. The load application mechanism includes handwheel, worm-and-wheel gearbox, driving a lead screw ensure the location of them and fit the specimen between two grippers. Note down the initial length with force and then drive the handwheel uniformly results grippers elongate the specimen therefore tension creates. Drive the handwheel till the specimen breaks at the same time note down the maximum force and maximum length from the digital display unit, just before the breaking action takes place. After getting the final reading we find out the strength of material.

SCOPE OF UNIVERSAL TESTING MACHINE FOR NON METALS

A traditional UTM is complex and high costly for non-metals such as plastics and other composite material. This UTM for non-metals machine which can reduce the complexity and cost as well as space also. It is economical for non-metals object. Due to the manually operation it reduces the higher electricity work and maintain the cleanliness due to the absence of hydraulic operation like other UTM machines. However, one of its drawback is it is limited to minimum tensile force due to less complexity of gearbox. This can be eliminated by using high strength gear along with increasing the quantity of gears. Accuracy can be maintain depending on instrument which are used for measuring forces. For an economic process development in comparison to others, a cost-effective and energy efficient it is suitable for low and medium scale industries.

CONCLUSION

Current demand of all industrial machine should be compact in space, economical and less maintenance. Universal testing machine for non-metals is less intricate, compact in design and cleanliness having in nature reduces overall cost of operation and make it economical for non-metal testing therefore it is able to fulfill the requirements current demand of industries.

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VIBRATION ANALYSIS AND EXPERIMENTATION OF CENTRIFUGAL PUMP IMPELLER

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ABSTRACT
The impeller is a rotating component of a Centrifugal Pump. In the Pump application, excessive vibrations encountered would pose a damaging effect on the impeller. Most of the dynamic machinery problems result from the interaction between the exciting forces and associated structural frequencies. When frequency generated by exciting force becomes equal to natural frequency, the amplitude of vibration becomes maximum causing resonance Hence the main objective is to carry out static vibration analysis and conduct experimentation performance on the Impeller of two material- MS and Nylon and record the running pump parameters – Pressure head (H) and flow rate (Q) and deserve when the pump is running smoothly without any noise. The smooth run, without noise, indicates that the vibration level is normal. To find out the natural frequency of an impeller modal analysis was carried out. Cad model generation was done in CATIA V5, meshing in HYPER MESH and ANSYS is for post-processing. The experimentation carried out using different material (MS and Nylon) should not only smooth run of the Pump but also improves the Pump efficiency resulting in sufficient power saving of the pump.

Keywords: Efficiency, Impeller, Duty point, Nylon

1. INTRODUCTION
An impeller is a rotating component of a centrifugal pump, usually made of iron, steel, bronze, brass, aluminum or plastic, which transfers energy from the motor that drives the pump to the fluid being pumped by accelerating the fluid outwards from the center of rotation. The velocity achieved by the impeller transfers into pressure when the outward movement of the fluid is confined by the pump casing. Impellers are usually short cylinders with an open inlet (called an eye) to accept incoming fluid, vanes to push the fluid radially, and a splined, keyed or threaded bore to accept a drive-shaft. The impeller made out of cast material in many cases may be called rotor. Also, it is cheaper to cast the radial impeller right in the support it is fitted on, which is put in motion by an electric motor, combustion engine or by steam driven turbine.

Table 1: Specification of the Pump (Duty Point)

Discharge Capacity	2.1 l/s
Number of revolution	2900 rpm
Number of blades	06
Head	11 m
Motor	1 HP
Flow type	Radial flow

Table 2: Existing Radial Flow Impeller Dimension

Parameter	**Size**
Impeller outer diameter	99 mm
Eye diameter	20 mm
Blade number	6 nos
Blade width at the inlet	5 mm
Blade width at outlet	2.5 mm
Inlet angle	19.25°
Outlet angle	23.76°

2. OBJECTIVES OF THE WORK
1. To study the **effect of vibrations** on impeller.
2. To analyze the **performance of pump** due to vibrations and Noise.
3. Comparison of **Efficiency** of existing impeller with Nylon.
4. A CAD model analysis of impeller to find out the **changes in Natural frequency of vibrations**.

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3. ADVANTAGES OF NYLON MATERIAL

1) Light weight

2) Abrasion resistant

3) Resists shrinkage and wrinkles

4) Fast drying, low moisture absorbency

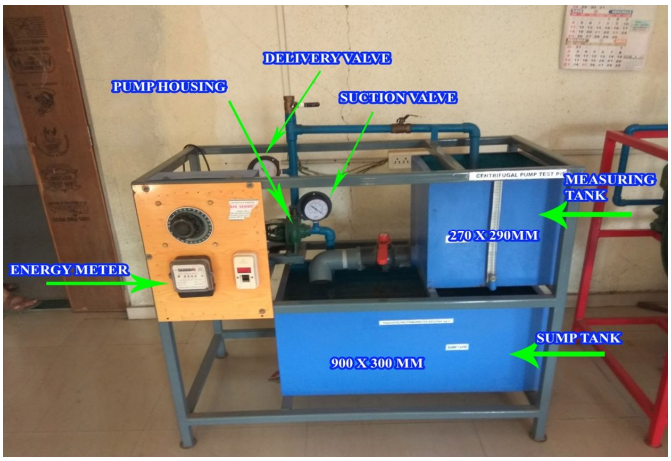
5) Resists damage from oil and many chemicals

6) Insulating properties

A Centrifugal pump with Nylon Impeller can be use for the flow of acids in chemical industries.

It is can used to flow the hot water in thermal industries efficiently.

4. EXPERIMENTAL SETUP & CALCULATIONS



Project set up

Nylon impellor

The experiment was carried out on best suited alternate material for pump impeller i.e. Nylon. FFT (Fast Fourier Transforms) analyzer is used to measure vibration response of a system. In experimental modal test, structure is artificially excited by using impact hammer and performing running test on actual working condition.

4.1 SETUP CALCULATIONS

4.1.1 Performance of single stage Centrifugal Pump (99mm Impeller Dia), CI Material Kirloskar make pump

(Data:- Measuring Tank C.S.Area :29X29cm, Water Volume =8410 cm3,

(Po) output Power= ρ x g x ht x Q÷1000(kw); Pi (Input Power=$\frac{3600}{3200} X \frac{10}{t1}$) η (efficiency)=$\frac{Po}{Pi} x100$)

4.1: Performance of single stage Centrifugal Pump (99mm Impeller Dia)

Sr. No	Delivery Pressure (Hd)	Suction Pressure (Hs)	Time for 10 Pulse of Energy meter (t1)	Time for 10 cm water column rise in delivery Tank (t2)	Total Pressure Head (Ht)	Water Flow Rate (Q)	Output Power (Po)	Input Power (Pi)	Pump Efficiency (η)
Units	m of Water	m of Water	Sec	Sec	m of Water	m3/s	kw	kw	%
1	2.5	3.483	13.57	2.14	5.983	0.00393	0.2307	0.8290	27.8224
2	5	3.000	15	2.5	8.000	0.00336	0.2640	0.7500	35.201
3	7.5	2.590	23.79	5	10.090	0.00168	0.1665	0.4729	35.2069
4	10	2.000	52.82	12	13.000	0.00070	0.0894	0.2130	41.9636
5	12.5	1.500	52.9	12.61	14.000	0.00067	0.0916	0.2127	43.0706

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2.5 m of water)

Suction Pressure Head,

Hs= -3.483 mHg

=-3.483 m of water

Total Pressure Head = ht = hd-hs

=2.5-(-3.483) = 2.5+3.483

=5.983 m of water

= 600 cmwc

Discharge of Water =Q= $\frac{w \times b \times h}{t_2} = \frac{0.29 \times 0.29 \times 0.1}{2.14}$ =0.0039299 m3/s

Po= Power Output= $\frac{\rho}{1000}$ x g x ht x Q (kw) = $\frac{1000}{1000}$ x 9.81 x 5.983 x 0.0039299

0.2307kw

Pi = Power Input = $\frac{3600}{3200}$ x $\frac{10}{t1}$ = $\frac{360}{32}$ x $\frac{1}{13.57}$ = 0.8290 kw

$\therefore \eta p$ = Pump efficiency = $\frac{Po}{Pi}$ = $\frac{0.8290}{0.23074}$ x 100 =27.8224 %

4.2: Performance of single stage Centrifugal Pump (99mm Impeller Dia),

Sr.No./	Delivery Pressure	Suction Pressure	Time for 10 Pulse of Energy meter (t1)	Time for 10 cm water column rise in delivery Tank (t2)	Total Pressure head (Ht)	Water Flow Rate (Q)	Output Power (Po)	Input Power (Pi)	Pump Efficiency (η)
Units	m of Water	m of Water	Sec	Sec	m of Water	m3/s	kw	kw	%
1	2.5	4.483	13.97	2.14	6.983	0.00393	0.2692	0.8053	33.4299
2	5	4.000	14	2.5	9.000	0.00336	0.2542	0.8036	36.961
3	7.5	3.590	23.79	5	11.090	0.00168	0.1830	0.4729	38.6962
4	10	2.500	51	10.96	12.500	0.00077	0.0941	0.2206	42.6562
5	12.5	1.500	54	12.61	14.000	0.00067	0.0916	0.2083	43.9663

4.1.2 Perfomance of single stage Centrifugal Pump (99mmImpeller Dia) ,Nylon Material with Kirloskar casing

(Data:- Measuring Tank C.S.Area :270X290 mm, Water Volume =8410 cm3,

(po) output Power= ρxgxhtxQ÷1000(kw); Pi(Input Power=$\frac{3600}{3200} X \frac{10}{t1}$, η (efficiency)=$\frac{Po}{Pi} x100$)

Sample calculations.

Calculation for Sr No (1) Where delivery pressure of 2.5 m of water)

Suction Pressure Head,

Hs=-4.483 m of water

Total Pressure Head = ht = hd-hs

=2.5-(-4.483)

= 2.5+4.483

=6.983m of water

= 700 cmwc

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Discharge of Water =Q= $\frac{w \times b \times h}{t_2} = \frac{0.29 \times 0.29 \times 0.1}{2.14}$ =0.0039299 m3/s

Po= Power Output= $\frac{\rho}{1000}$ x g x ht x Q (kw) = $\frac{1000}{1000}$ x 9.81 x 6.983 x 0.0039299

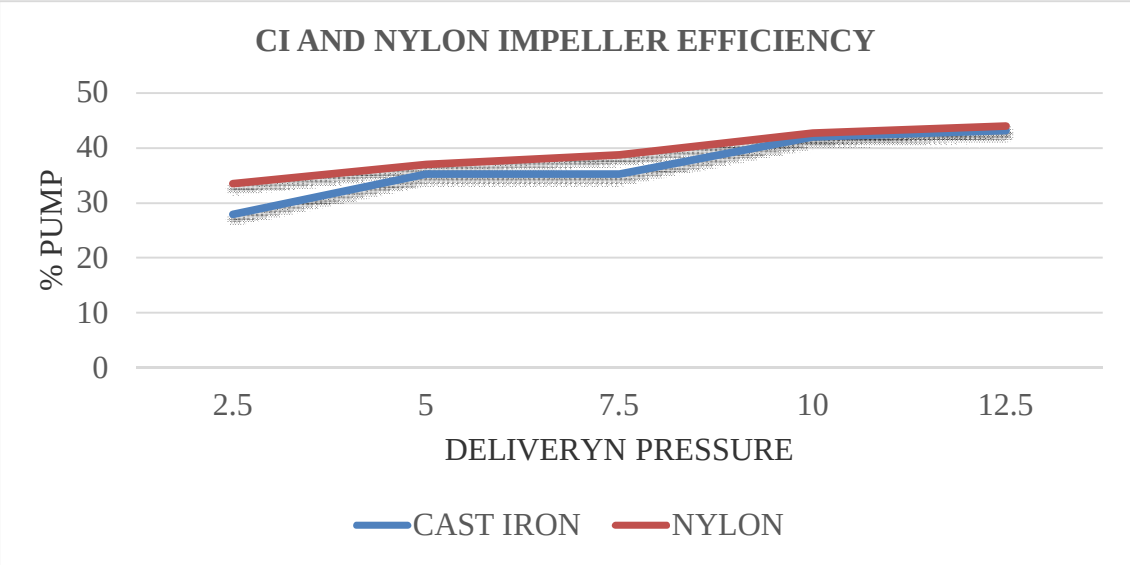
0.2692 kw

Pi = Power Input = $\frac{3600}{3200}$ x $\frac{10}{t1}$ = $\frac{360}{32}$ x $\frac{1}{13.97}$ = 0.8053 kw

∴ ηp = Pump efficiency = $\frac{Po}{Pi}$ = $\frac{0.2692}{0.8053}$ x 100 =33.4285 %

4.3. Comparison of Nylon and CI Impeller efficiency

Sr.No./	Delivery Pressure	Pump Efficiency (η) of CI	Pump Efficiency (η) of Nylon	Increase Efficiency of Nylon
UNIT	m of Water	%	%	
1	2.5	27.8224	33.42987	5.607464
2	5	35.201	36.96104	1.760038
3	7.5	35.20691	38.6962	3.489289
4	10	41.96362	42.65625	0.692626
5	12.5	43.07062	43.96625	0.895633



4.4 Graphical Representation of Nylon and CI Impeller efficiency

4.2 Additional Merits of Nylon Impeller Pump

1) Corrosion is Avoided
2) Starting torque less hence saving in power & Electricity Bill.
3) Sample calculation for saving in input power & electricity Bill.

Nylon Impeller

∴ Difference = (Pici- PiNylon)=

= (0.8290-0.8053)=0.0237 KW

∴Per day per pump energy saving Considering 24 Hr. operation /day for industrial use & tariff of Rs 8.5/KWH = 0.0237x 24x 8.5= Rs 4.8348 /Day /Pump/ Rs/Kwh

Rs 4.8348 Saving of Input Power

For single Pumps Such in operation

ISSN 2394 - 7780

& for one Year (365 –60) = 305 Day (considering 2 Month for Maintanance)

∴ Per Year Power saving for 1 Pump=

=4.8348 x 1 x 305= Rs 1474.61

For 15 Years life period of pump the saving is =1474.61x 15

22119.21/-≅ Rs.22120 /- (for single Pump)

Assuming (10) Pumps Such in operation

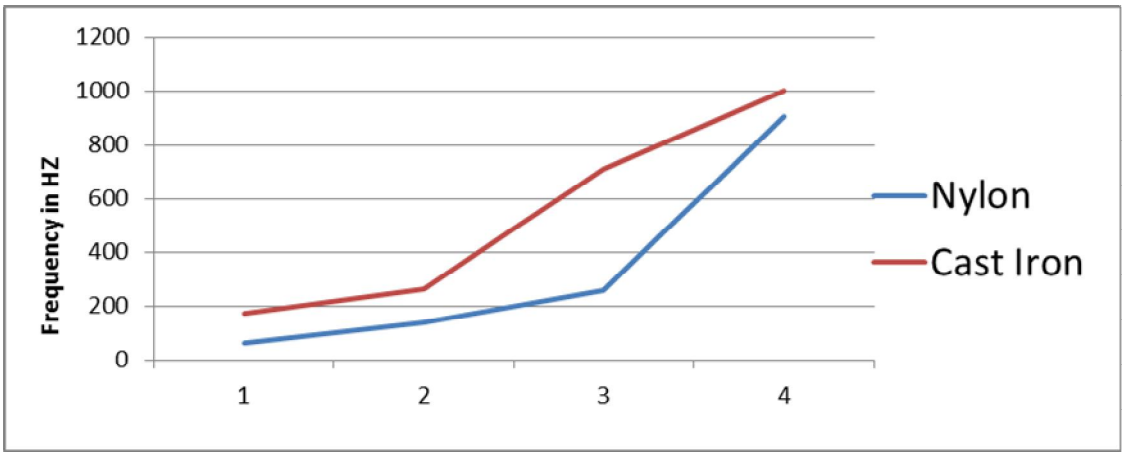
For 15 Years life period of pump the saving is =22120 x 10

Rs.221200/-

Natural frequency for different mode of two different materials are as follows:

4.5: Frequency Mode For Two Different Materials

Frequencies Modes For Two Different Materials in Hz.				
Nylon	63.617	137.92	256.11	907.48
Cast Iron	174.71	264.37	709.61	1000.2



Frequency Graph of Different Materials

5. CONCLUSIONS

1) From the above Experimentation and analysis data, we can conclude the following points.
2) Reduced natural frequency of vibration due to reduced weight of impeller.
3) Starting torque required is found less which improved the performance of pump, hence saving in power & Electricity Bill is possible. (for one year Rs 1474.61 & For 15 Years and 10 pump Saving Electricity Power in Rs.221200/-) [calculation are made hand calculated]
4) Improved the pump Efficiency by 5.60 % due to use of nylon impeller
5) From the CAD model Analysis the reduced natural frequency of vibration is conformed.

FUTURE SCOPES

1) Further experimentation can be carried out with compound material instead of pure homogeneous material like Nylon, in future to get more and more efficient results.
2) Experimentation can be carried out to flow water for more height.
3) In feature we can change the light material than Nylon and change the Efficiency of pump.

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FINANCIALLY OPTIMIZED SCHEDULING OF CIVIL ENGINEERING PROJECTS

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ABSTRACT
Construction Project Scheduling is the process in which planning of systematic arrangement of activities is done with an activity sequencer. Eventually, methods containing Resource Management and Time-Cost Trade-Off analysis were formulated to optimize CPM/PERT schedules so as to achieve consumers' requirement concerning project cost, duration, and resources. Though, funding the entire construction activities for the whole project journey is one of the critical aspects that must be treated well, or else, impractical schedules may occur. Hence, scheduling construction activities in any case in advance with the available funds give a rise for obtaining pragmatic schedules. Therefore this paper recommends financially optimized scheduling technique to formulate financially economical schedules that equalizes the financial demands during construction process at any period of time with the funds available during the same period.

1. INTRODUCTION

1.1 Theoretical background

An essential element for contractors to operate a profitable enterprise is the ability to acquire appropriate funds without any delay and to carry out construction activities with minimal financial resources. Contractors are always concerned in establishing schedules that ensure project negative cash flow from over expenditure of the pre-determined legal lending limit. Scheduling activities for construction projects comprise of three contradictory objectives viz. project duration, project total cost, and project total delay time. Productive resource management plays a significant role in terms of project total cost, duration, and delay time. CPM/PERT were formulated with a fundamental concept of customizing total project cost and duration. Resource management tools are among the mechanism that provides a significant improvement. Even though finance is one of the construction resources, none of the resource management techniques take into account the modified CPM/PERT schedules to stabilize project liabilities with the funds availability for the project's duration. Considering that this principle of scheduling underlies cash availability, it is considered as financially-optimised scheduling.

1.2. Motivation behind the Study

Numerous researches have made on establishing arithmetical templates finding an outcome for time-cost trade-off problems (TCTP). However, TCTP researches have not taken into account the parameter of scheduling activities based on available finance.

This paper presents a technique for establishing financially optimised schedules by considering the scheduled task in the required periods to the finance available during the same periods.

1.3. Objectives

a) To plan the construction project based on borrowing allowance and finance available to the contractor during that period.

b) To apply the technique of formulating a given problem as templates by considering different parameters.

c) To compare the time and cost of financially optimized scheduling technique with conventional technique.

2. LITERATURE REVIEW

2.1 General

Numerous techniques for handling linear scheduling problems have been developed in recent decades.

Selinger (1980) used dynamic programming to minimize project duration for linear construction projects. Handa and Barcia (1986) presented an integer programming model to optimize the project duration. Russell and Caselton (1988) extended the work of Selinger in developing a two state variable, N-stage dynamic programming formulation that minimizes the duration of linear construction projects. Rada and Carr (1989) used mixed-integer programming to solve time-cost trade-off problems (TCTPs). Reda (1990) utilized a linear programming formulation to minimize the project direct cost for a given project duration. Liu et al. (1995) used a linear/integer programming hybrid method to perform time-cost trade-off analysis. Time-cost trade-off analysis is concerned with selecting appropriate resources including crew size, equipment, methods, and technologies to complete the activities of a project within required durations at minimum cost (Li et al. 1999).

ISSN 2394 - 7780

However, TCTP studies in the literature did not consider the aspect of scheduling activities based on cash availability. Elazouni and Gab-Allah (2004) designed a method for devising financially feasible schedules that balances work with the available cash to perform it. The method offers a realistic and useful concept of scheduling construction projects; builds trust in CPM schedules and thus increases the willingness to use the CPM as a project management tool; produces realistic schedules as far as finance availability is concerned and thus increases the utility of schedules; achieves financial feasibility besides the demanded goal of time minimization; defines an extension scheme that fulfils finance constraints from searching in a boundless solution space to searching in a well-defined definite solution space.

3. METHODOLOGY

3.1.1 Formulating preliminary system

The preliminary system for a CPM schedule, as shown in Fig. 1, is a bar chart that represents project activities against project duration. The total float is added before each activity, shows the peak deviate without influencing project time span. Fig. 1, is a substitute activity of critical project activities as it is

the finishing activity in the CPM schedule.

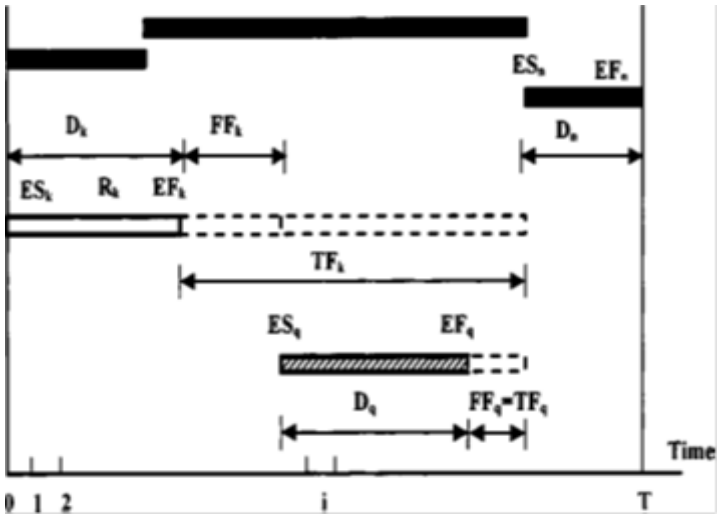

Fig-1: Preliminary system for CPM schedule with prevailing activity k
(10.1061/(ASCE)0733-9364(2004)130:1(15))

3.1.2 Formulating extended system

Formulating CPM schedules that are limited to predetermined legal lending limits requires extension instead of constriction. Practically, several extensions can be generated for the considered schedule. Attaining the objectives of formulating financially affordable schedules and minimizing project duration requires formulating an extended system. The extended system, as indicated in Fig. 2, is the modification of the preliminary system that enables a specific extended accretion I in the critical path, accumulates the extended accretion to the actual project duration to estimate an extended duration (T+I), and extends the total floats of activities by the extended accretion to develop revised total floats.

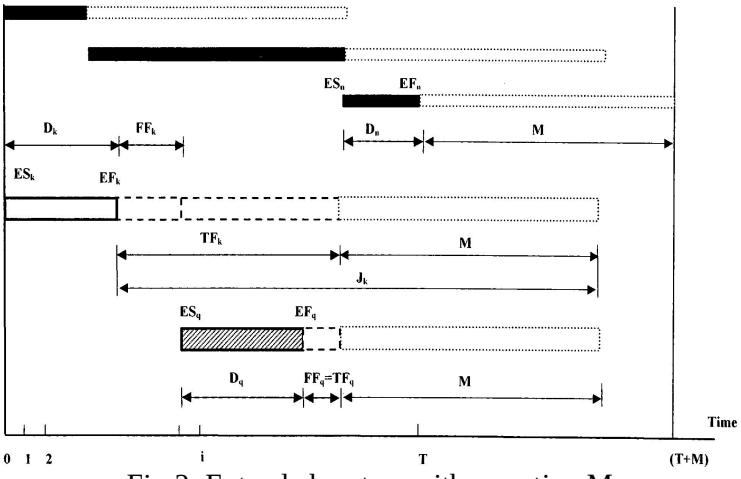

Fig-2: Extended system with accretion M
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ISSN 2394 - 7780

This total float is the time gap wherein an activity can be deviated without influencing the extended duration. For example, in Fig. 2, activity k can be carried completely at the end of its illustrated revised total float. Therefore, activity n should be shifted to the end of its adjusted total float by keeping the correlation wherein activity n depends upon activity k. Hence the deviate of activity k may have to be completed without resulting in more extension across the extended duration. Similarly the system is applicable among activities q and n. The extended system allows formulating a template which concurrently schedules activities so that negative cash flow devalues the prescribed lending limits and reduces the extension in the actual CPM schedule.

3.1.3 Template Drafting

The Template drafting phase supports developing a template for the extended system and incorporates the elements to set a target, along with adjusting limitations for example activity deviating, activity chain, and predetermined borrowing allowance. The template introduced consist of limitations that accumulated to optimize the financial element

4. INFORMATION COLLECTION & ANALYSIS

4.1 Finding an outcome

The purpose of finding an outcome is shown briefly in Fig. 3. Finding an outcome is done, and if it is remain unresolved, reiteration of last two phases of the process is done. The reiteration operation involves allowing a longer extended accretion and thereby adjusting total floats. However, the lack in finding an outcome after many iteration is erformed shows an inadequate lending limit.

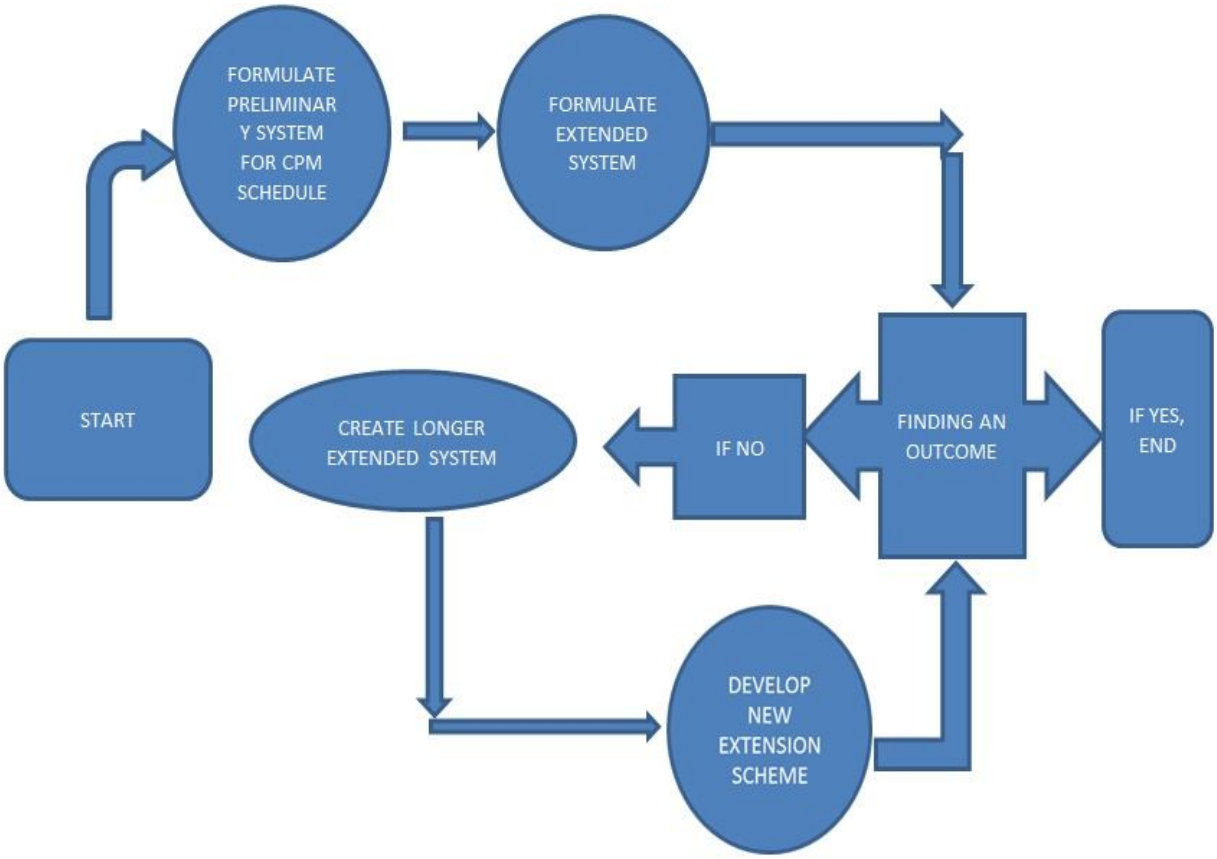

Fig-3: Logic involved in course of finding an outcome

4.2 Application of Method

An example of construction project is considered and put forward in this paper to illustrate the phases of the financially optimised scheduling technique. Fig. 4(a) indicates the actual schedule of a project includes twenty one activities with a working day as the trading period. The direct cost per day over all individual activity is mentioned. The total duration is 45 working days, which indicates seven full periods, all consisting of 6 working days and an eighth period of 3 days. The indirect costs of the project were assumed to be 10% of the direct costs. As stated earlier, the period was selected as a week of 6 working days. The payment is received 1 week once the weekly claim for the payment is done, with no advance payment. An interest rate of 0.15% per week was considered. The early and late start Schedules, as well as the total cash financial flows for the project's duration, are presented in Tables 1 and 2, which indicates that the maximum cash required is ₹4,93,900 and ₹2,30,400 for early and late start schedules, respectively.

ISSN 2394 - 7780

4.3 Final Project Schedule

Table 3 represents the output of the deviate cost of activities and composed schedules at the predetermined borrowing allowance. Moreover, Table 4 represents the financial flows with the project duration, and highest financial demand. Note that the highest financial demand shall not surpass the predetermined borrowing allowance. Scheduling within small borrowing allowance gives rise to impediment that transpires when the disposable income for the stipulated time does not allow for any work to proceed. These impediments can be resolved by increasing the project borrowing allowance.

Table-1: Overview of Scheduling Results at Predetermined Borrowing allowance Deviating Start of Activities and Project Duration (Working Days)

Activity	Days	Initial schedule		Deviated schedule	
		Start	Finish	Start	Finish
Excavation	2	1	2	1	2
PCC	7	3	9	3	9
Bar bending (Foundation & Plinth)	4	4	7	4	7
Foundation Shuttering	2	11	12	11	12
Concreting & Curing (Foundation)	4	13	16	12 & 13	15
Shuttering (Plinth)	1	17	17	17	17
Plinth Casting & Curing	4	18	21	19	22
Plinth Filling	2	20	21	20	21
Bar bending	7	8	14	8	14
Timbering & Shuttering (Column)	2	22	23	22	23
Column Casting & Curing	4	24	27	24	27
Brick Masonry	3	26	28	26	28
Timbering & Shuttering (Beam & Slab)	2	28	29	28	29
Slab Casting & Curing	15	30	45	30 & 31	45
Plastering	3	29	31	29	31
Gypsum Coating	2	32	33	32	33
Door & Window frame fitting	2	27	28	27	28
Electrical & Plumbing	3	28	30	28	30
Flooring and Skirting	3	30	32	30	32
Painting (Exterior)	3	33	35	33	35
Painting (Interior)	3	33	35	33	35

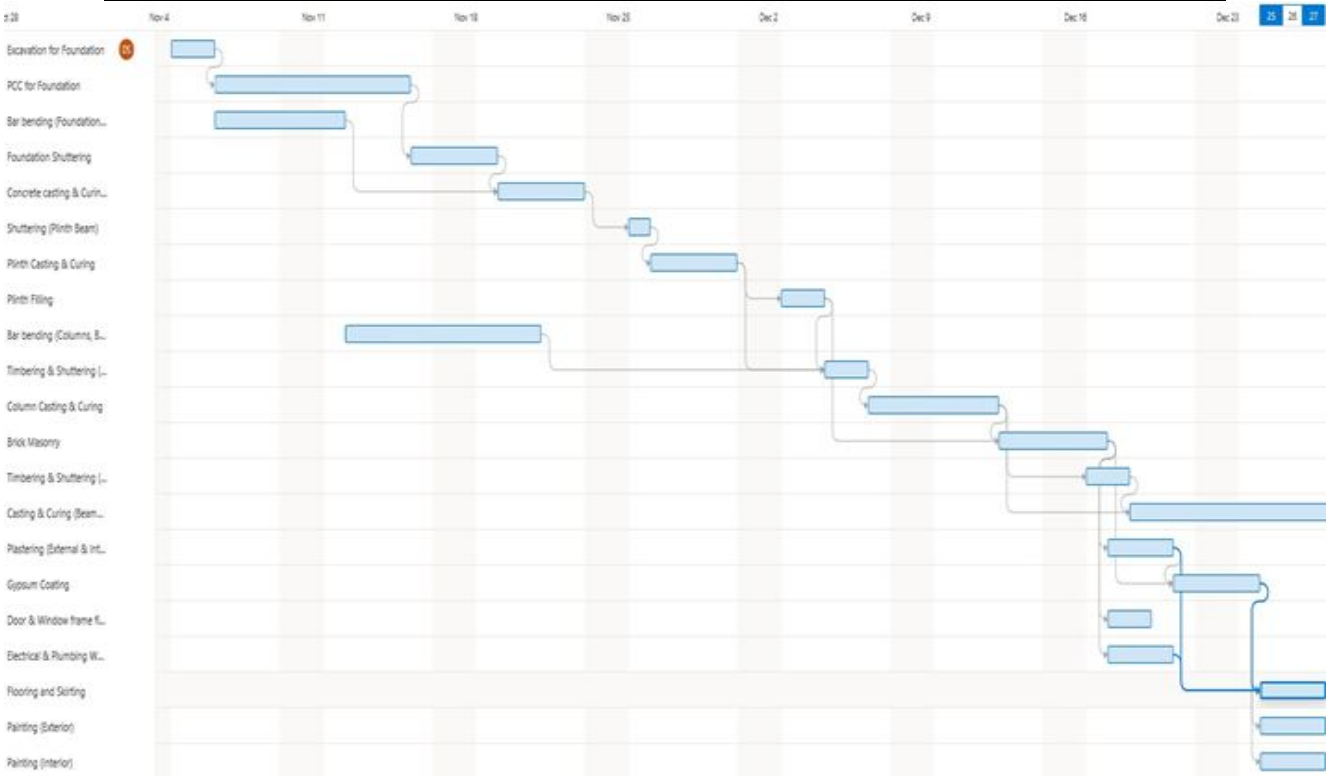

Fig-4 (a): Time scaled diagram indicating activity schedules

ISSN 2394 - 7780

Table-2: Project: Total Financial Flows including Project Duration

Tota Financial flows before receipt of weekly payment (₹)		
End of week	**Initial schedule**	**Deviated schedule**
1	(-53,400)	(-53,400)
2	(-2,9400)	(-2,30,400)
3	(-4,93,900)	(-2,12,400)
4	(-3,9900)	(-1,20,400)
5	(-3,855,00)	(-2,15,500)
6	(-47,800)	(-2,17,500)
7	(-1,800)	(-1,800)
8	(-900)	(-900)
Maximum cash required (₹)	(-4,93,900)	(-230400)

5. FUTURE SCOPE

Future amendments of the interface program involves tying current project schedule apps, viz Microsoft Project (MSP) and Primavera, with the program data access matrix in such a way that schedule activity determination, precedence co-relations, duration and cost can be precisely implied to the interface program, so that two fold management of collected statistics and altering the outcomes of the scheduling can be avoided.

6. CONCLUSION

The technique provides a pragmatic and beneficial approach of scheduling construction projects; produces pragmatic schedules till finance is available; attains financial optimization apart from the obligatory objective of time reduction; establishes an extended system that satisfies finance impediments from finding in an indefinite solution space to finding in a well-defined space; offers a useful device for trading and developing good bank overdrafts.

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SIGNIFICANCE OF ENGLISH COMMUNICATION FOR ENGINEERING STUDENTS

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ABSTRACT
This research paper presents the Significance of English Communication (EC) for Engineering Students and the problems faced by them and its remedies. The literature review reveals the importance of English in making the global records of diverse fields – science, education, international business and other professions. Around the world, English is the associate official language of several countries including India in both local and global professional perspectives. In India, English is mandatory in engineering academics therefore the budding engineers who are non-native speakers are needed to learn English competently to become effective communicators. This paper explores the need of active-participation of teachers and students in learning English through LSRW (listening, speaking, reading and writing) and improving communication skills through task-based activities such as presentation, role-play, group discussion, mock-interview, proposal and report writing, etc. It also epitomizes the required reforms in teaching-learning process to build the essential qualities demanded by MNC (Multi-National Companies) and global industries. Finally, the remedies describe some domains for students' practice that could make them to lead getting success in presentations at seminars, conferences and campus interviews.

Keywords: English Communication, mandatory, teaching-learning process, engineering students, effective communicators

1. INTRODUCTION

The paper "***Significance of English Communication for Engineering Students***" highlights the learning of English language and its impacts in life especially students of engineering. Learning English, apart from building your self-esteem, opens more opportunities in *international career* and in *knocking down a lot of barriers including cultural ones*. In India, the lack of English knowledge and its fluency always kept our engineering students back from participating and applying for courses and they also felt a very low self-esteem or unworthy. This situation resembles a quote – "**If you are not growing, you are dying**".

Life is learning and learning is life. The journey of life offers various challenges and *the journey learning makes capable of facing all those challenges*. The learning is very important to broaden your horizons and to improve yourself *to discover your hidden talents for overcoming the fear and obstacles.* Learning is possible through a language that evolve with culture so there is no a fix point where you can say yes I have learned the language completely. Rather it is a journey, where you learn something new every day.

2. LITERATURE REVIEW

The initiation of the research topic has been additionally motivated by reading number of reference papers, books and websites that are so related to the title. This literature review exhibits the reliable data of those references that add more weightage and support to the result of this attempt:

1. (A) "*Reading maketh a full man, conference a ready man, and writing an exact man*" – **Francis Bacon**, the famous essayist, has rightly observed in his well-known essay 'Of Studies'. (B) It is true that of all the four skills – LSRW is probably the most crucial skill. By all means, effective reading skills are vital to achieve success not only in one's academic but also professional life [Ref.5, Ch.16 pg.355].

2. (A) Role of English language in daily life in a state can't be separated from the geographic, historical, cultural and political influences even though those fields are not vulnerable to change. (B) A successful learner is a person who is able to identify and use English in various situations in community [Ref.9].

3. (A) Knowing the importance and growing demand of English communication competence for engineering students from rural areas, there is a need for the teachers as well as the students to make integrated efforts. (B) The rural area engineering students should effectively make use of the faculty, education system and the amenities provided to them in combination with the self-efforts, to emerge as a competent user of English communication to become successful in life and career [Ref.7].

4. (A) Data analysis reveals that the teaching practices are almost the same in the ESL and the EFL contexts, where teacher-centred classroom, exam-oriented activities and traditional teaching methods are dominant. (B) Schools play a role in promoting languages in accordance with the policies determined by the state. Though

ISSN 2394 - 7780

English is widely chosen by students at different levels, it is not recognizably used in the social context. India, on the other hand, is another case where English enjoys the status of an associate official language. The extensive use and the constitutional appeal of English in India make one label it as a second language [Ref.8].

5. (A) *The nature of language performance in the context of task-based instruction*: The nature of task-based instruction and relevant research effects the three different tasks - *Personal Information Exchange, Narrative, and Decision-Making* and three different implementation conditions for each task - *unplanned, planned but without detail, detailed planning on the variables of fluency, complexity, and accuracy*. (B) The study contributes to *the development of cognitive models of second language performance* and addresses a number of *pedagogic issues* [Ref.3].

3. LANGUAGE THEORY

A language is the speech of a group people and it is like life of the human body keeps changes on its fundamental property all the time. There are no appropriate theories about the origins of human speech so no one knows exactly how the language originated. However, there are some notices on language *sound system that undergoes the maximum change at first in speech and then relatively fewer changes take place in grammar over long stretches of time*. Let us see briefly some considerations of language theory:

3.1 The Divine Source Theory: Generally, every society has a divine story to tell about the origins of its language. The researchers noticed that the alphabetical symbols or ideographs used in writing are often associated with divine images.

3.2 The Natural Sound Source Theory: Another view, the origin of human speech has some words which seem to echo naturally occurring sound just as in English - cuckoo, buzz, hiss, bang, and bow-wow. Later, the early men and women heard and imitated these sounds with expressions or emotions. In 1871, Darwin's ***"Descent of Man"*** proposed '*like man his language also developed probably from expressions of emotions*' by the action of puffing of air out through the nostrils or the mouth and sounds like 'pooh' or 'pish' which are named as "**Pooh-Pooh Theory**". Muller's **"Ding-Dong Theory"** proposed '*there was a mystic relationship between sound and meaning*'. The human being's mind naturally gave a particular response to every impact the world made upon it just as solid bodies collision and its sound.

3.5 Purpose of a Language: Language must have evolved because humans needed it to the purposes of:

- To give factual information as well as conveying commands with emotion and feelings
- To maintain friendly social contact by chitchat or small talk
- To improve the imaginative reasons like poetry
- To relieve panicky and stress

3.6 Language like Assets: Language like money, land, property and status acquires unite and maintain power. Everybody speaks language and everybody uses it '**to mean something in a given context**' but only standard language is used as an extremely effective and powerful asset. *Knowledge prominences are encoded in the standard language* to receive social approval not the sub-standard. Language and its contexts are often carefully crafted to sustain power and for neutral social construct and that is said as -

- ✓ "Language is that system by which sounds and meanings are related." (Fromkin and Rodman, 1974)
- ✓ "Language is a system of sounds, words, patterns, etc. used by humans to communicate thoughts and feelings." (Oxford Advanced Learner's Dictionary 1989)

3.7 Usage of Language in Communication: The use of language is an integral part of being human and it is so spontaneous that we pay no more attention to it than we do to our breathing or beating of our hearts. It is the fact that through a native language one can acquire knowledge better but it helps only at native. English is must for the rest of the world deal and possibility of learning this language is only by **improving its vocabularies** - synonyms and antonyms; **forming phrases** – noun, verb, adjective and prepositional and **structuring clause**s – simple, complex, compound and compound-complex through and using it to acquire the worldly knowledge for communication. In communication, human beings use sound signals like animals but the difference is they transfer language to visual symbols (images and writing) which is most obvious characteristic that distinguishes human communication from animal communication.

4. THE HISTORY AND DEVELOPMENT OF ENGLISH

4.1 Emergence of English Language: The formation of English from Indo-European is "the story of three invasions and a cultural revolution. The language was brought to Britain by Germanic tribes - Angles, Saxons,

ISSN 2394 - 7780

and Jutes, influenced by Latin and Greek when St. Augustine and his followers converted England to Christianity, subtly enriched by the Danes, and finally transformed by the French – speaking Normans[Ref.1].

4.2 Development of English: At first, English was recognised as the language of Anglo-Saxon. The history of English language is perhaps started as the speech of some Germanic tribes in Europe. In the 1500 years of its existence, English has developed continuously and its character of word-stock changed (relation to sounds and spelling) from Germanic to partly Romance. There are three kinds of thing we have to consider – *the increase of vocabulary through borrowing from different sources*, *formation and coinage of new words and compounds*, and *changes in the meaning of words*. In this development, it is possible to see three main periods such as ***Old English 450 A.D. – 1100 A.D., Middle English 1100 A.D. – 1500 A.D.,*** and ***Modern English 1500 A.D. – the present*** in which series of changes were brought by migrations, invasions, conversions, settlement and colonisation.

English language itself is seen as a kind of organism with its own laws of change in pronunciation in spoken form by so many different people and it maintains its standard by the following works:

- Robert Cawdrey's **A Table Alphabetical**, the first all-English dictionary appeared in 1604.
- Dr Johnson's celebrated dictionary coded words and their spelling in 1755.
- **The New English Dictionary on Historical Principles** appeared from 1884 to 1928. Later, it was revised and reprinted with a supplement as **The Oxford English Dictionary** in 1933.
- John Walker produced **A Critical Pronouncing Dictionary** in 1791
- Daniel Jones published the **English Pronouncing Dictionary** in 1917 – recorded the pronunciation used by a considerable number of typical Southern English people in ordinary conversation.

5. THE STATUS OF ENGLISH

5.1 At Internationally: Once, English language was of Anglo-Saxon. Now, it becomes native language of the United Kingdom, the USA, Canada, Australia, Ireland, New Zealand and it has more than 400 million native English speakers. In 21st century, English is the associate official language of several countries used by more than 1.8 billion people. Especially, all the developing countries use English language in all academics, professional technology, international business - news media, banking, computing, tourism, etc. In India, English is emerged as an associate official language in all spheres of life either by force or through the law and by spreading English through the medium of education.

5.2 At Education: Presently around the world, English is in commanding position in education system from school to university level. The field of Information and Communication Technology (ICT) uses English as a unique communicative language in its exchanging of information programme and made the world as a global village. As Engineering is the biggest field of study in the world, nearly every single university conducts the scientific studies only in English. The Indian universities also made English communication mandatory so the budding engineers who are non-native speakers have to accomplish this language with fluency to become good communicators as well as to fulfil the demands of MNC and global industries.

5.3 At Communication: No matter in which country you live but English becomes part of your daily life. English is really flexible, gender free and easy to learn. In the last two decades, there are more ways and methods of English teaching through online lessons which make learning English easier. English plays a pivotal role in communicating with all the over the world directly or through internet and it opens the door of development and prosperity in personal and professional life.

6. BENEFITS OF LEARNING ENGLISH

6.1 Build Rapport at Workplace: The benefits of learning English are countless. Today, the importance of English is neither denied nor ignored. English communication helps to deal with various concerns and problems of personal and public and it builds healthy relations and credibility with co-workers in professional life. Employers respect employees who can communicate effectively; it means employers expect graduates to demonstrate a range of skills and attributes - *they are able to listen others as well as successfully relay their own ideas and opinions, communication, teamwork, leadership, critical-thinking, problem-solving and often managerial abilities and potential*. Having a good command of English helps you to have more chances to find a good job or a good business in life.

6.2 Add Values & Peace: English as an international language removes all the language barriers of national and international. Having a good command over English builds your confident and adds values when you take

ISSN 2394 - 7780

part in most important **discussions** - *conferences, seminars, workshops, and business meetings*, and to **watch media** for the latest – *world's discoveries, inventories and news* as well as **the various arts** - *books, music, movies*, etc. English language builds your abilities communicating and understanding for agreement and gives opportunities to connect multicultural population of the world for maintaining peace among them.

7. COMPLICATIONS FACED BY ENGINEERING STUDENTS

7.1 English as Obstacles: In India, more than 75% of engineering students are from vernaculars and they feel that English is souring grape and it becomes an obstacle in their daily life and career. Most of the engineering books are in English including lectures, practicals, tutorial, project reports, paper presentation, making project books and the source of internet information. Although, they have necessary qualification and intelligence, they could not clear their university exams and not possible to perform oral and written presentation successfully due to making the use of English is necessary in all the activities.

7.2 Lack of Revelation to English: English as non-native language of Indian students is very difficult to learn and understand by them. Like every language, it can also possible to learn through the most important activities - *Listening, Speaking, Reading and Writing* (LSRW) through which students can learn and understand the accent of English words and word groups and speak like native speakers. In Indian schools and colleges, English is treated as a subject not as a language and students are forced to learn English only through the subject books and not encouraged to read and present different kinds of books to improve the tongue. Students in maximum of their studies learn only questions and answers given by the teacher which limits their knowledge. They are not educated by saying *reading the whole books and their reference helps them to have vast knowledge of the curriculum* and *they are also not motivated for writing answers by their own words to improve their creativity*. Definitely, these activities will navigate them to move ahead availing more and more opportunities around the world but they were not guided for it by both teachers and parents.

7.3 Reason for Lack of Fluency: Mostly, in lectures, learner's first common language is used for certain explanation and translation to make students to understand the concept but the target (English) language is neglected. Even if they are good in their core technical skills, English always made them to feel a very low self-esteem and unworthy. The lack of fluency in English communication always makes them to keep back from participating and applying courses. So, for improving students' efficiency in English communication presentation skills, English must be used as a medium of communication in lectures and practicals.

7.4 Controversy upon Learning English as a Second Language: There is a lot of controversy upon learning English as a second language. A language is a tool for learning the literature of all the subjects (including English Literature) and its grammar is just a tool for developing and using the language skills. In India schools and colleges, English language is treated as a subject of the curriculum due to this situation, the application of English grammar in day to day life is being neglected and it is learnt only for the sake of getting marks and not for learning the language. Please question yourself that "*Had we learnt grammar of our mother tongue earlier when we learnt it?*" So let children learn language at first then its grammar.

7.5 Lack of Skillful Teachers: Most of the teachers, who are at the regional medium and primary, secondary and higher secondary English medium schools of rural or semi urban areas, are untrained and unaware of current trends and advanced technique of English Language Teaching (ELT). Teachers make students to habituate by heart learning as a result: English seems to be a dreadful demon for the students and this fright remains in the mind till their higher education. They follow much *exam result oriented teaching* –learning process which tests the memory power alone but not creative skills. This habit leads students to give prior importance to their technical subjects than to the communication competence in higher education. Even, their parents' passion is more in marks than skills or knowledge.

7.6 Lack of Family Guidance: Last few decades, the middle and lower class people have preferred English medium for their wards' education. The students who possess *different grasping power* and *English Communication Competence* are lack of parental supervision and guidance for their higher education. Since their birth, they start to use English language to acquire knowledge of relations, culture, traditions, society but it is not enough while doing higher education. The literate parents who knew the importance of English communication provide more exposure to their wards and guide them at home to perform better but this never happens with those students whose parents are illiterate. Family guidance will help students' growth and development in all aspects - *at home, at institution and in society*.

8. REMEDIES TO COMPLICATIONS

Directing students as per a teacher's point of view restricts them from doing things independently and creatively. Instead of forcing them doing by-heart learning, provide them facilities how to comprehend the

ISSN 2394 - 7780

concept with proper grammatical terms and then motivate them to write their own ideas and views and also allow them for self-learning and creation.

8.1 Regional Language VS English: When we learn regional language, it comes naturally but it takes a lot of time and it does not require learning grammar. Unluckily, it does not happen with English because as it is not our native language, it does not come naturally and not easy to attain the level of accuracy and comfort. In India, English language is treated as a subject instead of considering it as a tool to learn the literature of all the subjects. After learning English language, it is essential to learn English grammar for getting confidence while speaking and performing in all walks of life.

8.2 The role of the teacher

8.2.1 Invisible Curriculum: Invisible curriculum is mental abilities (psychology based), it means that the teachers must be flexible, open and cheerful and able to create supportive learning environment. With these perspectives, teachers play significant role in determining the quality of students programme, including their performance, attribute, and capability which help students to improve knowledge in terms of plans, application, interaction and communication.

8.2.2 Moral Responsibilities

- ✓ Apart from completing assigned responsibilities, the faculties are expected to think their moral responsibilities of exposing students to English language and attaining communication capability
- ✓ Teachers must communicate with students politely to make them to understand different forms of language (vocabularies and grammatical structures) for easy learning
- ✓ Teachers should focus on using target (English) language in explanation and communication with some reading activities and avoid overuse of regional language for direct translation in classroom

8.2.3 Limit the Use of Language Labs: To get rid of the traditional way of learning English, researchers introduced machine learning to simulate the children's learning on computers. This is suitable up to the practice of LSRW skills independently with 1:1 ratio but for the development of students' creativity some more exercises to be done through teacher's involvement. Teachers play very important role in making classroom more interestingly with English communication by giving and guiding creative writing.

8.2.4 Limit of ICT Classroom: ICT method of teaching (audio and video clips) in place of orthodox method makes students better self-understanding of the concept as well as improve listening, speaking and presentation skills. In addition teachers must discuss to provoke the sense of improving vocabularies and view the concept in multidisciplinary way so that students could possible doing self-explanation of the concept.

8.2.5 Student's Role

- Students should not feel that learning English by their own is a Herculean task and they must practice a lot to gain their confidence for overcoming the issues
- Students must freely approach the teachers to learn the techniques of learning English
- Students need to be exposed to reading journals, newspapers, magazines, stories, and listening radio and television news and programmes to improve English conversations

8.3. Classroom Management and Guidance

The well-planned environment and guidance make comfort to meet the needs of the students and to prevent or diminish students' misbehaviour. It develops students-teacher interaction, create learning environment, improve self-esteem and able to control themselves.

8.3.1 Active-Participation for Progression: "*Battling with yesterday weapons to win the contemporary battle is irrational*" so, *teachers and students should transform from orthodox learning into active-participative learning for shaping themselves in up-to-date career*. The active-participative teaching-learning process widens their horizon, deepens their insight to create a meaningful outlook with innovative ideology. It is a life-long learning to gain knowledge of size, shape, colour, strength and power of the worldly things and how to apply these all at right place, at right time in a useful way. It helps to survive peacefully as well as **'how to think rather than remember**'.

8.3.2 Visible Curriculum: Curriculum is a set of activities for developing the skills of understanding, improving and attaining both general and specific goals. University of Mumbai designed curriculum plan and implementation with the vision of providing interactive environment for the growth of mental and physical coordination. The plans and organization of the content and learning materials influence students to increase

ISSN 2394 - 7780

their curiosity in learning inside and outside of institute and to attain the determined goals in their life. These practical based individual and teamwork programmes build students' unique personality with the ability of flexibility and speed, balancing and conscious motor skills and assessment will be done on basis of all these qualities.

8.3.3 A Report on Fostering Students' Communication Skills: Basically, students would be very much motivated in active-participation because it provides facilities to gain new ideas and capabilities to overcome various problems of life. The university's fifth semester curriculum *Business Communication & Ethics* (BCE) emphasizes the active-participation of students. Theem COE's Mechanical Engineering students 2019-20 batches were guided by the author [(1)] and conducted all theory and practicals at ICT based communication lab where the students were encouraged to take part in each every activities individually as well as team. Students developed their pubic-speaking and presentation skills with the achievement of the result of Book-reports and Interpersonal Skills 80% and 90% respectively. This environment also helped them to have sufficient knowledge of the topics to improve their creativity, problem-solving skills, social skills, language skills and physical ability.

(A) Enabling Personal Awareness and Emotional-Being: They have got proper training in – *Role-play, Case-studies, Group-discussion, Public-speaking, Interpersonal Skills Presentation, Project-report Presentation, Book-report Presentation* activities at **communication lab, language lab and audio-visual lab** and also enhanced with the following skills - cognitive, affective, psychomotor aspects and awareness of their team members' qualities and drop-backs. The practical experience inculcated them how to deal emotionally and intellectually to complete the target and be fit to any kinds of work environment to become loving and creative.

(B) Creative Curriculum – Goals and Objectives: The following table of '*Creative Curriculum – Goals and Objectives*' is the best solution to build the ability of upbringing students to fulfil their English communication skills:

Creative Curriculum – Goals and Objectives			
Language Development	**Cognitive Development**	**Physical Development**	**Social/Emotional Development**
Listening and Speaking help - • to hear and discriminates the sounds of language • to part in conversation actively and to express self-using words into expanded sentences • to understand and follow oral directions to ask and answer questions **Reading and Writing help -** • to enjoy the value of reading by comprehending and interpreting the meaning of the contexts • to demonstrate the knowledge the concept • to understand the purpose or writing words and letters	**Learning and Problem-solving help -** • to observe objects and events with curiosity to show resolution flexibly to the problems • to apply knowledge to a new context to explore cause and effect **Logical thinking help -** • to classify objects for arranging by using numbers and counting • to compare and recognize patterns to use one to one correspondence **Representation and symbolic thinking help -** • to take on pretend roles and situations for making representations	**Gross Motor help -** • to demonstrate basic loco-motor skills to show balance while moving, climbing up and down • to demonstrate throwing, kicking, and catching skills **Fine Motor help -** • to control small muscles in hands • to coordinate eye-hand movement • to use tools for writing and drawing	**Sense of Self help -** • to stand up for rights • to show ability to adjust to new situations • to demonstrate appropriate trust and recognize own feelings and manages them appropriately **Responsibility for Self and Others help -** • to demonstrate self-direction and independence to take responsibility for own well-being • to follow rules and routines to pay respect and cares for environment and materials **Social behaviour help -** • to recognize others' feelings and respond appropriately • to respect others' rights while resolving conflicts

ISSN 2394 - 7780

8.3.4 Domains of Learning English Communication

English was found as '**a source of expert power**' at workplace for technical and social communication. People who were empowered with possessing *a good level of English* could save not only their own face but also the face of the company. This paper presents here some domains enabling you the expert power of English language.

(A) Improving the Basic Skills of English:

1) Keys for Gaining English Vocabularies: Everyone, who wants to become good in English, should use "**Dictionary**, **Thesaurus** and **Word Power book** to build vocabularies. Especially put your focus towards the **5** sense of words – "***Sound, Smell, Touch, Sight*** *and* ***Emotions***" which help you to speak and write artistically and proficiently. **English Communication** aids you to communicate your information ***internally*** through *emails, memos, office orders, minutes of meetings* etc., and ***externally*** to *suppliers, customers and service oriented* activities in the followings patterns of writing:

1. **Expository writing** helps you how to explain complex concepts clearly.
2. **Descriptive writing** helps you how to describe the realistic forms of a concept.
3. **Narrative writing** helps you how to do the systematic recitation of an event(s).
4. **Argumentative writing** helps you how to present the line of reasoning to dispute.

2) The Aspects of Vocabularies: Words are the basic tools to form a language which is used for exchanging ideas and thoughts (communication). The words are related to grammar of a language and its vocabulary. The grammar of a language is primarily the study of the form, function and meaning of the words and their relationship with each other in speech and writing of sentences. English language has thousands of words but all are classified into "Eight Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Prepositions, Interjections, and Conjunctions". By using the base word, you can learn the art of **'Word formation'** such as - Affixation (Prefix & Suffix), Conversion (Changing one form of the word into another form), and Compounding (Adding one word to another).

3) Basic Terms of Understanding English: Linguistics peculiarity has to do with the order of words or the syntax so the basic terms to understand English is ***better understanding of the grammatical building blocks*** in our brain. The keyword is as a 'heading' for the rest of the sentence and it can be retrieved from a relative clause and placed at beginning of the sentence, even when the context is a distance away, the connection – the interpretation of the keyword – comes later in the sentence.

Let's study the terms in the following sentences

Column A	**Column B**
1. The cake, we can make.	1. Literally: We can make the cake (object).
2. That cake, he has not eaten. (to indicate that exactly that one cake was not eaten)	2. Literally: He has not eaten that cake.
3. Cakes he wonders if mother is making? (we also understand what is meant when the question word is moved first -)	3. Literally: What does he wonder if mother is making?
4. The back door he is nervous whether they leave unlocked.	4. Literally: He is nervous whether they leave the back door unlocked.

None of the '**Column A**' sentences is worthwhile in English as well as some languages. They would be perceived as wrong, and perhaps even incomprehensible. We cannot move the words around any which way. The '**Column B**' presents the literary way of writing of '**Column A**' sentences.

B) Salient Features of Spoken English:

The nature and system of intonation pattern used by a native speaker of English is complex so the foreigners who learn this language would need years of study and practice. Thus, learning the following salient features will enable you to avoid conveying false impressions:

1. **Speech Sound Description:** Speaking is like singing. There are natural places to pause and even a breath. Every singer knows the art of taking breath such as the nature of the air system, the state of the vocal cords, and the positions of the soft palate, the tongue and the lips which are very important to the production of a speech sound.

ISSN 2394 - 7780

2. **Phonemes:** Each language has a limited number of distinctive sound-units which is called *phonemes*. The phonemes are the smallest units in the sound system of a language which can be used to differentiate meanings for examples – *pet, get, set, met, net, wet, let, yet*, etc. English cannot be spoken on the basis of Indian regional languages and Indians' pronunciation of English is different from the native speakers but in grammar and vocabulary not differ.

3. **Syllables:** One or more phonemes form the next higher unit called syllables i.e. one sound is more prominent than the rest, usually, it is a vowel, for example, b*ea*t /bi:t/. A syllable also corresponds to *a chest pulse, a muscular movement pushing the air out of the lungs*. Vowels generally take the central position in the syllable and consonants take the marginal positions. **How to identify the syllable!** - Place your hand touching below your jaw then pronounce a word you will find that your hand is pushed down one time by your jaw which is known as one syllable. If it is pushed two times, then it is called as two syllables likewise how many times it pushes down respect to that the syllable will be calculated.

4. **Word Accent:** Word accent is an important feature of English. Every English word has a definite place for the stress and you are not allowed to change it. Every good dictionary indicates the location of word accent which needs greater breath force, greater muscular effort, and greater amplitude of vibration of the vocal cords. In English speaking, you hit some sounds harder or soft and it is applied to every words of more than one syllable. There is no issue in one syllable words, but in more than one syllable all the syllables are not equally prominent/accent.

For examples: In the following words the mark (apostrophe) is used to indicate the accent place:

1) 'able, 'captain, 'damage, 'eager, 'kidney, 'master, etc. *accent on first syllable*;

2) a'bout, be'cause, be'side, de'ceive, ef'fect, pos'sess, de'light, re'course, etc. *accent on second syllable*.

3) Stress change according to function - 'object (n) - ob'ject (v); 'perfect (adj) - per'fect (v); 'produce (n) - pro'duce (v); 'increase (n) - in'crease (v); 'subject (n) - sub'ject (v); 'import (n) - im'port (v).

5. **Word Group Accent:** When you talk English, you may pause after a group but not in between. It means that when one group is very closely grammatically connected to the next, there is a very slight pause (half second) marked with single bar (|) and when two groups are not so closely connected, there is a longer pause (one second) marked with double bar (||). The single bar indicates punctuation mark (, and :) and double bar indicates punctuation marks (. and ;) to end a complete utterance.

Example 1: *Last Monday, | I would to get up early to Mumbai || so I caught a train | about half an hour before my usual one || and I got to work | about half past eight.* ||

Example 2: "When I was boy, | I leaped over fences. || When I was a young man, | I hopped into my father's car. ||

6. **Intonation:** Every language has melody in it and no language is spoken on the same musical note all the time. This way of speaking voice resembles the singing voice and it is the most important factor while **uttering between** – "*statement and question; command and request, simple sentences and complex sentences*" with the **significance of speaker's mood** – "*anger, grief, excited*" and **attitude** – "*self-importance, negligence* and so on". The intonation is affected by the *speaker's emotions*, the *degree of intensity* and the greater will be *the range of pitch* and *the amount of pitch change* and sometime with *little emotional content* or even *tiredness pitch*. The rise and fall of the voice in speaking especially affects the meaning.

7. **Word Group Intonation:** English is the one; its tune belongs not to the word but to the word group. If you say the word '**no**' with different tunes, it does not change its meaning but **the tune** that you use adds something to the words i.e. the speaker's feeling at that moment is known as **Intonation**. We can say a word group *definitely or hesitantly or angrily or kindly or interestingly or without interest* but the differences are largely made by **the tunes you use**. So you must learn the shapes of the English tunes and its meanings. **For example**: Saying the word '**thank you**' in two different ways changes its sense. 1. The first voice starts high (bold word) and ends low (not bold word) '**thank** you' - it shows the 'real gratitude'. 2. The second voice starts low (not bold word) and ends high (bold word) 'thank **you**' - this show rather causal acknowledgement of something not very important.

8. **Tune Shapes:** The shape of a tune is decided partly by the number of important words in the group and partly by the exact attitude you wish to express. For example, "Dad is in an **extremely bad temper**." In

ISSN 2394 - 7780

this sentence, the first four words are not helpful to the meaning and not important but the last three words are important which adds quite a lot to the picture you are giving of Dad. The words are possible to use with individual stress to express its own mood and importance in speaking. Intonation is continual variations in the levels at which the voice is pitched. Stress and intonation are linked phenomena; they work together to give the effect of accent.

9. **Guidance of Grammar:** Grammar guides you for – 1. Sentences are made up of grammatical units. Identify those units, and you will know where to pause. 2. Pausing between larger grammatical units creates a natural rhythm and more fluid speech.

For examples: A) **Noun phrases** – a beautiful woman (Subject) –

1. A beautiful woman | entered the room. ||

2. A beautiful woman | and her little cat | entered the room. ||

B) Verb phrases – had been dancing (time/auxiliary verb + main verb) –

1. A beautiful woman | had been dancing | since she entered the room. ||

C) Prepositional phrases – with my friends –

Clauses: 1. A boy, | who was no older than five or six, | leaped over a fence. ||

10. **Prosody:** The prosody features of English relate to an utterance longer than a sound segment which includes *length, stress* and *pitch*. The term 'length' relates to duration; 'stress' relates to intensity, muscular activity, or air pressure, and 'pitch' relates to the note of the voice as determined by the frequency of vibration of the vocal cords.

11. **Accent of Sentences:** Words are combined into sentences and the accented syllables tend to recur at regular intervals of time. **For examples** – a) It is 'not the 'book I 'wanted. (The time intervals between the beginning of the strong syllables /'not/, /'book/ and /'want/ will be roughly the same.) b) They 'came at 'night.

C) Development Voice Training: When you use English correctly, you actually allow more space in the mouth and the jaw moves a lot more by lips moving a lot more. You also work with accent, accent softening. Once you understand these challenges, you may have actually achieved the specific strategies of English sound. "**Good practice means better results**", keeping this statement in mind, you practice very well being good in producing of sounds – right pitch, volume, and pace.

D) Introduction to Sentence Stress: All words of more than one syllable are stressed but the purely functional one syllable words such as **Pronouns** (I, we, you, me, him, her, etc.); **Short Preposition** (in, at, from, by, etc.); **Articles** (a, an, the); **Conjunctions** (and, so, but, though, etc.) are not stressed. In general, the picture words (providing most of the information) are stressed such as - **Nouns** (head, chair, book, pen, etc.) **Main Verbs** (eat, love, take, cry, try, etc.); **Adjectives** (good, blue, long, cold, etc.); **Adverbs** (well, quite, not, just, etc.). The stressed words are pronounced with **more strongly** than others. *More strongly* means **more loudly, longer** and **high pitch** which is very important in English pronunciation. Pronouncing sentence stress correctly will make a big difference to your English speaking. You will immediately feel that you sound clearly and more natural when you speak English.

For example, I could **hardly believe** my **eyes** (Unstressed function words are *'I, could, my'*).

Let's start by looking at sentence stress in more details

1. **Practice of Sentence Stress:** Look at the sentence – *How about we* **go** *for a* **coffee this evening?** In this sentence, there are two kinds of words. One is called as '**Content Words**' and other is '**Functional Words**'. The ***Content Words*** – '*go, coffee, this, evening*' give you '**the meaning**' of the talk. If you don't have these words in the sentence, you won't understand the sentence. If someone comes up to you and say that, "Go coffee this evening," - you can understand that what he/she means even if it sounds a bit peculiar/weird. Next, ***the Functional Words*** – "*how, about, we, for, a*" don't carry meaning but they help to connect the content words together to create a grammatical structured sentence.

2. **Difference between Content Words and Functional Words:** Content Words and Functional (Grammar) Words are foundations of sentence stress. The content words (nouns, main verbs, adjectives, adverbs, long prepositions) are usually stressed, and functional words (pronouns, auxiliary verbs, short prepositions, conjunctions, interjections, articles) are usually unstressed. Look at the following sentences where the content words are bold and speak it with stress:

ISSN 2394 - 7780

1. How about we **go** for a **coffee this evening**?

2. My **phone's broken** so I'm **going** to **buy** a **new one**.

In sentence 2, if you hear only the grammar word – "*my, so, I'm, to, a*", it doesn't make you sense the meaning but if hear – phone's broken, going, buy, new, one, you can understand the meaning of the talk. Please note that the *Sentence stress is flexible, and the line between context words and functional words is not fixed so most probably there are other possibilities*.

By the way, the above practice can also really help your listening English. You can see that you don't need to hear every word to understand the meaning of a sentence. If you focus on listening to the stressed words, you can understand someone's meaning even if you don't hear the unstressed grammar words. Okay, now you know the basic about sentence stress. Recognize the stress words of the following sentences and practice it to understand that what you can do and how can you develop sentence stress:

1. Could you **get** some **bread** from the **bakery** on your **way here**?

2. I **heard** that the **weather's going** to be **bad tomorrow**?

3. She has **no idea** what she **wants do after** her **graduation**.

Note 1: Practice it at a lower speed until you can pronounce the stress easily, then try again at full speed.

Note 2: Now, to pronounce sentence stress well, you also need to pay attention to the unstressed words in a sentence.

3. **Stressed vs. Unstressed & Contrast:** Previously, you studied that stressed means pronouncing some syllables more strongly, more loudly, and more clearly than others it mean that that stressed is relative. Now, the very important point about sentence is **stressed and unstressed**. Stressed is about **contrast**. To pronounce stress clearly, *you need a clear contrast between your stressed and unstressed syllables*. So when you are practicing sentence stress, you should pay equal attention to the unstressed words.

For example, Could you **get** some **bread** from the **bakery** on your **way here**?

In the above sentence, you need to pronounce the stressed words more strongly, and you need to pronounce the unstressed words at a lower volume with a higher speed. Often unstressed words have a weak pronunciation. Knowing how to pronounce weak forms is also important if you want to pronounce sentence stress clearly.

Keys to develop sentence stressed and unstressed sounds and apply to the sentences that continued:

- Read the sentence, make the stressed words as clear as possible
- Exaggerate the stress a little bit
- Pronounce the unstressed words as fast as you can
- Try to get a really clear contrast between the stressed and unstressed words

1. I **haven't heard anything** from them **since their wedding**.

2. It is **worth spending** some **time practicing this contrast**

Note: If you can pronounce the contrast between stressed and unstressed sounds clearly your English will sound much better and more natural

E) Keys for Improving Writing Skills: "Learning is an art that helps you to think clearly and makes you smart enough." A question is raised on, "**Can creative writing be taught?**" If we say '**no**', it means – "***Creative writing is natural so it cannot be taught***"; but if we say '**yes**', it means – "***For exhibiting creative writing skill certain aspects such as grammar of writings, climax of the story and the ending where to be appeared, and absolute formation of the plot are to be taught***". Creative writing is *1% inspiration* but *99% perspiration* so you must not think that writing is an easy work it requires a lot of reading *for kindling you by collection of vocabularies* that build *perseverance of mind that needs a lot of hard work.*

F) A Suggested Report: No, all languages have built-in complicated rules that determine what is possible and what is not. No written grammatical rules exist for which parts of speech or sentences can be moved and when. The researchers figure out that although young and old choose different words that their word order lacks organization. However, there could not find any difference between the generations how they construct the

ISSN 2394 - 7780

sentences. These points prove that ***writing is depended on the writers' point of view by their feelings, emotions and explanations***.

9. CONCLUSION

It is highlighted that English communication is recognised as an important element in the academic life and in engineering career. It requires the use of integrated methods of advanced communication skills to facilitate enhancing the qualities which are the demand of industry as well as society. So this paper concludes with the following suggestions: **changing the mentality** *(English is a language not a subject) of teachers and students in learning English language* and **development of sentence stress** *by practicing the 'Domains of Learning English language'*, and **avoid using the grammar translation teaching method** and ***use task-based communicative approach*** and **learner-centred approaches** for *getting success in presentations at seminars, conferences and campus interviews* and *achieving the essential qualities demanded by MNC (Multi-National Companies) and global industries.*

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NUMERICAL ANALYSIS OF TITANIUM AND STAINLESS STEEL INTRAMEDULLARY ROD

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ABSTRACT
The solid metal rod which is forced into the bone when it is broken due to accidents or high impact is called Intramedullary rod or Intramedullary nail. It is similar in case of humans as well as animals (pets) in both the cases this solid rod is forced into the bone. In this paper we will specifically work on the Tibia bone which is also known as Shinbone or Shankbone in Human body. This bone is used to connect the knee with the ankle bones. Two materials are found to be suitable for design of tibia rod i.e. Titanium and Stainless Steel. Both the materials are easily available in the market and are extensively used for manufacturing of Tibia rod. Primary goal of this study is to compare the different mechanical properties and parameters of both the materials regarding Tibia Rod. In this study the rod dimensions are fixed and by using Titanium and Stainless Steel the performance of the rod will be compared with each other.

Keywords: Intramedullary nail, Stainless Steel, Tibia rod, Tibial Fracture, Titanium

1. INTRODUCTION
The skeletal system comprises of bones and joints in the body. Each bone is made up of many cells, protein fibers and minerals. Hard parts of the human body are the components of skeletal system. The skeleton provides support and protection for the soft tissues which makes the complete body. Joint is the connection made between bones which help skeletal system to move at different locations. 6 major functions are provided by skeletal system to human body.

1. Support: The skeleton in the human body act as a frame which helps to support the body and maintain its shape. The musculoskeletal system in the body provides support, stability and movement to the body. This system comprises of bones of skeleton, muscles, cartilage, tendons, ligaments, joints and other connective tissues that supports and binds tissues and organs together.
2. Movement: The joints between the bones is responsible for the movement of skeletal system, movement is powered by skeletal muscles attached to the skeleton at various sites on bones. Nervous system coordinates the mechanics provided by muscles, bones and joints for the movement.
3. Protection: Many vital internal organs are protected by the skeleton from being damaged (For example: Skull protects brain and eyes, ribcage protects the lungs and heart, vertebrae protects the spinal cord).
4. Blood cell production: Blood cells are made inside bone marrow, which is in the bones of the skeleton, it is the site of hematopoiesis.
5. Storage: Calcium is stored by the Bone matrix and is involved in calcium metabolism, iron is stored in bone marrow and is involved in Iron metabolism. Bone is not completely made up of calcium but it is a mixture of chondroitin sulfate and hydroxyapatite, the latter making up 70% of a bone.
6. Endocrine regulation: Osteocalcin is the harmone released by the bone cells, which is responsible for blood sugar (glucose) regulation and fat deposition and it also increases both insulin secretion and sensitivity, in addition to boosting the number of insulin producing cells and reducing fat storage.

1.1 Human Skeleton Components
Human Skeleton consists of three main components, namely bones, cartilages and joints. Bone: A bone is a rigid organ i.e. rigid or dense form of connective tissues. It has honeycomb like matrix internally, which helps to provide rigidity to the bone. Bone is the responsible for bearing a load therefore it is also known as load or weight bearing organ which provides strength to the human skeleton. Cartilages: It is a smooth and resilient elastic tissue, a rubber-like padding that protects and covers the end of the long bones at the joints. It is not as hard and rigid as bone, but it is much stiffer and less flexible than muscles. Joints: A joint is the connection made between bones in the body which link the skeletal system into the functional the whole. They are constructed to allow for different degrees and types of movement. Human body contains six types of synovial joints. Synovial joints are the most movable type of joints in human body. Six types of synovial joints are pivot, hinge, saddle, plane, condyloid and ball and socket joints.

ISSN 2394 - 7780

1.2 Classification of Bones on the basis of its Shape

Bones are classified according to the shape: - long, short, flat, irregular, sesamoid and sutural.

Long Bones

Bones that are longer than they are wide are called long bones. They consist of a long shaft with two bulky ends or extremities. They are primarily compact bones but may have a large amount of spongy bones at the ends or extremities. Long bones include bones of the thigh, the leg, the arm, and the forearm, e.g. the femur, the tibia, the fibula, the humerus, the ulna and the radius. They provide places for the attachment of large muscles.

Short Bones

Short bones are roughly cube shaped with vertical and horizontal dimensions approximately equal. They consist primarily of spongy bones which are covered by a thin layer of compact bones. Short bones are found in the hands and feet, they include the bones of the wrist and the ankle.

Flat Bones

Flat bones are thin, flattened, usually curved and provide muscle attachments. They protect internal organs. Examples include bones of the skull, the pelvis, the sternum and the scapulae.

Irregular Bones

Irregular bones have complicated shapes. They are primarily spongy bones that are covered with a thin layer of compact bones. Their shapes are due to the functions they fulfill within the body, e.g. they comprise the vertebrae, the spinal column, the wrist, the ankle and some facial bones.

Sesamoid Bones

Sesamoid bones develop in some tendons in locations where there is considerable pressure, tension, friction or stress. They may form in the palms of the hands and the quality varies considerably from person to person. Examples include the patella (kneecaps).

Sutural Bones

Sutural bones are classified by their location rather than by their shape, they are parts of sutural joints between the cranial bones. The numbers of sutural bones are considerable and therefore these are un-named bones.

1.3 Fractures in Bones

A fracture is the medical term for a broken bone. It can range from a thin crack to a complete break. Bone can fracture crosswise, lengthwise, in several places or into many pieces. Most of the fractures happens when a bone is subjected to force or pressure which exceeds the permissible strength of the bone.

Tibia (Shinbone) Shaft Fracture

The tibia is the most commonly fractured long bone in the body. A tibial shaft fracture occurs along the length of the bone, below the knee and above the ankle.

Classification of Tibia fracture

Tibia fractures are classified depending on:

- The location of the fracture (the tibial shaft is divided into three parts: distal, middle, proximal)
- The pattern of the fracture (for example: the bone can break in different directions, such as crosswise, lengthwise, or in middle)
- Whether the skin and muscles over the bone is torn by the injury (open fracture)

The most common types of Tibial shaft fracture include:

Transverse Fracture: In this type of fracture, the break is a straight horizontal line going across the tibial shaft.

Oblique Fracture: This type of fracture has a angled line across the shaft.

Spiral Fracture: The fracture line encircles the shaft like the stripes on a candy cane. This type of fracture occurs due to twisting force.

Comminuted Fracture: In this type of fracture the bone breaks into three or more pieces.

Open Fracture: If a bone breaks in such a way that bone fragments stick through the skin or wound penetrates down to the broken bone then the fracture is called as open fracture or compound fracture. Open Fractures often involve much more damage to the surrounding muscles, tendons and ligaments. They have a higher risk for complications especially infections and take longer time to heal.

ISSN 2394 - 7780

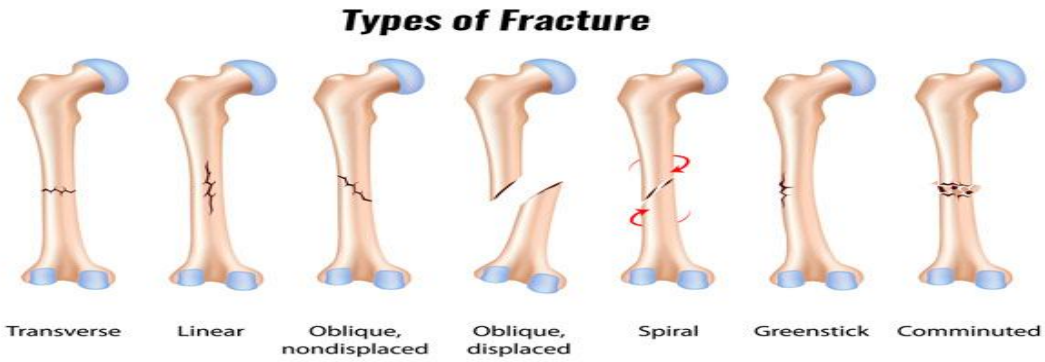

Fig.1.1 Types of Tibia bone Fracture

1.4 Healing of the Tibia Bone Fracture

Intramedullary nailing is surgery to repair a broken bone and keep it stable. The most common bones fixed by this procedure are the thigh, shin, hip and upper arm. A permanent nail or rod is placed into the centre of bone which helps body to apply the load or body weight on the bone. [5]

Sr.No.	Parameters	Dimensions (mm)
1	Upper Leg Length	60 mm
2	Lower Leg Length	360mm
3	Angle of Upper Leg	10°
4	Nail Diameter	5mm
5	First Nail Location	25 mm from Upper side
6	Second Nail Location	38 mm from Upper side
7	Third Nail Location	25 mm from lower side
8	Fourth Nail Location	14 mm from lower side

2.**DESIGNIntramedullary Rod:** The solid metal rod which is forced into the bone when it is broken due to accidents or high impact is called Intramedullary rod or Intramedullary nail.

Materials for Intramedullary Rod: Two materials are found to be suitable for design of tibia rod i.e. Titanium and Stainless Steel. Both the materials are easily available in the market and are extensively used for manufacturing of Tibia rod.

Fig 2.1 Dimensions of the rod [1]

For Design purpose the dimensions of IM rods are kept same for both materials.

Diameter :15mm

Length: 420 mm

Materials: Stainless Steel and Titanium

Mechanical properties use for our study are as follow:

Table 1.

Parameter	**Titanium**	**Stainless Steel (316L)**
Density (kgm^{-3})	4510	8000
Tensile Yield Strength (MPa)	315	332
Tensile Ultimate Strength (MPa)	411	673
Young's Modulus (GPa)	102	165
Poisson's Ratio	0.36	0.3

All the above stated values for Titanium are use from the Engineering software database i.e. Ansys whereas for 316L SS referred [9] (Table 1)

ISSN 2394 - 7780

IM rod is designed according to the above mentioned dimensions and material with above mechanical properties is assigned to the rod using Simulation Software (Ansys) and the rod is subjected to various loads like Axial Tensile/compressive force etc.

Simulation software does not give exact solution but it gives an approximate value for defined problem.

Static analysis calculates the effect of steady loading condition on the rod neglecting inertia and damping effect.

The load or force acting on the bone or the rod is assumed to be the average weight i.e.70kg which is 70 x 9.81 equals 686.7N.

3. FINITE ELEMENT ANALYSIS

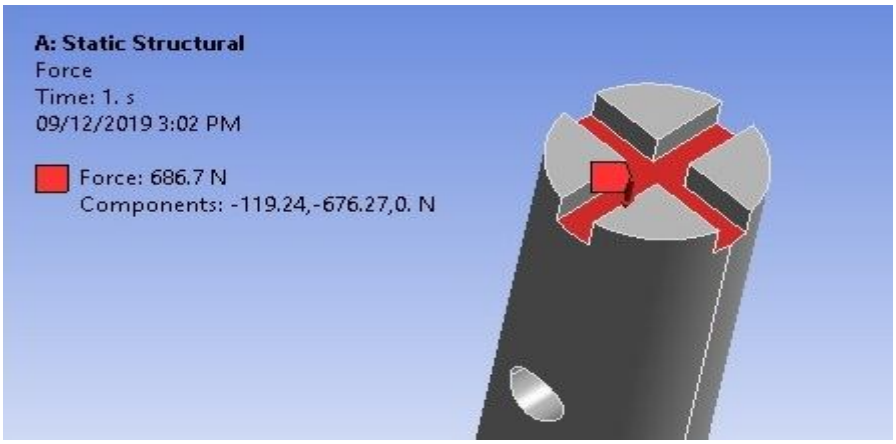

Fig 3.1 Boundary conditions on rod

The boundary conditions are applied on the rod as shown in the figure 3.1.

As the bone is subjected to the compressive force the force acting on the rod is negative.

The upper leg is inclined to the lower leg by an 80^{o} to horizontal therefore the components of the force is distributed in two directions and their resultant equals 686.7N.

3.1 Deformation and stress result using 316L Stainless Steel

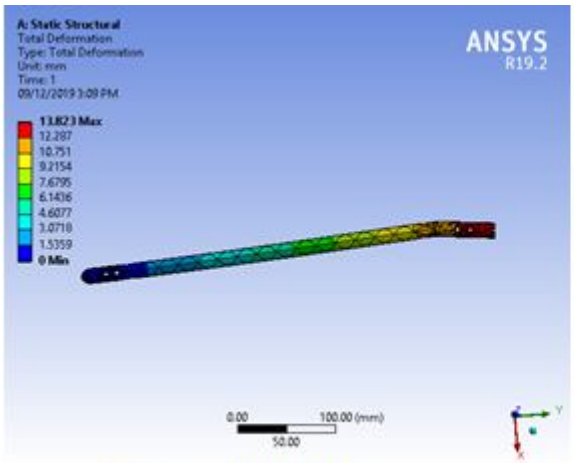

Fig.3.1.1 Total Deformation

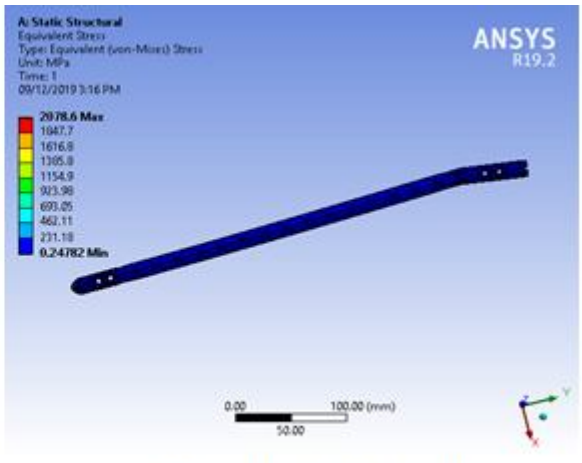

Fig.3.1.2 Von-Mises Stress

From above figure it is clear that when the rod is subjected to the axial compressive force the maximum deformation that rod gives is 13.823mm and Maximum stress induced is 2078.6Nmm^{-2} when rod is made using 316L Stainless Steel.

$$\% \text{ Change in rod due to deformation (approx \%)} = \frac{420 - (420\text{-}13.823)}{420} \text{x } 100$$

$$= 3.29\ \%$$

Therefore from above calculation the total deformation of the rod is 3.29%

ISSN 2394 - 7780

3.2 Deformation and stress result using 316L Stainless Steel

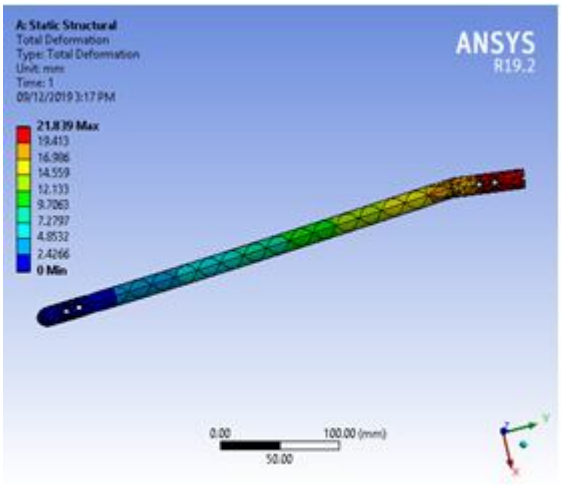

Fig.3.2.1 Total Deformation

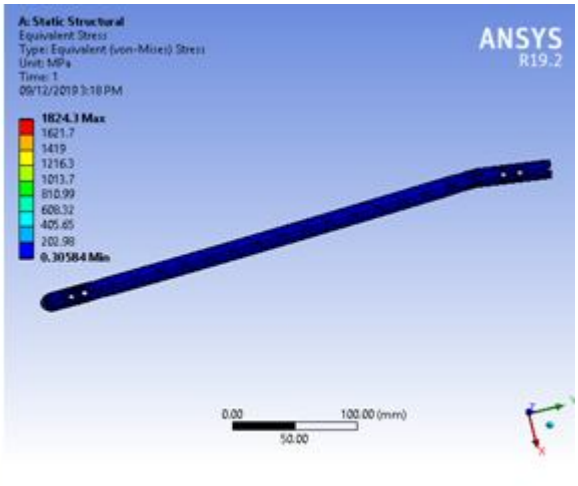

Fig.3.2.2 Von-Mises Stress

From above figure it is clear that when the rod is subjected to the axial compressive force the maximum deformation that rod gives is 21.84mm and Maximum stress induced is 1824.3Nmm^{-2} when rod is made using Titanium.

$$\% \text{ Change in rod due to deformation (approx \%)} = \frac{420 - (420\text{-}21.84)}{420} \times 100$$

$$= 5.2\ \%$$

Therefore from above calculation the total deformation in rod is 5.2%

4. RESULTS AND CONCLUSION

4.1 Comparison of results between two rods -

Table 2

Parameters	Titanium	Stainless Steel (316L)
Deformation (mm)	**13.823**	**21.84**
Von-Misses stress (Nmm^{-2})	**2078.6**	**1824.3**
% Change in rod	**3.29 %**	**5.2 %**

From above table the deformation in Stainless steel is 1.91% greater than Titanium whereas in stress comparison Titanium has more stress than Stainless steel.

$$\% \text{ while stress calculation} = \frac{2078.6 - 1824.3}{2078.6} \times 100$$

$$= 12.23\ \%$$

(Titanium has 12.23% greater stress than Stainless steel)

Which means if two rods are used simultaneously Titanium rod will fail first as it has more stress than Stainless steel because mechanical part or components always fails due to stress.

Many researches has been carried out on the stability of the Intramedullary nails from which we come to the result that the Titanium Intramedullary nails are much more stable than Stainless steel nails without using end caps. [2]

4.2 CONCLUSION

The main purpose of this paper was to compare the performance of the two materials in the form of solid rod when it is forced into the bone and bone is subjected to various loadings.

The deformation in Stainless steel is 1.91% greater than Titanium whereas in stress comparison Titanium has 12.23% more stress than Stainless steel.

ISSN 2394 - 7780

From this study we come to know that both materials have its own advantages and disadvantages but it varies according to the application.

Stainless Steel Intramedullary nail has comparatively greater strength whereas Titanium nails have better mechanical stability as compared to Stainless Steel.

As per cost Stainless steel is comparatively cheaper than titanium and focusing on strength factor it is mostly preferred in the surgeries.

After surgery the healing stage is the important stage where healing depends on the Elastic modulus of the rod. [1]

4.3 SCOPE FOR FUTURE WORK

Intramedullary nails can be designed using various materials and composites.

Nowadays many industries are taking interest in hybrid composites because they have lot of excellent mechanical properties as compared to the conventional material used. [3]

Some constraints or rules to be followed while designing an Intramedullary rod i.e. the elastic modulus of the material has to be nearer to the value of the bone elastic modulus.

As possible as the value is nearer to the bone it will give positive result regarding healing rate .

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IOT BASED SMART PARKING SYSTEM

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Problem in Today's Farming

1. ABSTRACT

In the recent years, a large number of new registered vehicles were reported compared to the previous years, which makes it a rough estimate of 54.5% increase in a span of 7 years (Indian Ministry of Transportation, 2007). Referring to the aforesaid statistics provided by the Malaysian Ministry of Transportation, the current transportation infrastructure and car park facilities are deemed insufficient in sustaining the influx of vehicles on the road.

Therefore, problems such as traffic congestion and insufficient parking space inevitably crops up. In Asia, the situation are made worse by the fact that the roads are significantly narrower compared to the West (Inaba et al., 2001). Various measures have been taken in the attempt to overcome the traffic problems. Although, the problem can be addressed via many methods, the paper focuses on the car park management system introduced, which is the smart parking system.

This study will review the evolution of vehicle detection technologies as well as the detection systems developed over the years.

2. INTRODUCTION

The smart parking system implemented mainly in the Europe, United States and Japan (Shaheen et al., 2005) is developed with the incorporation of advanced technologies and researches from various academic disciplines. With its deployment in the car park, it is hoped that it would solve the aforementioned problems faced by the patrons within the car park.

3. ADVANTAGES OF SMART PARKING SYSTEM IMPLEMENTATION

The smart parking system is considered beneficial for the car park operators, car park patrons as well as in environment conservation (Shaheen et al., 2005; Chinrungrueng et al., 2007). For the car park operators, the information gathered via the implementation of the Smart Parking System can be exploited to predict future parking patterns.

Pricing strategies can also be manipulated according to the information obtained to increase the company's profit. In terms of environment conservation, the level of pollution can be reduced by decreasing vehicle emission (air pollutant) in the air (Shaheen et al., 2005). This can be attributed to the fact that vehicle travel is reduced. As fuel consumption is directly related to vehicle miles travelled, it will be reduces as well.

Patrons are also able to benefit from smart parking system as parking space are able to be fully utilized (Kurogo et al., 1995; Sakai et al., 1995) with a safer (Shaheen et al., 2005; Chinrungrueng et al., 2007), optimized and more efficient system implemented (Sakai et al., 1995; Shaheen et al., 2005). The system is made more efficient as vehicle travel time and search time are significantly reduced due to the information provided by the smart parking system.

With the information provided, drivers are able to avoid car park that are fully occupied and locate vacant parking spaces with ease elsewhere. The number of vehicles parked illegally by the roadside which leads to traffic congestion is also reduced as it is absorbed into the car parks (Kurogo et al., 1995). Most importantly, traffic congestion can be reduced. All this would eventually lead to convenience for the patrons.

4. METHODOLOGY

The project works through a set of instructions and commands placed by the programmed engineer within the Arduino through the software.

Arduino was feed through DC 12V source and have several blocks as per use, including a 5-volt, We put the Node MCU for connectivity with database.

The project needs some components to work properly. Here, all the components will introduced with details.

ISSN 2394 - 7780

1) Arduino Board

Arduino is a project made by the largest technical community of engineers, developers and hobbyists whose goal is to develop ideas and interactive control projects around the world, based on different types of electronic panels but programmed in a language Single programming and free.

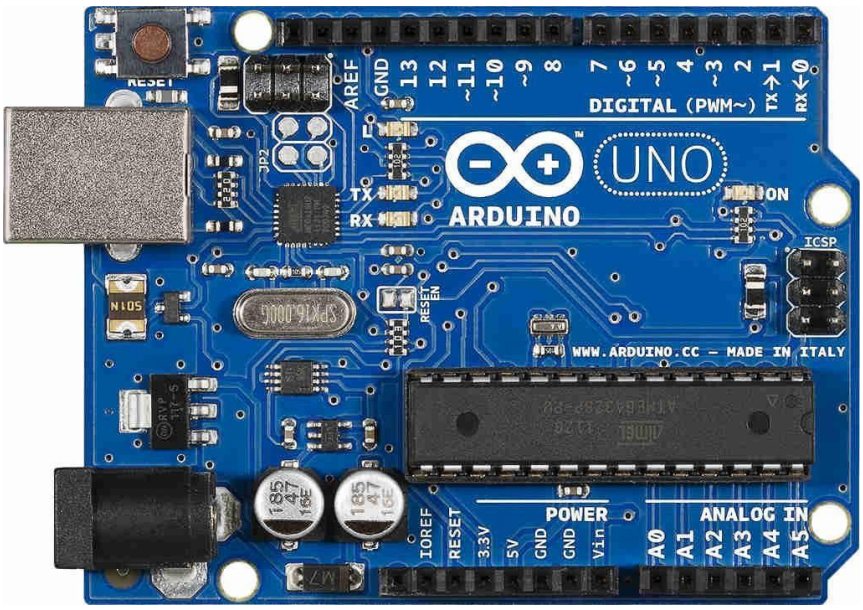


Figure-1: Arduino UNO Board.

Sure, Arduino is not the only electronic controller in the market, but there are many micro-controllers available in the market such as Parallax, Basic Stamp and the most powerful competitor, Raspberry Pi, all with powerful capabilities and the ability to work. Full projects, of course depending on the needs of your project, but what distinguishes the following Arduino Open source platform Open Source Hardware and Software.

Arduino is made primarily of ATMEGA8 and ATMEGA168 controllers, and all its designs are licensed under the Creative Commons license. This is the most important feature for electronic circuit designers because it makes it easier for them to design anything they wantThe software is written in C ++, and is available to everyone to download and programmers can modify it according to their needs.

It is the most widely used and widely used one of the many Arduino's. It is the first choice for beginners. It is easy to learn. It operates with an ATmega328 controller. This type has 14 digital ports (I / O), 6 of which can be used as ports to control the " PWM Outputs ", the most important feature of this type is that the control chip" ATmega328 "is not fixed in the board, but installed on the holder of the integrated circuit" IC ". This feature makes it the best option for beginners so that if burned the slide while working on your project by mistake, you can

Restore your work on the board as soon as you change the slide The ATmega328 controller is similar to the same model.

The first-ever type of Arduino's motherboard is the ATmega32u4 controller, which has a unique feature that contains a built-in USB connection, eliminating the need to use a secondary processor. The feature allows the panel as soon as it is connected to your device to appear as a keyboard and mouse, which makes it ideally suited to build various applications that enable you to control your PC.

2) The ServoMotor

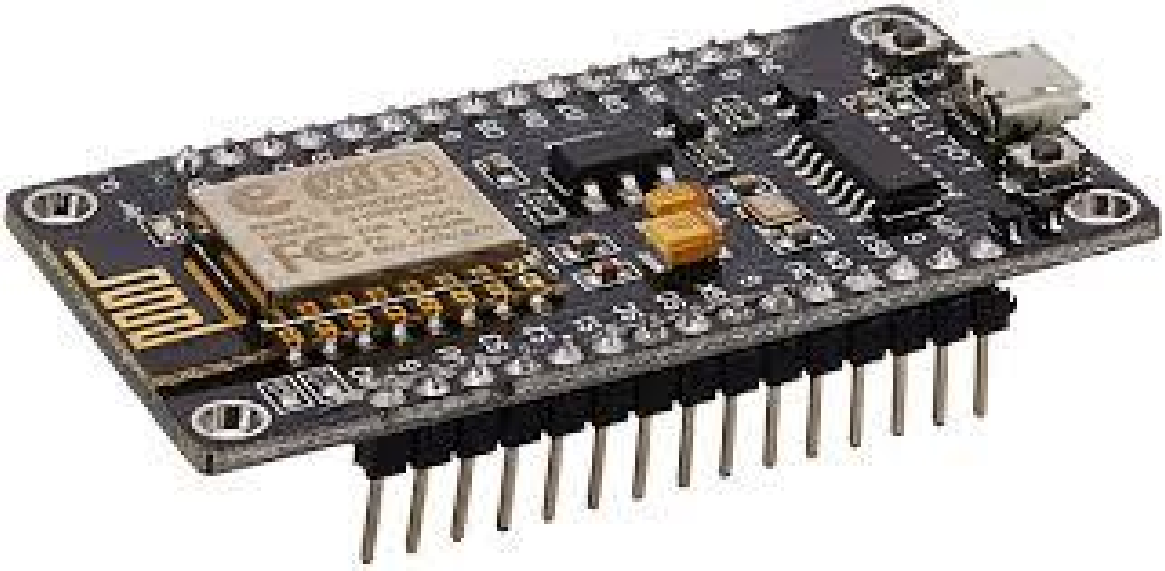
The servo engine is a motor that comes with a Gear gearbox and a Shaft transmission that gives motion greater torque and greater precision. This engine can rotate 180 degrees and in some types 360 degrees.The servomotor is internally made up of a "mostly microcontroller" control circuit. When the engine gives pulses at a certain time constant, the engine rotates to the angle according to that time constant.

In each type, the time constant varies from one engine to another according to the manufacturer and the technical bullet in that comes with the servo engine.

In the Arduino, programming environment there is a library called Servo Library installed in the program. This library gives us the ability to control most of the 180 degree Servo drives. At the end of this post, you will have the ability to use the library's commands through practical examples.

ISSN 2394 - 7780

3) Node MCU



4) IR Proximity Sensors

5) Connecting Wires

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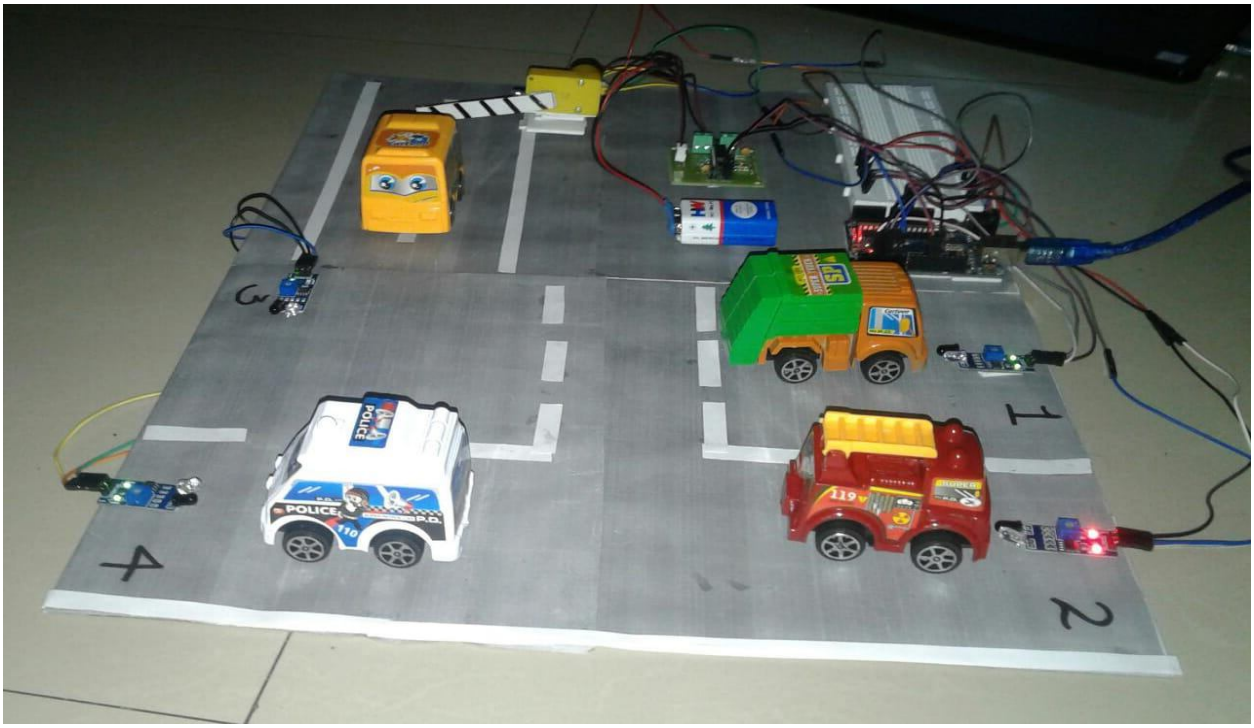
6) Breadboard

IMPLEMENTED PROJECT



5. CONCLUSION

In this study, the various types of smart parking system and has been presented. From the various examples of the implementation of the smart parking system being presented, its efficiency in alleviating the traffic problem that arises especially in the city area where traffic congestion and the insufficient parking spaces are undeniable. It does so by directing patrons and optimizing the use of parking spaces.

With the study on all the sensor technologies used in detecting vehicles, which are one of the most crucial parts of the smart parking system, the pros and cons of each sensor technologies can be analysed. Although, there are certain disadvantages in the implementation of visual based system in vehicle detection as described earlier, the advantages far outweighs its disadvantages.

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FABRICATION OF CLOTH DRYING MACHINE USING A CONDENSATION UNIT

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ABSTRACT
The following paper discusses to study the clothes dryer machine by using heat. There are many cabinet dryers which are widely used today as an alternative to natural clothes drying, especially for those who are busy working from morning until evening, having limited time and for the residents in urban areas. Nowadays cabinet dryer are already offered in the market, but they are expensive to afford. A cloth dryer has to be made with the help of available materials. Its efficiency is investigated with respect to how fast it is able to dry up the clothes. Hence a set of experiments are performed to determine the worthiness of this dryer. The main advantage of this dryer is that it can work all round the year, with a built-in auxiliary heating system. Also, with no moving parts, it consumes less power than conventional dryers in washing machines. It can easily be built with commonly available materials such as plastic moulded body, aluminium motor, timer output etc. The comparison of two different materials such as iron and aluminium are done for best results.

The cloth drying machine is designed on Solidworks and analysed on Ansys 2018.

Keywords: Design, Analysis, Cloth Dryer, Aluminium Motor, Solidworks, Ansys 2018.

INTRODUCTION
Now days drying clothes usually use natural way by using the energy from the Sunlight and the wind, but nowadays the technology is plentifully developed upward and the clothes dryers that use the electric energy or other energy come to use extensively, Especially in the urban area where limited sunlight (cloudy days) and restricted air flow of house types such as high rise condominiums and apartments, natural drying is prohibited in some housing areas for aesthetic reasons and conventional domestic electric dryers are too expensive and inefficient decreasing energy losses and heat recovery is important research topics, nowadays. Many cabinet dryers widely use, especially those who are busy working. Besides that, most of laundries today have their own dryer cabinet. It is not just because to run their operation at all the time, but they also can prevent the risk to the cloths that might lose or dirty. Cabinet dryer on the market nowadays is using electrical power as a source in generating heat.

The design available in markets are very bulky and uses lots of energy because it is not utilized properly half of energy get wasted to the surrounding. The size of the product made very compact so when it needs to be get used we can unfold it and extend it to its ultimate size where we can hang clothes and two heating sources. Because two heating sources are provided time required to dry cloths is less as compared to other expensive devices which also uses lots of energy to dry the cloths.

TYPES OF DRYERS
Spin Dryer: This machine simply spins their drums faster than a typical washer could in order to extract addition water from the load. They may remove more water in two minutes than a heated tumbler dryer can in twenty minutes, saving significant amounts of time and energy. Although spinning alone will not completely dry clothing, this additional step saves a worthwhile amount of time and energy for large laundry operations such as those of hospitals. **Condensation Dryer:** Just as in a normal dryer, condensation dryers pass heated air through the load. However, instead of exhausting this air the dryer uses a heat exchanger to cool the air and condense the water vapour into either a drain pipe or a collection tank. Afterwards, this air is run through the loop again. The heat exchanger typically uses ambient air as its coolant, therefore the heat produced by the dryer will go into the immediate surroundings instead of the outside, increasing the room temperature slightly. In some designs, cold water is used in the heat exchanger, eliminating this heating but requiring increased water usage.

Dehumidifier Dryers: By keeping a low humidity, dehumidifiers encourage fast evaporation without high heat. This type if dryer is suitable for clothes that can withstand tumbling but not high heat.

Heat Pump Dryers: A closed-cycle heat pump clothes dryer uses a heat pump to dehumidify the processing air. Such dryers typically use under half the energy per load of a condenser dryer. Whereas condensation dryers use a passive heat exchanger cooled by ambient air, these dryers use a heat pump. The hot humid air from the tumbler is passed through a heat pump where the cold side condenses the water vapour into either a drain pipe or a collection tank and the hot side reheats the air. In this way not only does the dryer avoids the need for

ISSN 2394 - 7780

ducting, but it also conserves much of its heat within the dryer instead of exhausting it into the surroundings. Heat pump dryers can therefore use less than half the energy by either condensation or traditional dryers. Heat pump dryers use about 1kWh (kilowatt hour) of energy to dry an average load instead of 2 for a condenser dryer or from 3 to 9, for a conventional electric dryer. Domestic heat pump dryers are designed to work in typical ambient temperatures from 5 degrees Celsius to 30 degrees Celsius. Below 5 degree Celsius, drying time increases significantly. As with respect to ambient air, the higher humidity of the air used to dry the clothes has the effect of increasing drying times however, because heat pump dryers conserve much of the heat of air they use, the already-hot air can be cycled more quickly, possibly leading to shorter drying times than tumbler dryers, depending on the model.

Contrary to Internet rumors, the first tumble dryer was not invented by American George T. Sampson. A handcranked version was created in 1799 by a Frenchman named Pochon. Sampsons's United States patent (number 476,416) which he received on June 7th, 1892 was for an improved rack for holding wet clothes near a heat source. Heat tumble dryers appeared in the 20th century.

LITERATURE REVIEW

1. Professor J. Ross Moore (1938): This paper gives us an overview and the origin of the concept of drying clothes. The first electric dryer was invented in the early 20th century. Inventor J. Ross Moore was tired of hanging his clothing outside, especially during the winter. To help keep his wardrobe out of the freezing weather, he built a shed to house his clothes while they dried. In addition, he added a stove. The clothing would hang on the line in front of the fire and dry. This was the beginning of the development of electric dryers. For the next three decades, Moore worked to eventually build a gas and electric unit, but couldn't find anyone to help him get his idea the frigid winters, he built a shed, installed a stove and hung the clothes there to dry.

2. Professor Pochon (1799): In this paper we can see study about the invention of a ventilator which is very similar to a tumble dryer. In 1799, a Frenchman known as Pochon invented the ventilator, a precursor to the modern tumble dryer. This early clothes dryer was a rotating metal drum with holes bored into it. Wet clothes were placed inside the drum which was then positioned over an open fire and cranked by hand.

3. George T. Sampson (June 7th, 1892): This paper focusses on the using of heat from a stove rather than a ventilator. On June 7, 1892 an African American named George T. Sampson received a patent for a device similar to Pochon's ventilator. Sampson's invention used the heat from a stove rather than an open fire. Thus it was a more efficient way of drying up the clothes rather than using an open fire which was far more dangerous.

4. SeungPhyoAhn, Seong Hwan Kim, Yong Gap Park, Man Yeong Ha (May 2019): From this Research paper we can learn that a vented dryer is a system in which outside air flows in, and moisture from wet clothes is evaporated using a heat source and discharged directly outside. This study experimentally investigates the thermal characteristics and drying mechanisms of such a dryer along with the main factors that affect the drying performance. The heat and mass transfer coefficients in the drum increased at the beginning of the drying process and gradually decreased due to the reduction of moisture in the clothes. The air entering the electric heater was preheated by heat that leaked from the drum and other parts in the dryer. This phenomenon recovers approximately 5–8% of the heat. Although the drying time increases when decreasing energy consumption, there is a heating algorithm that can achieve energy-star performance while minimizing the increase in drying time by appropriately setting the heater input at the beginning and end of drying.

5. J. Lee, N. Hoeller, D. Rogers, S. Musnier, F.A. Salustri (27th August, 2009): This paper describes that clothes dryer machine are one of the most energy-consumptive appliances in the residential sector, but there has been relatively little work to study its environmental aspects and improve upon its design and efficiency. The research group is began such a project, with the ultimate goal of which is to provide decision-making tools for the public and policy makers.

6. Chris Woodford (13th July, 2018): This paper describes the design and analysis of clothes drying machine system and helps us to understand the science behind the cleaning and the drying of clothes. The paper conveys information such as wateris the world most versatile cleaner, but it's amazing how much of it you can waste when you do the laundry. On its shortest and simplest setting, with only a half load of washing, my old clothes washing machine uses about 20 litres (5 gallons) of water; with multiple rinses, many machines will easily use double that much. Most of that water is spun out at high speed (think

ISSN 2394 - 7780

centrifuge) and then drained away, but even the most efficient machines leave a significant amount of wetness lingering in your clothes.pangam30@gmail.com

7. Paul Bendt, Ecos (2009): This paper describes dryer operation and testing undertaken by Ecos and explains the differences that have been observed. Emphasis is placed on simple and inexpensive changes that could reduce energy consumption by half. Dryers also place a large load on the home's HVAC system, and dramatic savings are possible here as well. Further results show that gas dryers have lower environmental impacts than electric dryers, often lower than even the hoped-for improvements of advanced technologies. We recommend changes to the test procedures and metrics so that energy efficiency can be recognized and rewarded. These results will provide the basis for effective programs and policies that could save 50 billion kWh per year in energy spent drying clothes.

8. Ali Alahmer, Mohammed Al-Dabbas (14th October, 2013): This research paper presents the design and construction of the energy efficient, time saving, cost effective of passive solar powered clothes dryer. This manuscript begins with a derivation of mathematical model represents of solar dryer followed with an analysis of the elements necessary for successfully designing the various components of a solar dryer. The solar drying performance achieved an average drying rate of 0.35 kg/h and drying time of 3 h in a typical day, even under local low ambient humidity of around 35% and at moderate outdoor wind speed. Also, the computational fluid dynamic CFD of transient thermal behavior based on Navier-Stokes equations was used to demonstrate the prevailing temperature rises in the solar natural-ventilation system associated with the internal heat flux due to solar radiation and moisture removal. The efficiency of solar dryer was improved using Nano coating technology.

9. Richard D. Smith, John F. Gerling, Stephen D. Schultz (2002): This invention pertains generally to the drying of clothes and, more particularly, to a compact microwave clothes dryer and method. Microwave clothes dryers were first envisioned as a means to transfer heat energy directly to the moisture in clothes without the need for hot air. This results in lower drying temperatures and reduced fabric wear, as well as being faster and more energy efficient. It also permits the drying of delicate fabrics that might otherwise require dry cleaning. Studies have shown that the concept of microwave clothes dryers is technically feasible, but that the practical and economic feasibility of full size residential dryers is questionable

METHODOLOGY

The project is about the designing the mechanical part of the machine and to fabricate the mechanical part of the system.Besides that it is also needed to apply all knowledge and skill that required to make it done. The design and construction of the Clothes dryer is to dry clothes up to 5kg with a height of 1.4m and a diameter of 0.6m and it has to be moveable with wheels attached at the bottom and this has to be done with the available engineering materials. However, this is for academic purpose, a similar project for general people with greater clothes capacity can be done with a selection of better engineering materials. The design of a clothes dryer machine usually come with a machine washing in which there is a chamber for washing the clothes and then there is chamber for drying up the washed clothes, however people face problems due the ground space taken by the washing machine and there aren't much options when it comes to a power efficient clothes dryer in the market. This project focusses on providing an alternative for a solo clothes dryer which is energy efficient, requires less space, easy to carry and is comparatively less in price.

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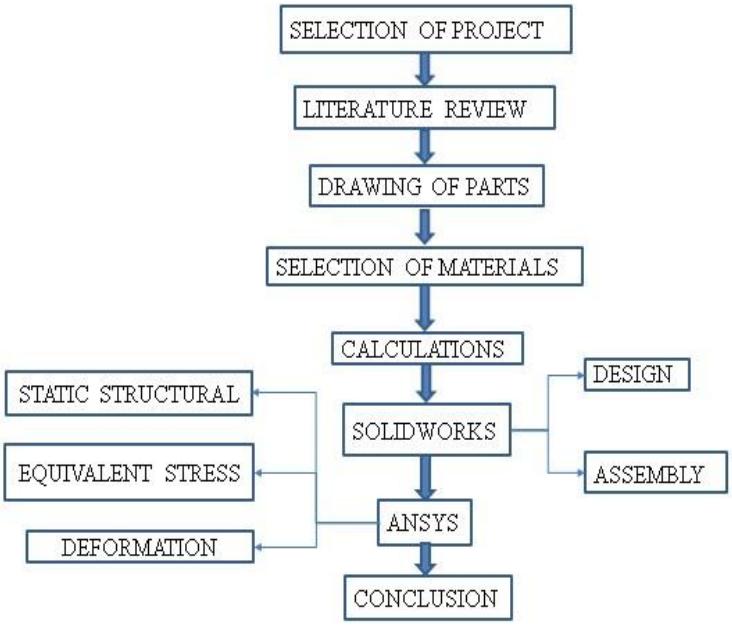

SELECTION OF MATERIALS

Many parts of a washing machine are manufactured from sheet steel, usually coated with zinc to improve rust resistance. The steel manufacturer supplies the metal in a coil, which allows the material to be cut to size with minimum waste or automatically fed into the forming process. On some models made by Speed Queen, the spin tub is made of stainless steel**.** All other models use a steel (called enameling iron) designed for a porcelain coating. For the wash tub, which isn't visible unless you open the machine cabinet, enameling iron with a porcelain coating is generally used. Whirlpool is the exception, using plastic instead of enameling iron for the outer wash tub.

However the main components of the cloth dryer machine is aluminium motor and the timer that is to be used for drying of the clothes and they are discussed below,

Aluminium Motor:Aluminium motors when compared to iron motors are light in weight and even caters to the needs of the project by providing higher efficiency and the ventilation is even better. These aluminium motors covers output from as little as 0.18Kw to 1.5Kw in frame sizes 63 to 132M in 2, 3 and 6 pole speeds. Some of the other advantages of aluminium motor over cast iron motor is its high resistance to corrosion and atmospheric attack and the fact that aluminium is almost one third the weight of cast iron. Hence using aluminium motor reduces the cost and increases the efficiency and the durability of the cloth drying machine.

OBJECTIVES

The objectives are as followed:

1. Develop a clothes dryer machine that can dry clothes in less amount of time.
2. Design the clothes dryer machine with suitable shape.
3. Analysis the beam structure (rod that supports the load of clothes) of the machine.
4. The time taken to dry the clothes using materials that has been chosen.

CONCLUSION

The designing of cloth dryer machine requires various components and different materials. The data or material for the project was collected from several research paper. The invention relates to a cloth drying machine which is less in price as well is more efficient. Literature review has been done for the cloth drying machine and many research papers were referred for Literature review. Hence the experiment plan is developed for the designing of the cloth drying machine.

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AGROCHEMICAL SPRAYER

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ABSTRACT
India is a highly populated country and about 60%to 70% of its population depends on agriculture. In this majority is the small scale producers. One of the most important part of farming includes pesticides spraying. In today's market many types of agricultural sprayers are available which works on different kinds of power source. This sprayer have higher cost which is difficult for the medium scale farmers to afford. To over this problem the project comes with the mechanism which is easy to use and affordable.

Keywords—Pesticide sprayer, nozzle, chain shaft mechanism.

I. INTRODUCTION

India is the agriculture based country. Majority of its population depends on agriculture, where more than 60%-70% of population is depend on agriculture. This structures the main income. Agriculture is the main source of Indian economy so, it is known as backbone of Indian economy. The total national output is between 48% and 60% is contributed by the agriculture in initial two decades.

Instead farmers in India does not produces the crop which has to be produce. Reason behind this is the insects which damages the crops and the lack of use of technology in Indian farmers. Many types of pesticides sprayers are available in market but due to its complication in use and high cost it becomes difficult to farmers to use this machine. So we have to make such machineries which is easy to handle and with low capital cost. India is the developing country and it will take some time for farmers to overcome with the problems of use of high quality machines and its techniques. Now in present time the farmers are using the sprayers which are helpful for them for killing insects damaging the crops. The invention of a sprayer, pesticides, fertilizers, etc. bring revolution in the agriculture sector. Maximum agriculture output was enable to the farmers after invention of the sprayers.

In present time farmers are using motorized sprayers which requires different types of fuels, batteries or solar panels. Accordingly we have decided to make a project on sprayer which works without any fuel. The sprayer works on a simple pressure generated in the drum when the wheel of the sprayer rotates. This will reduce the cost of fuel to the farmer and can cover the large area than the backpack hand sprayer.

Figure 1: Agrochemical Sprayer

ISSN 2394 - 7780

II. LITERATURE REVIEW

Literature review is carried out to check the working of different pesticides machines. It is done to check the sprayer geometry its construction. Different types of pesticides requires different types of working process, and it has its own advantages and dis advantages.

Backpack type pesticide sprayer is easy to use and has less cost and it works on manual power. But on other hand the contact between the harmful chemicals and human body is less so it causes severe damages to the human body due to its harm fuel chemicals.

The fuel used agriculture sprayer does not require any human efforts it works on fuel so less human efforts are required. But in another case if the backpack type agricultural sprayer contain this fuel motor it is dangerous to human body .Ads the machine is located on the human back due to the engine vibrations the back of the human gets severe pain which is not good for physical health

To overcome this problems our project is introduced this pump nozzles are fitted about 3 feet to 4 feet away from human body so less effect of pesticides on human body . As it is not located on human body the risk of back pain is also not introduced.

III. PESTICIDE SPRAYING

Now a days pesticides spraying on crop has become very common due to constant weather change which causes various disease to crops and also birth to new bacteria's and insects which leads to decrease in production rate of the crops. The nutrients growth required for plant growth are developed in environment. Various environmental factors such as humidity, sun raise, light, ambient temperature, etc. are the factors that affects that are to be considered for growth of plant. Having the proper information about this climate built the good relation between farmers and crops. Many biological factors parameters like pests, disease and soil affects the productivity of the plant growth. The process of growth of plants stop cause inactiveness of enzymes. As the humidity increases in the air the fungal diseases spread rapidly over the plants and they result the restriction of transpiration. Due to this regular use of pesticides are made to control the infection on the plant.

As the economy backbone of India is agriculture. Many revolution in agriculture are seen in recent years. This Agrochemical sprayer works on consumption of less human effort without consumption of any fossil fuel so the maintenance cost and working cost is very negligible.

IV. CONSTRUCTION

The main components of agriculture sprayer are as follows:

A. Frame:

The main function of the frame is to carry the whole mechanism on it. It must be of mild steel and must be so strong enough to work in farms.

B. Nozzles:

Nozzles are used to control the pressure, speed, direction, mass, flow rate emerging from them. They are used for the purpose of spraying the pesticides in larger areas as much as possible.

C. Pump:

Pump is one of the major component of the sprayer as it pumps the fluid inside the tank towards the nozzles.

D. Crank:

The main function of the crank is to transfer the motion from sprocket to the tank.

E. Connecting Rod:

Connecting rod connects the crank and the pump

F. Wheel:

Wheel is used to carry the whole mechanism, as the wheel rotates it makes the motion in the pump.

G. Chain:

Chain has no sleep it is used to transmit motion from gear sprocket to the pinion sprocket.

ISSN 2394 - 7780

V. WORKING

It works on the principle that the rotary motion gets transfer into reciprocating motion.

The figure shows the working of agricultural sprayer. The farmer grabs the handle bar of the sprayer ant pushes the sprayer in the forward direction. As the sprayer moves in the forward direction the wheel rotates which moves the sprocket. The sprocket brings the motion in the chain the chain moves another sprocket connected to the crank .This moves the crank as the crank moves it brings the motion in the connecting rod the connecting rod connected in the pump moves the pump upside down. As the pump moves the liquid inside is pumped towards the nozzles. The nozzles spray the liquid in the possible direction. The direction of the nozzles can be adjusted as needed to the person handling it.

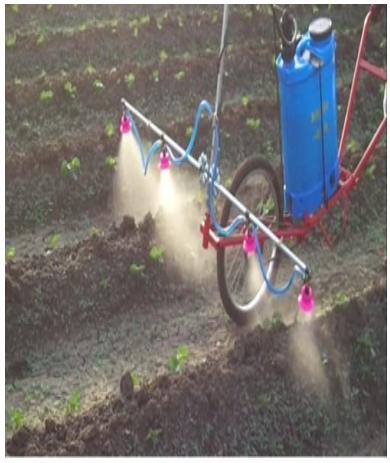

Figure 2: Working of Agrochemical Sprayer

As we have done the fabrication of the model the cost of the components used is shown in the table

SR NO.	COMPONENTS	MATERIAL	COST
1	TANK WITH PUMP	PLASTIC	1000
2	FRAME WITH MECHANISM	MILD STEEL	1500
3	FRONT WHEEL	RUBBER	100

Table 1: Cost of the materials

Our table clearly shows that the cost of the project is moderate for the middle class and the lower level farmers for their farming purpose.

The total Discharge of pesticide through nozzle is 36.73lit/hour and Discharge of one nozzle is 9.18lit/hour

Fig. 5. Figure 3: Agrochemical sprayer trolley

VI. SAFETY

Most of the farmers in India spray harmful pesticides without taking any safety measures for example not using gloves, face mask, etc. while spraying fertilizer, due to this many harmful chemical can be inhaled or consumed accidently while spraying by the farmer. A commonly used chemical known as Dupont Coragen is used as a pesticide which is very harmful for human body.

ISSN 2394 - 7780

In traditional method while spraying fertilizer the nozzle spray is kept very near to the body as the tank is lifted on back and the nozzle is taken in to the hands while spraying. While spraying in opposite direction of wind the chemical dust's more on the body which causes harmful effect. In this Agrochemical sprayer the nozzle can be adjusted as required and can spray 4 – 5 lines in a row. Also the nozzle is placed away from the body as seen in the figure. This causes minimum damage to the human while spraying hazardous chemicals.

VII. ADVANTAGES:

1. Low maintenance cost.
2. Pollution free working.
3. Moderate in cost.
4. Easy to handle.
5. Pesticides do not effects the human body.
6. Adjustable features in spraying.
7. No need of carrying heavy load on back while spraying pesticides.

VIII. DISADVANTAGES:

1. Requires human efforts.
2. It cannot be used in loamy soil.
3. It cannot be used in dense farming.
4. Rust takes place in the wheels.
5. Turning angle of the wheel is very large.
6. It is only used in dry land crops.

IX. APPLICATIONS:

1. Capsicum farming.
2. Beans farming
3. Brinjal farming.
4. Onion farming.

X. CONCLUSION

From the above project the following are conclude:

- The design of the project is simple and has low fabrication cost.
- The model is affordable to middle class farmers.
- It has small floor area so it causes less damage to the crops.
- It reduces the fuel cost as no fuel is used in it.
- It can be used in large fields in dry soil.
- It is more convenient than conventional spraying and weeding as it saves time and money.

XI. ACKNOWLEDGEMENT

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ASSOCIATION RULE FOR TRAFFIC ACCIDENTS-AUTOMATED RULE

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ABSTRACT
Vehicle casualty has become a major obstacle in nation. The study of main causes for this traffic accidents have become the most important sector in research field. In this paper, we are going to present the traffic accidents from Chikkamagaluru to Hassan (Karnataka) from 2012 to 2019 were excavated using association rule mining which generated lots of frequent item sets. The rules can also be used to scrutinize conventional display of accidents and measures can be taken by some comparable security improvement to prevent the accident, and conclusively progress the city's traffic assurance level. The experiments results showed that these methods suggested in the paper are adequate. Accordingly, an automatic modeling algorithm using association rules was certainly established to promote the effective application of association rule mining on intelligent transportation system.

Keywords: Data Mining, Traffic Safety, Influencing Factors of Accidents, Association Rules, Mapping

I. INTRODUCTION
In this world where there is increase in the number of vehicles in the same way there is increase in the number of accidents. So a perfect advancement which can be done in the field of technology is to prevent traffic accidents. Urbanization not only brings convenience to the way of life but also causes traffic hazards. From 2012 to 2019, over 4000 traffic accidents occurred between Chikkamagaluru to Hassan (Karnataka) and the city needs a safer traffic environment. The strong association rules can be used to find the network hidden in the accident data. To get them, we could measure the importance and credibility of the rules with the two thresholds Support and Confidence.

Detecting and analysing the factors causing accidents is necessary and measures to reduce accidents must be developed. The main causes of traffic accidents may be people vehicles roads or the environment taking these attributes into consideration rules r being made by plotting graph and to check which attribute has caused more number of accidents and preventive measures are given which will be represented using maps.

Mapping is one advancement which helps the user to travel to any particular location .When the features such as accidental zones are represented in maps it helps large number of users to be safe. This kind of advancement in applications will give the user details about the next accidental zone he is nearest and helps in to prevent the chances of accident. It gives the alert of the accidental zone by which the users will be conscious. The reasons for the accidents will be given by tapping on particular accidental zone. This application also gives comments for maintaining speed limit and helps to overcome the problem of traffic accidents.

II. LITERATURE SURVEY
In [4] Most of the information necessary for driving a vehicle is regarded as visual information. Inspire of importance, visibility conditions at the time of a crash are often not documented at a high level of detail. Past studies have not examined the quantify values of visibility and its association with crashes. The study aims to associate crash occurrence under different levels of visibility and the factors included in the crash databases by developing ordinal logical regression. The intent is to observe how different visibility conditions contribute to crash occurrences. The findings indicate that the likely hood of a crash increase during periods of low visibility, despite the tendency for less traffic and for lower speeds to prevail during these times. The findings of the study will add valuable knowledge to the realm of the impact of visibility in the way of using and designing appropriate counter measure

III. PROBLEM STATEMENT
Discovering the associations among the traffic accidents is the key factor to reduce the traffic accidents. Input for the prevention of the traffic accidents are collection of the previous traffic accidents data which have been occurred for specified number of years. Noting down the location where the accidents has occurred at what date and time intervals and other basic information are being collected. Processing step includes usage of Apriori algorithm for association rule mining to find the main reasons for accidents by using algorithms and rules the attributes which has caused more number of accidents is being noted. Output step is such that the predicted results are being considered and are plotted in graphs for easy understanding and preventive measures have

ISSN 2394 - 7780

made according to the percentage of accident causing attribute and efforts are made to solve the problem of traffic accidents.

IV. DATA PREPARATION

The data used in this paper where collected from the Department of traffic police station Karnataka. Table 1 shows the data set which includes the attribute such as year, location, weather condition, road type, speed limit, school zone, hospital zone, time, tunnel, state, curve, accident type.

Table 1: Data Set Of Accidents

Year	LOCATION	WEATHER CONDITION	ROAD TYPE	SPEED LIMIT	SCHOOL ZONE	HOSPITAL ZONE	TIME	TUNNEL	STATE	CURVE	ACCIDENTS
2012	AIT CIRCLE	SUNNY	TWO WAY	70	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN,SINGLE CAR COLLISI
2012	AIT CIRCLE	RAINY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE
2012	AIT CIRCLE	SUNNY	TWO WAY	60	YES	NO	DAY	NO	FF	NO	HIT N RUN ,COLLISION ACC
2013	AIT CIRCLE	CLOUDY	TWO WAY	45	YES	NO	DAY	NO	FF	NO	INEXPERIENCE ACC
2013	AIT CIRCLE	LIGHT RAIN	TWO WAY	80	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE,HIT N RUN
2014	AIT CIRCLE	HEAVY RAIN	TWO WAY	30	YES	NO	DAY	NO	FF	NO	COLLISION ACC,INEXPERIENCE ACC
2014	AIT CIRCLE	SHOWERY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	HIT N RUN
2015	AIT CIRCLE	SUNNY	TWO WAY	75	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN,SINGLE CAR COLLISI
2015	AIT CIRCLE	WINDY	TWO WAY	55	YES	NO	NIGHT	NO	FF	NO	HIT N RUN,SINGLE CAR COLLISION
2015	AIT CIRCLE	CLOUDY	TWO WAY	60	YES	NO	DAY	NO	FF	NO	SINGLE CAR COLLISION
2017	AIT CIRCLE	MODERATE RAIN	TWO WAY	40	YES	NO	DAY	NO	FF	NO	INEXPERIENCE ACC
2017	AIT CIRCLE	SUNNY	TWO WAY	85	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN
2018	AIT CIRCLE	LIGHT RAIN	TWO WAY	62	YES	NO	NIGHT	NO	FF	NO	DRINK N DRIVE
2019	AIT CIRCLE	SUNNY	TWO WAY	35	YES	NO	DAY	NO	BQ,CT	NO	NO ACCIDENTS
2012	MLMN COLLEGE	CLOUDY	TWO WAY	40	YES	NO	DAY	NO	CT	NO	INEXPERIENCE ACC
2014	MLMN COLLEGE	LIGHT RAIN	TWO WAY	60	YES	NO	DAY	NO	FF	NO	HIT N RUN,OVER SPEEC ACC
2016	MLMN COLLEGE	MODERATE RAIN	TWO WAY	53	YES	NO	NIGHT	NO	CT,BN,BQ	NO	SINGLE CAR COLLISION,DRINK N DRIVE
2015	MLMN COLLEGE	WINDY	TWO WAY	50	YES	NO	DAY	NO	CT,BN,BQ	NO	HIT N RUN
2016	MLMN COLLEGE	SUNNY	TWO WAY	40	YES	NO	DAY	NO	FF	NO	NO ACCIDENTS
2017	MLMN COLLEGE	SUNNY	TWO WAY	80	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,COLLISION ACC
2015	MLMN COLLEGE	HEAVY RAIN	TWO WAY	62	YES	NO	DAY	NO	FF	NO	DRINK N DRIVE
2014	MLMN COLLEGE	CLOUDY	TWO WAY	30	YES	NO	DAY	NO	CT,BN,BQ	NO	NO ACCIDENTS
2013	MLMN COLLEGE	FOG	TWO WAY	50	YES	NO	DAY	NO	FF	NO	SINGLE CAR COLLISION,COLLISION ACC
2012	NARIGUDDANAHALLI CIRCLE	SUNNY	TWO WAY	70	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN,SINGLE CAR COLLISI
2015	NARIGUDDANAHALLI CIRCLE	RAINY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE
2015	NARIGUDDANAHALLI CIRCLE	SUNNY	TWO WAY	60	YES	NO	DAY	NO	FF	NO	HIT N RUN ,COLLISION ACC
2017	NARIGUDDANAHALLI CIRCLE	CLOUDY	TWO WAY	45	YES	NO	DAY	NO	FF	NO	INEXPERIENCE ACC
2017	NARIGUDDANAHALLI CIRCLE	LIGHT RAIN	TWO WAY	80	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE,HIT N RUN
2018	NARIGUDDANAHALLI CIRCLE	HEAVY RAIN	TWO WAY	30	YES	NO	DAY	NO	FF	NO	COLLISION ACC,INEXPERIENCE ACC
2019	NARIGUDDANAHALLI CIRCLE	SHOWERY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	HIT N RUN
2012	NARIGUDDANAHALLI CIRCLE	MODERATE RAIN	TWO WAY	40	YES	NO	DAY	NO	FF	NO	INEXPERIENCE ACC
2014	NARIGUDDANAHALLI CIRCLE	SUNNY	TWO WAY	85	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN
2015	NARIGUDDANAHALLI CIRCLE	LIGHT RAIN	TWO WAY	62	YES	NO	NIGHT	NO	FF	NO	DRINK N DRIVE
2013	NARIGUDDANAHALLI CIRCLE	SUNNY	TWO WAY	35	YES	NO	DAY	NO	FF	NO	NO ACCIDENTS
2012	KAVIRATHNA KALIDASA RD	SUNNY	TWO WAY	70	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,HIT N RUN,SINGLE CAR COLLISI
2018	KAVIRATHNA KALIDASA RD	RAINY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE
2019	KAVIRATHNA KALIDASA RD	SUNNY	TWO WAY	60	YES	NO	DAY	NO	FF	NO	HIT N RUN ,COLLISION ACC
2012	KAVIRATHNA KALIDASA RD	CLOUDY	TWO WAY	45	YES	NO	DAY	NO	FF	NO	INEXPERIENCE ACC
2014	KAVIRATHNA KALIDASA RD	LIGHT RAIN	TWO WAY	80	YES	NO	NIGHT	NO	FF	NO	OVER SPEED ACC,DRINK N DRIVE,HIT N RUN
2016	KAVIRATHNA KALIDASA RD	HEAVY RAIN	TWO WAY	30	YES	NO	DAY	NO	FF	NO	COLLISION ACC,INEXPERIENCE ACC
2015	NURTURE SCHOOL	SHOWERY	TWO WAY	50	YES	NO	NIGHT	NO	FF	NO	HIT N RUN
2016	NURTURE SCHOOL	LIGHT RAIN	TWO WAY	60	YES	NO	DAY	NO	FF	NO	HIT N RUN,OVER SPEEC ACC
2017	NURTURE SCHOOL	MODERATE RAIN	TWO WAY	53	YES	NO	NIGHT	NO	CT,BN,BQ	NO	SINGLE CAR COLLISION,DRINK N DRIVE
2015	NURTURE SCHOOL	WINDY	TWO WAY	50	YES	NO	DAY	NO	CT,BN,BQ	NO	HIT N RUN
2014	NURTURE SCHOOL	SUNNY	TWO WAY	40	YES	NO	DAY	NO	FF	NO	NO ACCIDENTS
2013	NURTURE SCHOOL	SUNNY	TWO WAY	80	YES	NO	DAY	NO	FF	NO	OVER SPEED ACC,COLLISION ACC

V. METHODOLOGY

i. DATA COLLECTION

Data is collected from the traffic police station. The main functionality of this module is to identify the suitable data set and collect the data regardless of the field of study or preference for defining data, accurate data collection is essential to maintaining the integrity of research. Both the selection of appropriate data collection instruments (existing, modified, or newly developed) and clearly delineated instructions for their correct use reduce the likelihood of errors occurring.

ii. DATA PREPROCESSING

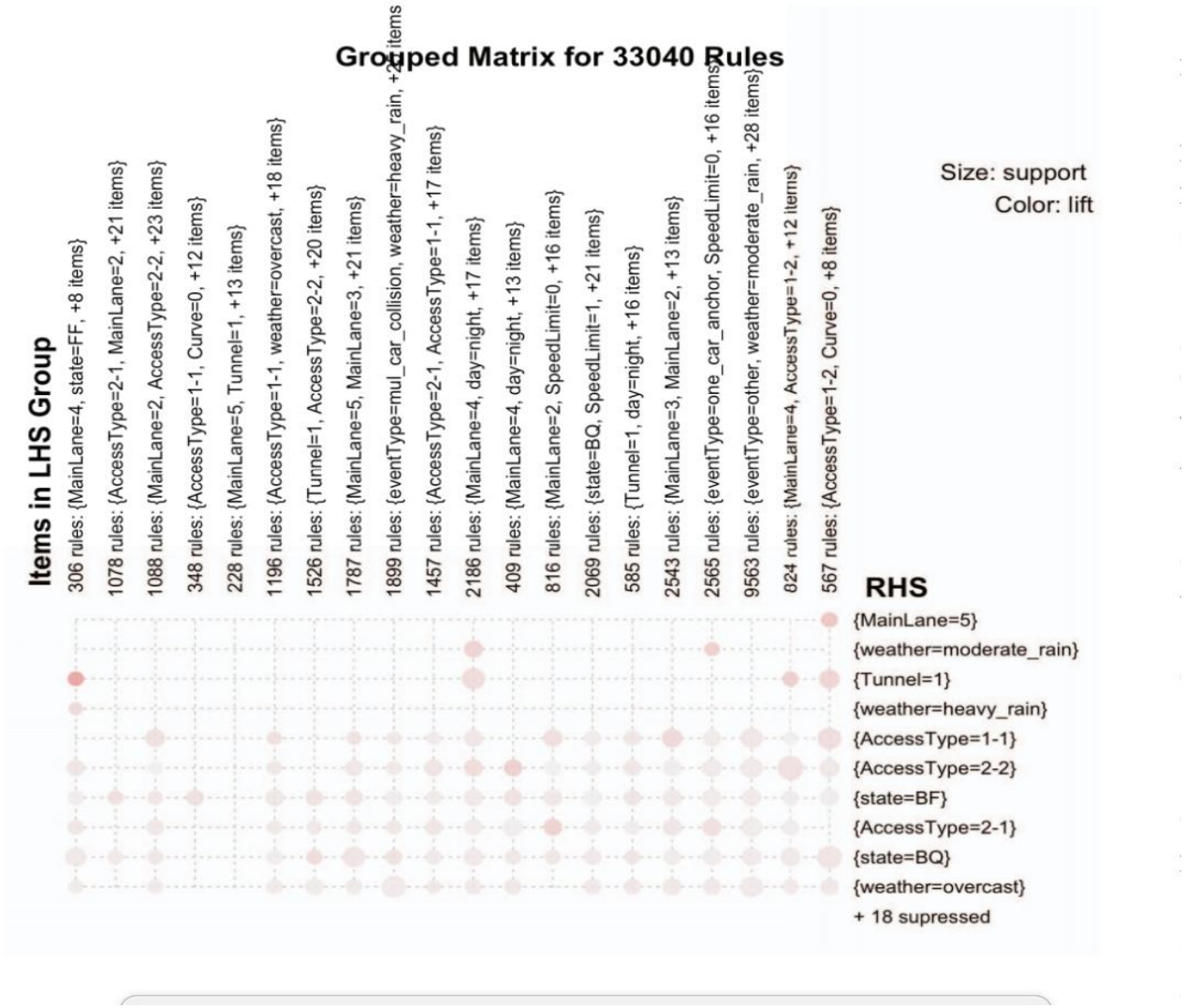
The main functionality of this module is to clean the data. The techniques are removing the duplicate values, handling the missing values and elimination of inconsistent values. The task of handling the missing values is further classified into two more subtasks namely inferring the missing value from the existing values and ignoring the missing values in some cases.

iii .CLUSTERING PROCESS [K-mean cluster algorithm]

K-means tries to partition x data points into the set of k clusters where each data point is assigned to its closest cluster. This method is defined by objective function which tries to minimize the sum of all squared distances within a cluster, for all clusters shown in Table 2. Grouping of certain attributes will gradually decreases the number of steps to calculate and easy to understand.

ISSN 2394 - 7780

Table 2: OVERVIEW OF CLUSTERING RULE



iv. APPLY ASSOCIATION RULES [APRIORI ALGORITHM]

In this paper used the Apriori algorithm to do the association rule mining. Support is shown in Equation 1. The Confidence is the degree of trustworthiness of association rules, as shown in Equation 2. The Lift refers to the relevance of LHS and RHS in the rules, as shown in Equation 3.

Support (P=>Q)=Support(P_Q)---------(1)

Confidence (P=>Q)=p(Q|P)=Support(P_Q)/Support(P)----------(2)

Lift (P=>Q)=Confidence(P=>Q)/Support(Q)-----(3)

v. Predict accidents patterns and graph representation

The attributes which has caused maximum number of accidents will be identified and percentage of each attributes are being given in the graph .The graph gives the user an easy way to understand any sort of problems or issues. By this the attribute with maximum number of accidents is being highlighted by having the maximum percentage.

vi. Mapping

Once the plotting of graphs is done the next step is to mark all the points on the map which are given as accidental zones. An alert for each and every respective position is being developed. Popup messages for the attributes which has occurred more number of times is being shown and a proper working setup is done.

ISSN 2394 - 7780

VI. RESULTS

Location graph

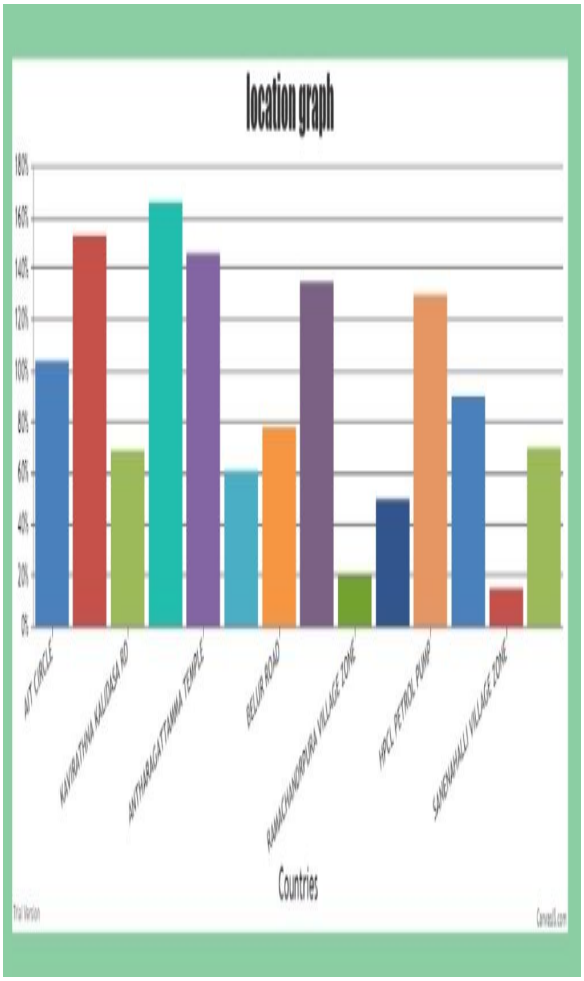


Figure6.1: Location graph of traffic accidents

In figure 6.1 represents the location graph, some of the places when maximum number of accident have been occurred are being considered and are plotted in x and y axis, the location or place when maximum number of accidents has occurred will be the highest shown in the graph plotted .**Speed limit graph**

In figure 6.2 represents the speed limit graph. The vehicle speed limit is being considered and plotted in the graph. The speed in which maximum number of accidents is being shown and that speed limit has caused more number of accidents.

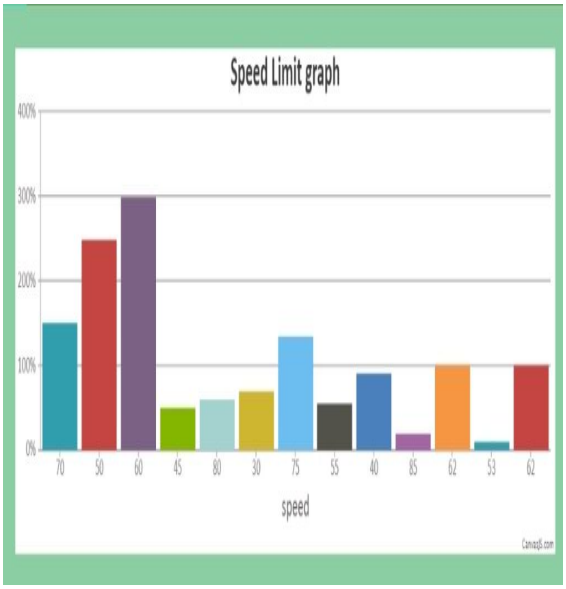


Figure 6.2: Speed limit graph of traffic accidents

ISSN 2394 - 7780

ACCIDENT PREDICTION

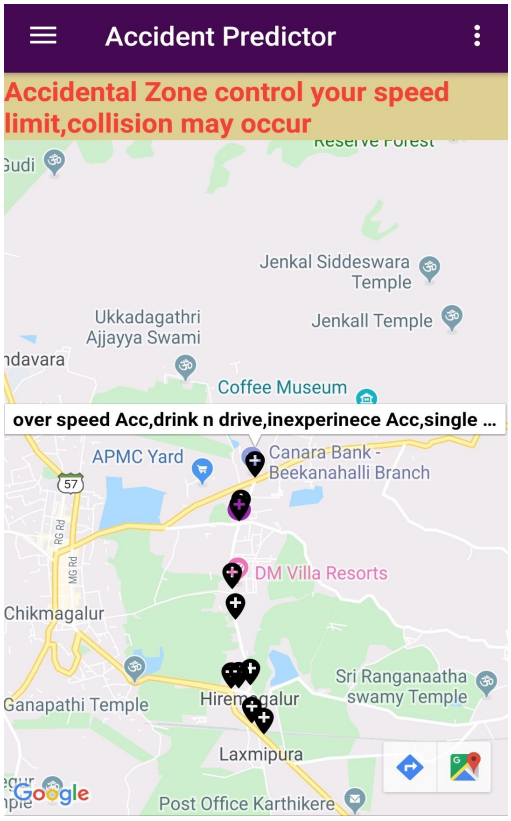


Figure 6.3: Mapping of accidental zones and its alerts

Mapping is an essential part shown in figure 6.3. The accidental points have been marked on the map and a popup message box is being given when the attributes causing maximum number of accidents is given. The user can do send suggestion which can be viewed by the admin.

VII. CONCLUSION

In this paper, we used the association rules to analyze the relationship between the influencing factors of traffic accidents collected from Chikkamagaluru to Hassan, and proposed a minimal Support calculation method based on interest frequent item set. Classification of the accident causing attributes and grouping them and representing in graphs is an easy step for the user understands. Mapping of the accidental zones and giving alerts is greater help to the users to minimize the number of accidents. The main motto of this project is to prevent the traffic accidents and by this project there will be a gradual decrease in the number of accidents.

Developing the same kind of mapping to all the other places and states of the country will in turn help road safety. Following of the alerts and suggestions given by this system will save the user from any chances of accidents. Hence we are collecting the data from the traffic sources to make safe India.

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COMBINE ACCELERATOR AND BRAKE PEDAL

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ABSTRACT
In Automobiles, have different pedals for the function of acceleration and brake, in order to operate any one of them it is necessary to leave the one pedal free and press the other pedal for operation. The death rate is about 25% , due to automobile accident and is going on increasing every year. One of the main reason is pressing the wrong pedal at the time of emergency. To solve the following problem, a mechanism is developed "Combine Accelerator and Brake Pedal", which can reduce the death rates by some instant. This mechanism reduces the operation time of pedals by approximate 5-6 seconds. This pedal is designed in such a way that it can be used universally in any automobiles. Its manufacturing and production is very easy. The pedal is hinged over a lever which can oscillate, retracting springs have been attached to the lever which can bring them to its original position. Pressing the pedal from the lower end it will cause the action of acceleration, when pedal is pressed at the center, lever moves and brakes are applied.

INTRODUCTION
In present time the death ratio in India is about 25% caused due to road accident, this mechanism will reduce this by 7-8% of total, as it can be used in any automobile. This innovation improves the mechanical movement of the brake and accelerator pedal, it is arranged in such a way that it can perform any one function without possibility of errors and not interfering the other operation. Typically the cars have the foot pedal arrangements such that, left pedal is for clutch, right pedal is for accelerator and middle is for braking. Here right foot has to be used for the operation of accelerator and for braking. This ensures that the throttle is released as the brakes are applied. But however foot is always at some distance from the brake pedal while it is placed on the accelerator pedal. This movement of foot will take some time and also it will increase in the total braking time of any automobile. Due to combine brake and accelerator pedal, misapplication of pressing the pedal will be very less in manual transmission, as the driver will disengage the clutch so it will be easy to discover his mistake of pressing the pedal.

LITERATURE REVIEW
[1]**Vaibhav V. Sawant et.al,(2019):-** This study by Vaibhav Sawant concludes that this new mechanism results in avoiding interference in braking during acceleration and vice versa. This combine pedal mechanism thus provides a driving control which permits the quick and smooth transition from acceleration to braking without transferring the foot from one pedal to another.[2]**V. B. Vishal et.al,(2018):-** The subject of the power descriptive memorandum is a combine pedal mechanism which involves the both operations such as acceleration and braking. There is advantages over the conventional pedals. This combine pedal mechanism allows to operate both the function of acceleration and braking on the same pedal without moving the foot over the pedal.[3]**Jay Krishna et.al,(2018):-** This study helps us to analyze and incorporate combine pedals which helps in decrease in the possibilities of accident and improved transition time between accelerator and brake pedals. [4]**Karthik Rao et.al,(2018):-** This paper helped us to get through the design, construction, working, and use of the pedal in an actual automobile vehicles. They also got the problems of the drivers which gets confused to press the pedals in case of acceleration and braking. [5]**Ajinkya Bhonge et.al,(2016):-** Their study is about a pedal which is adjustable, ergonomical for driver, light weight, serviceable, secure and better braking effect which are expected by driver. So they have made an pedal considering the following content. [6]**Sahil Arora (Jan, 2016) :** This study by Sahil Arora is based on avoiding interference of braking during acceleration and vice versa. This combined pedal mechanism thus provides a smooth and quick transition over pedals which minimizes the time taken for shifting the foot from acceleration pedal to brake pedal. [7]**H. Nijmeijer et.al,(2015):-** The study by him is based on one pedal operated acceleration and brake. In his study acceleration is done by the pedal but the braking action is taken place by the kinetic energy generated by the acceleration pedal is used to deaccelerate the vehicle. It works efficiently in the electric vehicles and similar mechanism is being used by the well known companies like BMW and TESLA. [8]**Sangdong Lee et.al,(2010):-** The study of Sandong Lee has analysis the time required to press the pedal and the time for switching foot between the pedal and has implemented a new system to reduce the total time and more efficient braking. [9]**Rickard Nilsson et.al,(2002)** : This study by Rickard Nilsson is focussing on the adaptability of new inventions by drivers because drivers actually face lot of problems in adapting new method of accelerating and braking using combined brake and accelerator pedal instead of separate pedal. [10]**Henri Bonnard et.al,(1999):-** He

ISSN 2394 - 7780

developed an mechanism for the driving school vehicles in which there is an electric signal actuator and a mechanical actuator. When any pedal is pressed an electronic signal is to be send to the actuator and it will automatically press the pedals of the other side of the driver, In case of the driving school vehicle. So if the instructor does not press the pedal it will automatically press the pedal and take the action of acceleration or braking when ever needed. [11]**John J. Teti et.al,(1977) :-** The study by John Teti is based on the construction and the fitting of the combine pedal on any automobile vehicle. It can be also be fitted on any heavy vehicles and also on industrial vehicles. [12]**Antonio Frontcra Pascual et.al,(1967):-** The subject of the power descriptive memorandum is a combined accelerator and brake pedal control system for automobiles. At the present time, as is known automobiles are equipped with independent pedal controls for operating the accelerator and the brake. [13]**Charles Rabin et.al,(1960):-** The present invention generally relates to control device for automobiles and similar type vehicle having internal combustion engine with carburetor normally provides with throttle valve for controlling the inlet of fuel and air mixture in which there is incorporate a construction providing for closing of throttle valve when the brakes of the vehicles are applied. [14]**F. E. Detmers et.al,(1940):-** This study on combine acceleration and brake pedal by F. E. Detmers helped us to get the detailed construction of the pedal to be designed and to be placed in an automobile. He also adopted an hydraulic throttle opening mechanism with combine pedal system.

METHODOLOGY

The design of the pedal was done on the Solid Works modeling software. The pedal is vertically mounted on the pivoted lever, both the end of the pedal takes the action of acceleration and braking. To accelerate, driver has to press the lower end of the pedal and for braking, driver has to push the pedal downwards from the center of the pedal which moves the pivoted lever and braking action can take place. An driver can quickly operate brakes or accelerator just by moving foot. One of the main disadvantage is that, a person may get confused while operating this pedal mechanism, who is much familiar with the conventional pedal system, so the person has to relearn the pedal mechanism. Also driver can not lift the foot over the pedal, as it has the braking and acceleration action which can lead to an accident. Continuously keeping foot over the pedal will make driver uncomfort while driving. Driving in the traffic situation will be more difficult with the single pedal arrangement.

CONCLUSION

With the above study we can conclude that this mechanism can reduce the interface of braking during acceleration and vice versa. It has more advantages over the conventional pedal system. This combine pedal mechanism gives quick and smooth operation from acceleration to braking, without moving the foot over the pedals. The rapid increase in automobile needs an exploration of such a new mechanism which can reduce drivers efforts and also reduce accidents.

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DESIGN AND ANALYSIS OF MICROSTRIP PATCH ARRAY ANTENNAS OF TWO DIFFERENT SHAPES FOR WEATHER MONITORING

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ABSTRACT
This paper demonstrates the design, development and analysis of four element micro strip patch array antenna of different shape for X and Ku band applications. We are analyzing and comparing the various parameters like gain, return loss, radiation pattern, antenna efficiency, VSWR etc., of four element rectangular and triangular microstrip patch antenna array. Considered antennas are designed to operate at 9.4 GHz on an infinite ground plane using FR4 substrate in IE3D design system. These array antenna configurations can be used for X and Ku band applications like satellite and telemetry communication systems.

Keywords: micro-strip patch, array antenna, Return loss, Gain and VSWR.

1. INTRODUCTION

An antenna is a valuable necessary component for any wireless communication system using radio frequency and microwaves. Due to the more advancement of wireless communication systems and increasing other wireless applications, wideband and low profile antennas are in great demand for commercial applications, military applications and in satellite communication systems [1]. In antenna design the main attributes considered are compact size, low profile and multiband. Thus, antenna can be fabricated in various configurations with various geometries in order to use in several applications. Antenna should have low profile and compact size, must fulfill requirements like light weight, low cost and must be easy to fabricate. Thus, micro strip antenna is one such antenna which supports all these requirements. In this paper, keeping an eye on important Antenna attributes, four elements rectangular and triangular low profile patch antennas array configurations are implemented with coaxial feeding using IE3D design tool and simulated results are compared.

2. MICROSTRIP ANTENNA DESIGN

In this paper we are focusing on designing of two types of microstrip patch array antennas they are four elements rectangular microstrip patch array antenna and the triangular microstrip patch array antenna [10] [12].

2.1 Four element rectangular patch antenna array

The single element rectangular microstrip antenna with a dimension L of 6.951 mm and width of 9.711mm with a dielectric constant of 4.4, designed for frequency of 9.4 GHz has been enhanced to obtain the four element microstrip patch antenna. The following equations have been used for the design [1],

Width of an element $W = \frac{C}{2fr}\left[\frac{\epsilon r+1}{2}\right]^{1/2}$

Length of an element $L = \frac{C}{2fr\sqrt{\epsilon_r}} - 2\Delta L$

Where $\Delta L = \frac{\square}{\sqrt{\epsilon e}}$

$$\epsilon e = \frac{\epsilon r + 1}{2} + \frac{\epsilon r - 1}{2}\left(\left(1 + \frac{12\square}{W}\right)^{-\frac{1}{2}}\right)$$

To implement four elements microstrip patch array first we designed single element antenna which is a basic antenna element that can be used to implement four element array antenna [9]. It is very thin metallic strip placed on the infinite ground plane using FR4 substrate, thickness of the substrate used is h=1.6mm to operate for the frequency 9.4GHz. The microstrip patch is designed to get the maximum radiation pattern normal to the patch. The various outcome parameters analyzed are gain, VSWR, the percentage bandwidth, efficiency of an antenna, radiation pattern and efficiency. The antenna dimensions are calculated by considering the basic antenna design equations as given in [1]. It is designed and simulated using IE3D simulation tool, the simulation results are compared as shown in the table1.

ISSN 2394 - 7780

The design of four element microstrip patch array antenna is to obtain good gain and bandwidth. The percent of bandwidth achieved is 21% with a gain of 6 dBi and Antenna efficiency 35%. Four element rectangular microstrip antenna and its return loss are shown in fig. 1 & fig. 2 respectively, for this -17 dB is the return loss at the resonating frequency 9.4GHz. Using coaxial feeding simulation results are obtained as shown in table 1.

From the fig. 2 it is clear that the gain obtained for the four element antenna is 6 dBi at the resonating frequency 9.4 GHz. Here the intension is to compare the gain, bandwidth, return loss, VSWR, and antenna efficiency of 4 element rectangular and triangular microstrip antenna.

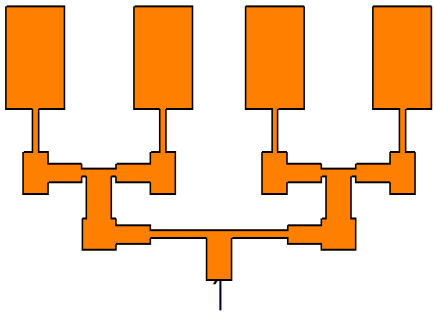

Fig. 1 Four element rectangular microstrip patch array antenna

From the fig. 3 it is clear that the gain obtained for the four element antenna is 6 dBi at the resonating frequency 9.4 GHz. The gain is a relative measure of an antenna ability to direct or concentrate RF energy in a particular direction or pattern. Here the intension is to compare the gain, bandwidth, return loss, VSWR, and antenna efficiency of 4 element rectangular and triangular microstrip antenna.

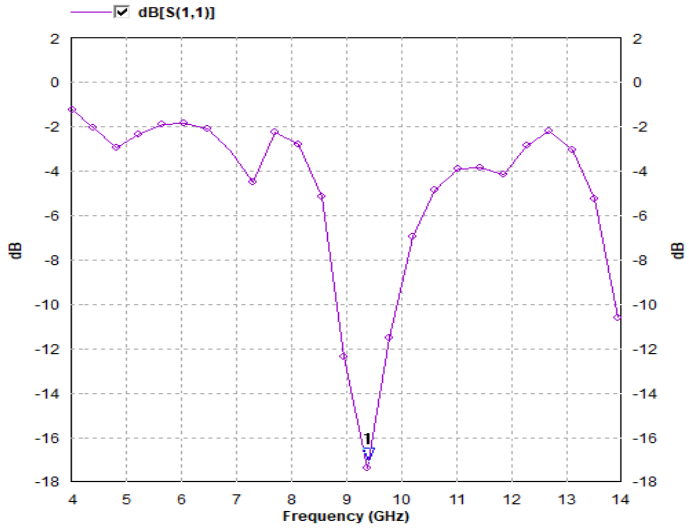

Fig-2: Return loss of four element rectangular microstrip patch antenna

The designed antenna provides radiation and antenna efficiency of about 35% at the resonating frequency 9.4 GHz as shown in fig. 4.

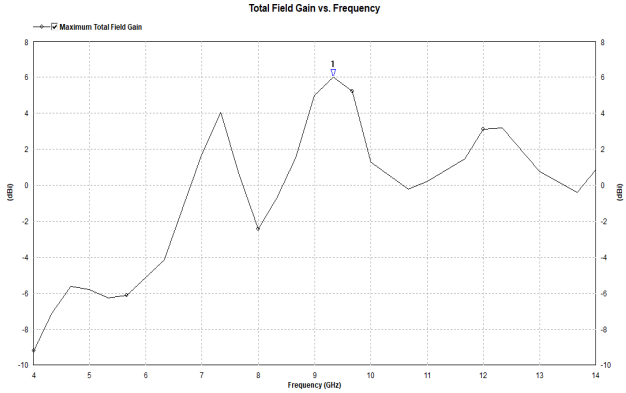

Fig-3: Gain Vs frequency of four element rectangular microstrip array antenna

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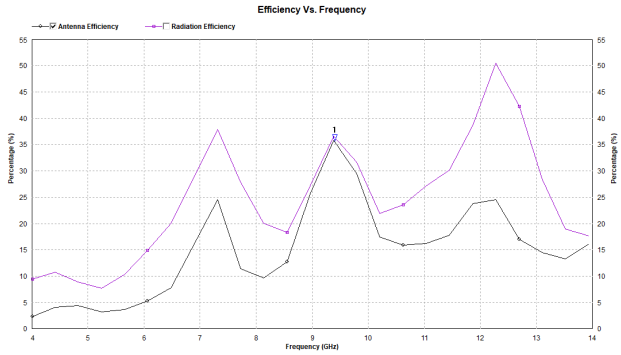

Fig. 4 Antenna efficiency of four element rectangular microstrip antenna

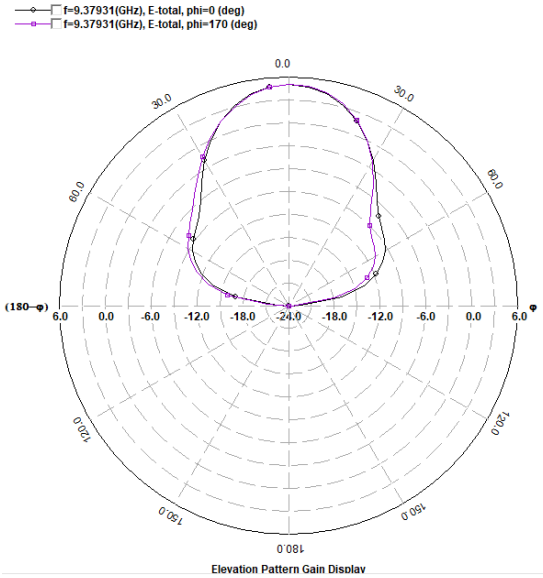

Fig. 5 Radiation pattern of 4 element rectangular microstrip antenna

The radiation pattern in fig. 5 is broader and unidirectional and VSWR for the antenna is 1.3, VSWR shows how efficiently the radio frequency poer is transmitted from a power source through a transmission line into the load, it also numerically describes how well the antenna is impedance matched to the radio transnmission line it is connected to. Normally the value of VSWR must be less than 2 as shown in fig. 6. The directivity of fundamental antenna depends on how directional an antenna radiation pattern is. The radial distance from the origin in the broader direction represents the strength of radiation emmitted in that direcion.

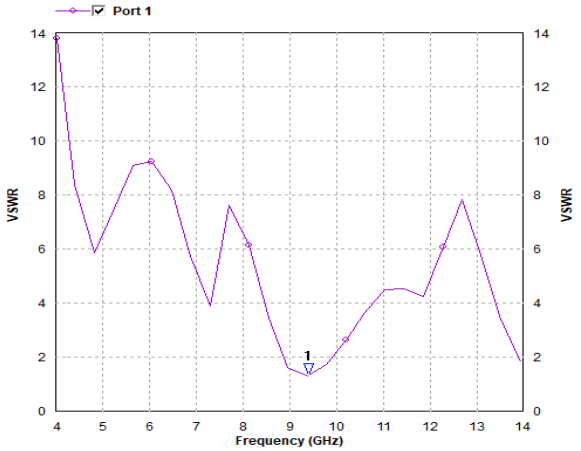

Fig. 6 VSWR of 4 element rectangular microstrip array antenna

2.2 Four element triangular microstrip antenna array

Before implementing 4 element triangular microstrip patch antenna, single equilateral triangular microstrip patch antenna is designed, length of each side is a=5.07 mm. Using single patch four element microstrip patch

ISSN 2394 - 7780

array antenna is designed. The frequency with which it is designed is 9.4 GHz and dielectric ϵ_r= 4.4, thickness h=1.6mm. Length of each side is calculated using the equation [9],

$$a = \frac{2C}{3f0\sqrt{\epsilon 0}} \quad \text{mm}$$

Where, C=velocity of light $3x10^{10}$ cm/sec,

The resonating frequency is 9.4 GHz at which the return loss is -25 dB, it provides the percent of bandwidth about 9%. The bandwidth achieved in this case is slightly lesser compared to the bandwidth obtained in rectangular array which is 21%, but the triangular array has more return loss compared to the rectangular array. In general one of the limitation of microstrip antenna is they have low bandwidth. By using the coaxial feeding technique we can excite the antenna to get above simulated results. Fig. 7 shows the design of 4 element equilateral triangle array antenna and fig. 8 shows the return loss.

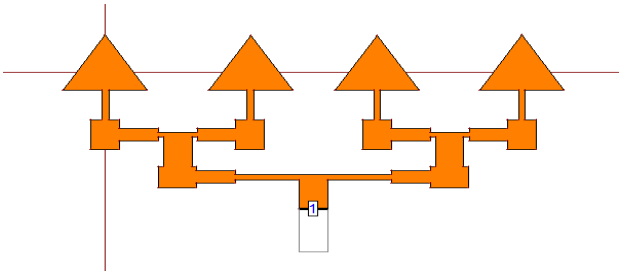

Fig.7 Four element equilateral triangle microstrip array antenna

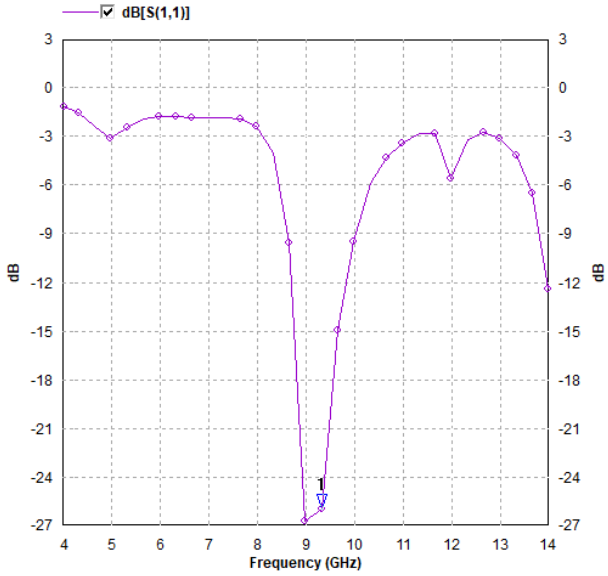

Fig. 8 Return loss of four elements triangular microstrip antenna

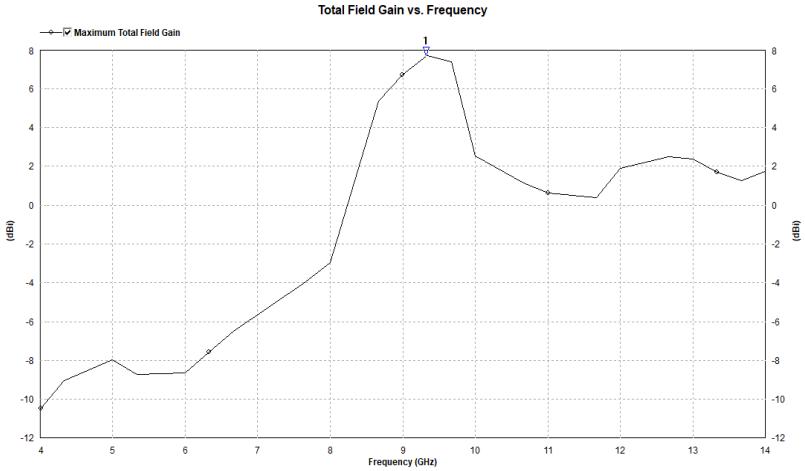

Fig. 9 Gain of the 4 element triangle microstrip antenna

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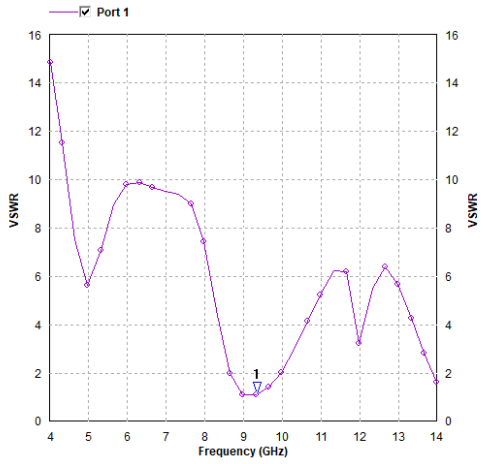

Fig. 10 VSWR of four element triangular microstrip antenna

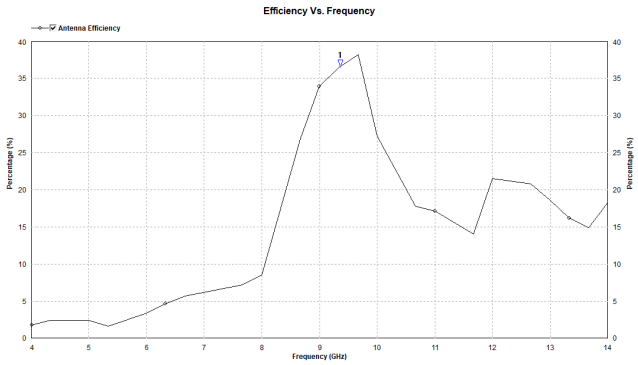

Fig. 11 Antenna efficiency of four element triangular array antenna

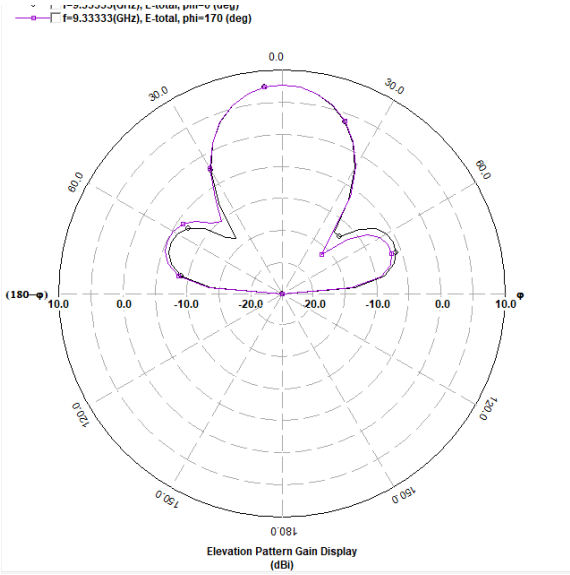

Fig. 12 radiation pattern of four element triangular microstrip antenna

The efficiency is the total power radiated to the net power accepted by the connector transmitter, from the fig. 11, the antenna efficiency achieved by the triangular array is 37% which is slightly larger than the efficiency obtained in rectangular array antenna at 9.4 GHz. Also, fig. 12 shows the radiation pattern of the triangular array which has two side lobes and a major lobe in the broader direction, indicating the strength of the signal in that direction. Thus the above results are tabulated in the table 1**.**

3. CONCLUSION AND RESULTS

The outcome results of gain, VSWR, percent of bandwidth, return loss, and radiation efficiency are studied and analyzed, accordingly the results are tabulated in the table 1. We observe from the figures of both type antennas

ISSN 2394 - 7780

resonating at 9.4 GHz, the gain for rectangular microstrip array is 6 dBi which is slightly smaller than gain obtained for triangular array antenna which is 7.6 dBi. The bandwidth achieved is more in rectangular array compared to the triangular array antenna but the gain and antenna efficiency wise the triangular antenna is more suitable as it is having -25 dB return loss which means the reflected power is less compared to -17 dB in case of rectangular array antenna and also VSWR of triangular array is 1.1 which is lesser than 1.3 of rectangular array antenna. The 4 element triangular microstrip antenna configuration is chosen because it has advantage of occupying less metalized area on substrate than the 4 element rectangular microstrip patch geometry, Its dimension that tends to be small can make the overall dimension of the antenna very small.

Four element Antenna Type	**Resonant Frequency F_0 in GHz**	**Gain**	**Bandwidth percentage**	**Antenna efficiency**	**VSWR**	**Return loss**
Rectangular Microstrip patch array antenna	9.4 GHz	6 dBi	21	35 %	1.3	-17 dB
Triangular Microstrip patch array antenna	9.35 GHz	7.6 dBi	09	37 %	1.12	-25 dB

Table 1

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DEXTER: A DESKTOP ASSISTANT

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ABSTRACT
The use of computers has taken a great turn up in the modern world. The less tech savvy people find it difficult to use. To overcome the problem Virtual Assistant (VA) was developed. Many companies have launched virtual assistants like Microsoft's Cortana, Apple's SIRI, google assistant and many more. However, most of the VAs are for mobile phones. The most important means of communication is language and the primary medium being the speech. The interactions between humans and computers that is their communication is called Human Machine Interaction using Human-machine Interface (HMI). In this proposal, a simple stand-alone desktop application called DEXTER is presented. Application works on Natural Language Processing (NLP). The input given to the DEXTER is by speech using a microphone. It first listens to voice, analyze it and then performs its tasks. The output is by both speech and text. The user can use the application without the microphone by using its GUI. DEXTER has simple and easily understandable Graphical User Interface (GUI). The application works on Windows Operating System (OS). DEXTER helps the user to search on Wikipedia, to send emails and various online services. It also helps to perform basic operations like open OS application, play music, to display time, date, battery and much more. By paying attention to what user likes, what user wants to share, Dexter certainly provides the users with an experience where user's individuality is celebrated and not ignored.

Keywords: Desktop Virtual Assistant, Graphical User Interface (GUI), Human Machine Interface (HMI), Natural Language Processing (NLP), Online services.

INTRODUCTION
Today, we humans rely upon machines and every machine is leaning towards automation, may it be home or car. There is a tremendous change in technology over the last few years. Believe it or not, in today's world you can interact with your machine. Since human brain is more responsive to voice rather than written text hence virtual assistant is gaining hike in the industries and it is a major innovation for various other applications. The efficient way to interact using voice commands is human-machine interaction. To achieve this, we need to use speech to text API for understanding the input. To interact with computers, an intelligent virtual assistant (IVA) or intelligent personal assistant (IPA) which is a software agent, came into existence. Many companies have developed virtual assistant applications such as Apple's SIRI, Microsoft's Cortana, Google Assistant, etc. Many of these applications are limited to mobile devices only. In this proposal, an idea for desktop based virtual assistant called DEXTER is implemented. This application uses Natural language processing for both input and output. It uses query processing by matching input with available keywords and it response back with output.

OBJECTIVES OF STUDY
1. To understand the concept of virtual assistant.
2. To understand the concept of Natural Language Processing.
3. To make a desktop based assistant with GUI.

CONCEPTS
A. Virtual Assistant
A virtual assistant is an application that understands natural language i.e. voice commands and completes the end users' task. Historically these tasks were performed by personal assistant or secretary where there was a lot of paperwork and it was time consuming. Virtual assistant basically performs task for the end users. The tasks include searching Wikipedia, playing music, setting reminders, open applications, etc. Some of the most popular virtual assistants are Apple's SIRI, Microsoft's Cortana, Google Assistant, Amazon's Alexa. They use natural language processing (NLP) to match user voice input to executable commands.

B. Natural language processing
NLP is one of the major component of AI which processes human voice. Starting with collection of data(voice), and then analyzing it, the NLP converts this data into text. This text is actually the command. Now NLP performs the task based on the command and output is generated in the form of text and later it is converted into speech. NLP helps humans to interact with machines.

ISSN 2394 - 7780

C. Human Machine Interaction

HMI refers to the communication and interaction between humans and machines using a user interface. The user interface is a part of the computer and its software that people can hear, see, touch, talk or otherwise understand. HMI is the study, planning and design of how humans and machines work together so that a person's needs are satisfied in the most effective way. It reduces decision making time. Tasks are completed in less time and with fewer errors.

LITERATURE SURVEY

A. Personal Assistant with voice recognition intelligence

- Technologies: The system starts its process by pattern detection and then performs its tasks. The system was a machine learning algorithm which used keyword learning for further processes and it also contains offline voice recognizer (CMUSphinx).
- Disadvantages: All the functionalities which are developed are for mobile device and not for desktop.

B. Open Source Platform Digital Personal Assistant

- Technologies: As the user commands, the system starts to neglect the unimportant part and collects the keywords i.e. extraction of keywords and uses NLP for input and output. The whole system was an IOT based device.
- Disadvantages: This Assistant is developed only for home automation and it does not contain dialog system.

C. Study Of Voice Controlled Personal Assistant Device

- Technologies: The system was implemented using NLP, it takes an input through a device i.e. IOT Box. It analyzes the commands and matches it with web service adapter and cloud server.
- Disadvantages: When the application was actually made it wasn't able to interact with another modulus but helped to be organised.

D. Virtual personal assistant for the blind

- Technologies: The model is combination of text to speech and speech to text

i.e. basically speech recognition. In the system optical character recognition (OCR) was used for handwriting recognition.

- Disadvantages: All the functionalities which are developed are for Android devices and not for desktop.

E. Next-Generations of Virtual personal assistant

- Technologies: The input for the system can be speech, image or gesture. After the input recognition it passes through interface engine which is connected to the knowledge base for understanding the input.
- Disadvantages: They developed a device which does not contain GUI.

PROPOSED ARCHITECTURE

The whole working starts with the human voice, when we give command to the Dexter, it listens and then recognizes and converts our command into fragments / machine level language by speech recognition module. After that, that command reach to the Dexter. Dexter checks whether the given command is available or not. If yes, according to the flow, it will do its work, for example, if a user gives a command to Dexter like "Salman Khan Wikipedia", first it checks whether the Wikipedia module is available to search about the given command, if yes then it will go to Wikipedia module then collect the results from

Wikipedia about Salman Khan and then Dexter shows us output on console and also reads it out.

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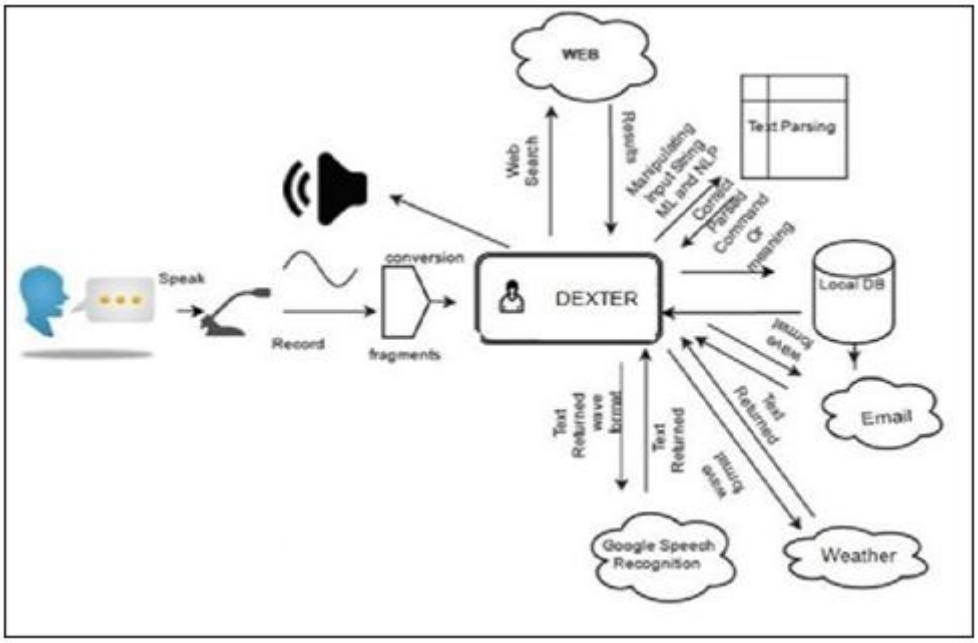

Fig. 1. Proposed System of Dexter

The another module we are using is Text-Parsing, the advantage of this module is that suppose a non-technical person gives command ”Dexter Please Open Google” but we have only ”Open Google” in our program, text-parsing module does the work of catching only the understandable command from the fragments and passing it to Dexter to perform the action according to the command. If user gives command to ‘Send mail’ then it will go through Email/SMTP module. While sending the email Dexter will ask some basic things like “what should I say, who is recipient?”, etc. For fetching recipient we are using database so if you say the recipient name as Pratik, that mail is directly send over the email address of Pratik otherwise if the given name is not present in database we have to tell Dexter the full email address of that recipient. This project is based on AIML 1.0 and uses PY-AIML for using the AIML interpreter in python.

CONCLUSION

DEXTER performs various functionalities such as managing various applications on just the voice **commands.** It contains key features like Voice Pattern Detection, keyword parsing, etc. which helps the end user to use various functionalities and services of the desktop. DEXTER is language barrier independent which actively responds to user’s voice commands. The application will let the user add data such as calendar entries, set an alarm, or even reminders. System is fully GUI based, easy to operate and user-friendly. Virtual Assistant reduces paperwork. Hence, we conclude that DEXTER is a desktop assistant with GUI with both speech input and output, that is, you will speak to it and it will speak back to you. All the objectives that had been charted out in the initial phases were achieved successfully.

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SIMULATION OF REVERSE POWER RELAY FOR GENERATOR PROTECTION

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ABSTRACT
Generators are hearts of the power system. Any faults at the generator side may lead to severe failures and fatal accidents. Thus, a major concern is protection of these generators from number of faults like- varying voltage, varying current, short circuits, varying frequency, over-fluxing, reverse power flow, etc. In this project, we have designed a protective scheme for power flow in opposite direction that is flow of power from grid to the generator, due to which the generator starts consuming and acts as a load. Modelling tools are important to have a basic idea of power system. These tools aid an engineer to modify the system under normal and faulty scenarios. This paper contains the simulation and modelling of digital reverse power relay in MATLAB/ Simulink. MATLAB libraries offer Power System Analysis Toolbox which are simulation based, for power system engineers.

INTRODUCTION
In power systems, for detection of synchronous generator's motoring action, reverse power relays (RPR) are used. When the field winding is electrically connected with the excitation system but the prime mover fails, this condition occurs. Thus, the machine acts like a synchronous motor connected with huge power system. In such conditions, the rotors behave like the active load on that machine. Motoring action eats power to rotate the prime mover and severe damage is caused to the prime mover. This condition is dangerous since there is an objectionable rise in temperature, especially in case of steam turbine. Therefore, these must be detected quickly and the GCB should be tripped.

Electromechanical relays are replaced with digital relays which are highly accurate and have high-speed operations. Immediate operation of relay is a must, especially for faults which may result in system blackout. Some additional perks of digital relays are - multiple variable settings, highly sensitive, control for a wide range and compact size.

OBJECTIVES OF STUDY
1. To detect a reverse power flow in the power system.
2. To trip the circuit breaker within threshold.
3. To design a relay logic to prevent motoring action of the synchronous alternator.

PRIME MOVER FAILURE FAULT OR REVERSE POWER FAULT
A generator is incorporated with prime mover and is connected with the grid, supplying power. When the failure of the synchronized prime mover occurs, the condition is known as motoring. Here, the generator pulls power from the bus, operates as a motor and drives the prime mover. In a synchronized condition, frequency of all the generators is same. Any dip in frequency of one alternator causes the other power sources to feed power into the alternator. This power flow in the reverse direction is known as the reverse power flow or motoring action of alternator. Another cause of reverse power occurs during synchronization. If the frequency of the bus bar to which the machine is to be synchronized is slightly higher than frequency of the machine and the breaker is OFF, reverse power flows. Hence, during synchronization, the machine frequency is kept little more than that of the bus bar. This enables the machine to take load the moment the breaker is closed. A reverse power relay can be used but it must have a time delay setting to ensure correct trip in case of short time fluctuations, phase swings and disturbed synchronization. Hence, when a power reversal issue occurs, the first thing is to decouple the corresponding alternator from live line with the help of the breaker. If it is stuck, then whole bus needs to be shut down.

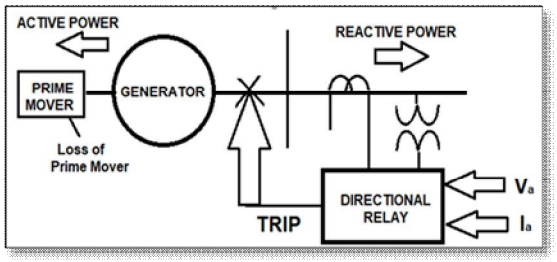

Fig. 1. Reverse Power Flow

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REVERSE POWER RELAY

Reverse Power Relays (RPR) are used to detect motoring operation of synchronous alternators. The RPR is a protective directional relay that stops power from flowing in the opposite direction. It is used in installations where a generator functions in parallel with other generator or the utility in order to prevent power to flow again into the first generator when it fails the output. The relay checks power from the generator and in case of output falling below a specific value, it immediately decouples the generator coil to avoid flow of power into the stator coil. The generator output fails because of issues with the prime mover, speed controller problems, turbine that drives the generator, or varied frequencies during synchronization. The RPR senses power flow in reverse direction and separates the generator to avoid damage.

MATLAB/Simulink MODELLING

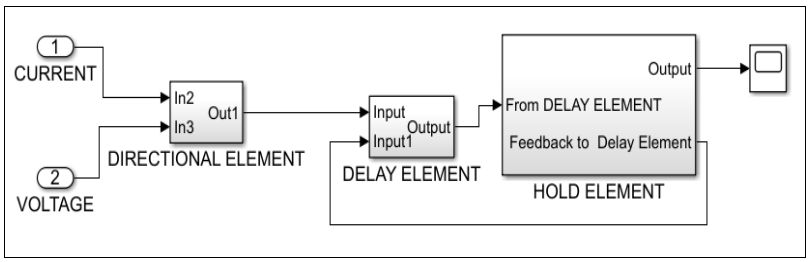

Fig. 2. Relay Logic Subsystem

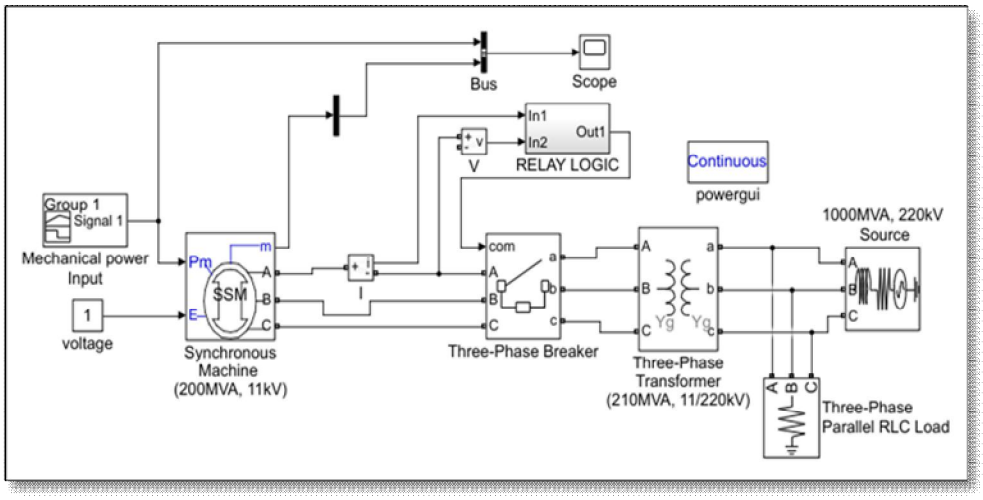

Fig. 3. The proposed scheme

- **Directional Element**

In the directional element, a low voltage signal from PT and current signal from CT are converted in perfect square waves with values +1 to -1. This means, 'switch' and 'switch1' output is a square wave and not touching zero. Later, these waves are multiplied to yield '1' as an output during the overlapping and '-1' during the non-overlapping interval.

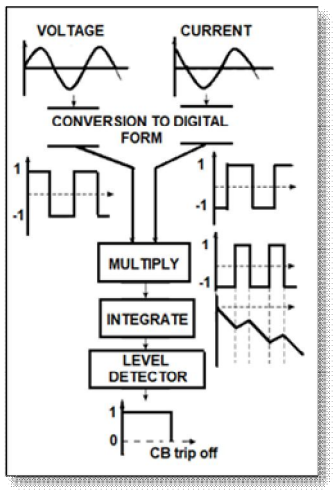

Fig. 4. Implementation of Directional Element

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The switch2 output is:

- 1 for overlapping = normal condition
- -1 for non-overlapping = abnormal condition

The product is then integrated from 'L' to '-L'. In order to keep the integral always less than '0' under normal load flow conditions, the upper limit of the integrator is set at '0' value.

However, the output of integrator tends to drop until it reaches a threshold value 'L', under power flow reversal scenarios. That is, more the overlapping condition, more the value of integral that is positive ('0' here) indicating healthy condition. And lesser the overlapping condition, lesser the value of integral that is negative. When it crosses the threshold value '-L', trip signal is received by the breaker from the relay. For this case, L is set at 0.01, however any value could be selected depending on the amount of reverse power.

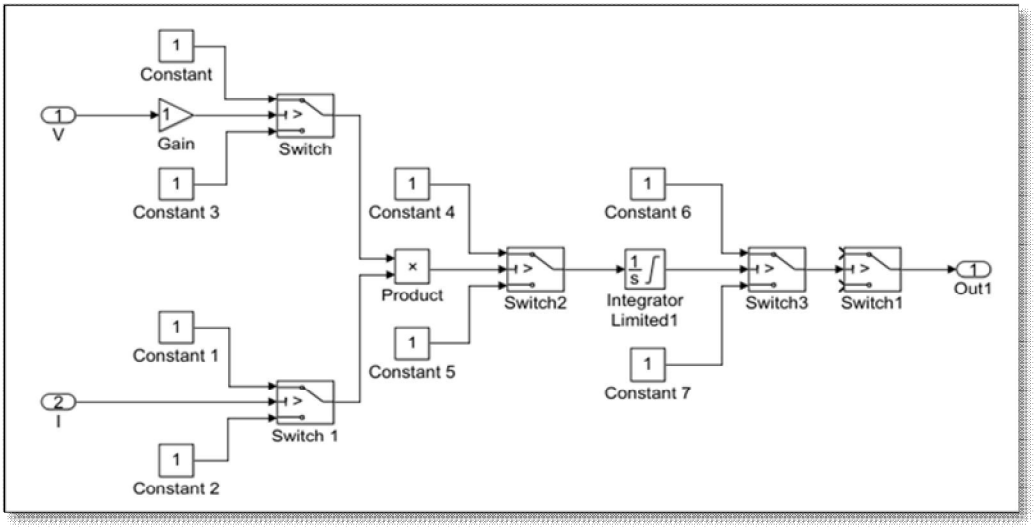

Fig. 5. Directional Element

- **Delay Element**

The job of the delay section is to avoid the relay from passing any false trip signals to the breaker during temporary faults or transients. The delay element input i.e. output of the directional element is fed to a decision block with output '0' when normal and output '1' when abnormal conditions occur. This output is then integrated and the value of the integral is compared with the threshold level 'T', whose value is set equal to the delay time desired.

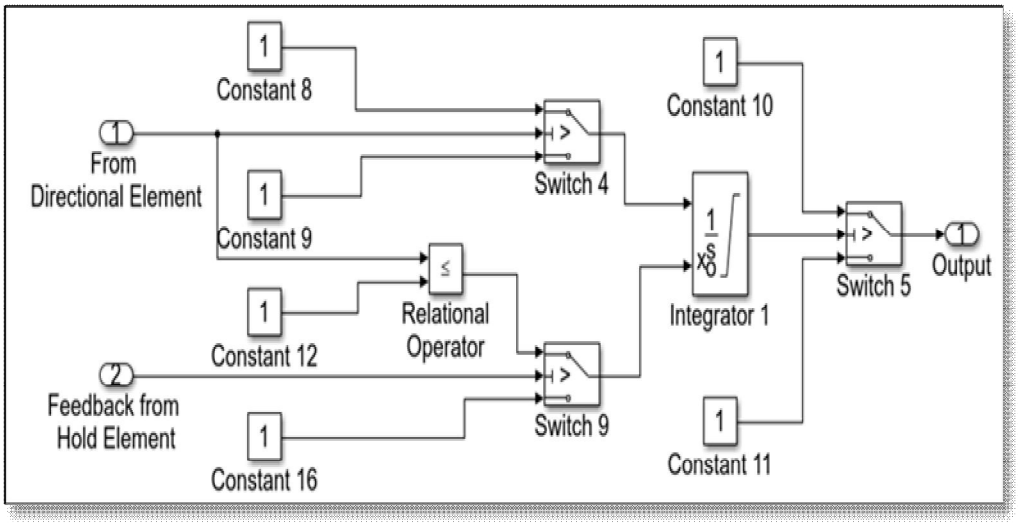

Fig. 5. Delay Element

When,

- ✓ normal condition - value of the integral < T - the output of the delay element = '1'.
- ✓ Under stable conditions, the input obtained at the integrator is '0'. Hence the value of the integrator is '0' always (less than value 'T'), therefore, correspondingly, the delay element output will be 1.

ISSN 2394 - 7780

✓ abnormal condition - the integral value > T, the output of the delay element = '0'.

The input to the integrator is '1' and after 'T' seconds, integral value is obtained, to indicate fault condition.

✓ transient condition or a temporary fault - for < 'T' seconds, once the fault clears the integrator value is reset to '0' by the relational operator.

- **Hold Element**

The function of the hold block is to maintain the status of the relay, 'stable' after the relay has tripped. Since, once the CB has opened, the fault will stop existing, faking a normal condition and pushing the relay to again pass a '1' signal to the CB, causing it to close again. The '0' value from the delay block is integrated after getting inverted. When the value of the integral exceeds '0', the output of the hold block switches to '0' from '1'. But the integrator cannot reset here. So, once the integral exceeds its threshold i.e. '0' it never returns to the value. Thus, the hold block output is '0', always. There is a switch block between hold element and delay element, which is used solely to stop the relay from false tripping during transient periods.

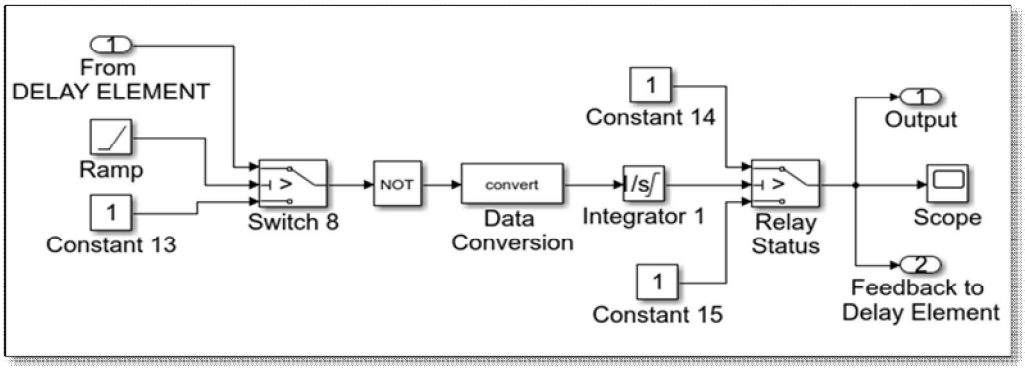

Fig. 6. Hold Element

OVERALL CIRCUIT

The functioning of the complete circuit is interesting; however, has a chain of signals inter-related with a feedback path at the final stage. The directional block converts all the signals into perfect square waves and also analyses the overlaps and non-overlaps in power waveform. The power signal is then integrated and output is fed to the delay block. The delay block merely provides a delay of certain time instant so that blackouts can be avoided during transients. In this case, we have provided a delay of 7 sec. The block has two major elements- the relational operator and Switch 4.

During normal conditions, Switch 4 functions. When a fault occurs, the relational operator works instead of Switch 4. In this way, these two elements work alternatively. The relational operator obtains a feedback from output which enables delay block to provide proper delay and the hold block to hold the status of each element until the fault is cleared. The hold block consists of a logical operator NOT. When a fault occurs and the circuit breaker opens, the initial circuit up to the hold integrator 2 feels that the conditions have normalized since reverse power stops to flow. Hence, all the initial elements tend to reverse their status. NOT keeps the faulty status maintained till actually the fault clears. The output of hold block yields the relay status which is '1' in normal conditions and goes down to '0' during abnormal conditions.

OUTPUTS

✓ **Generator Power**

The mechanical input to the generator changes from 0.6pu to 0.8pu at 25s. And further keeps on oscillating at different time instants. However, at 75s it is observed that output electrical power goes negative for a very short instant, this is where transient occurs. Later, at 100s actually the fault has occurred. Thus, power flows in reverse direction.

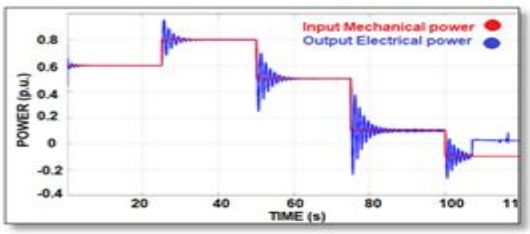

Fig. 6. Generator power

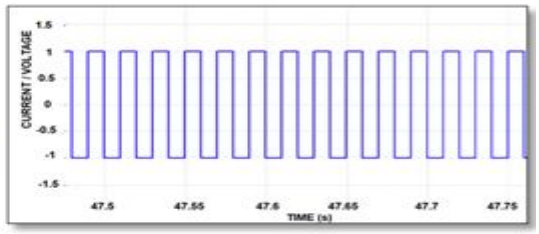

Fig. 7. Current/Voltage Input

ISSN 2394 - 7780

✓ **Directional Block Signals**

At 100s, the reverse power flows, hence, it is observed that the overlapping width that is of magnitude '1' is getting narrower where current and voltage signals seem to go out of phase gradually. This is the input signal given to the directional element integrator which integrates from '0' to '-L'. The integrator integrates the power signal and keeps it '0' for normal conditions.

As soon as reverse power starts to flow as 100s, integration values appear. It is observed that the directional block experiences transient condition where it changes its status from '1' to '0'. But soon the condition is normalized and status returns to '1'. At 100s, when fault occurs, it sets its value to '0', this time indicating an actual faulty condition.

✓ **Delay Block Signals**

Here, status '1' indicates normal condition. At 100s, fault occurs but due to a delay setting of 7s, the delay block checks the conditions till 7s and later yields an output '0' indicating that fault has occurred.

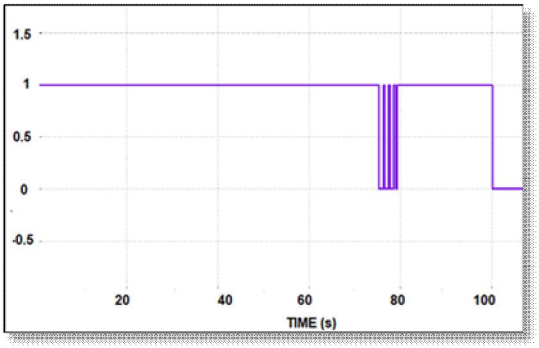

Fig. 8. Directional Block Output

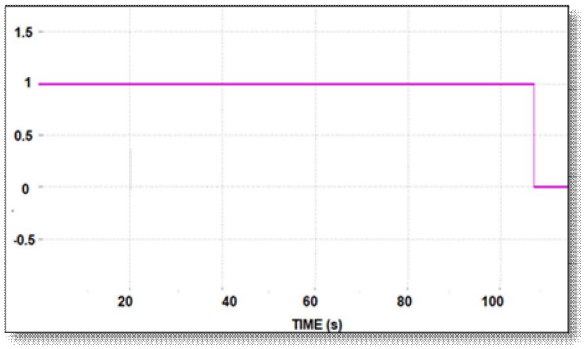

Fig. 9. Delay Block Output

✓ **Hold Block Signals**

The integrator of hold block follows the delay block and waits for 7s as a delay. Later, it starts integrating the values as shown above.

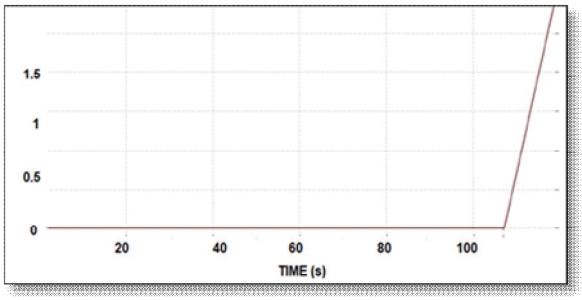

Fig. 10. Hold Block Output

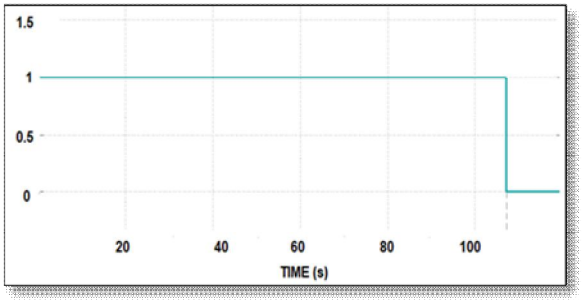

Fig. 11. Relay Status

Finally, it can be observed that the system operates safely during all mechanical transients and smoothly isolates the generator at 107s, when mechanical input loss occurs. The relay status '1' indicates healthy conditions. When at 100s the fault occurs, the system checks it for 7s and thus gives a trip signal to the circuit breaker as relay status changes to '0' indicating actual occurrence of fault.

CONCLUSION

The objective of the project is to investigate the reverse power condition of the power plants generator. The relays are able to detect disturbances and when these occur, all digital and analogue signals are stored in its memory, including the pre-fault, fault and post-fault intervals.

Simulation of digital reverse power relay is done in MATLAB/ Simulink®. The proposed relay model has been depicted by taking into account different case studies. The digitization process of electrical quantities is also explained in detail. As compared to other power relay model in existing power system software, MATLAB offers advantage in terms of their flexibility. Further it can be modified the testing parameters as well as the design of the relay. These models have been contributed to MATLAB online resources to support their Power System Tools. The models help the analysts and developers to develop the analytic skills and visualize the behavior of the system under transient as well as normal conditions.

ISSN 2394 - 7780

A variety of protection schemes can be accomplished with significant improvements in relay logics. High speed-tripping time of half cycle or less can be obtained along with multiple variable settings. Greater sensitivity and high pick-up ratio will not only enable wide range controlling but also facilitate smooth and safe operations of the power system. Similar to reverse power relay logic developed in this project, a number of other logics can be designed based on different power system fault. The whole scheme can be implemented in hardware using analogue and digital circuits. The thresholds can be varied and set according to the fault and protection scheme. More advanced digitization processes and technological principles can be implemented to form complex multi-functional, multi-fault protection schemes.

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Volume 7, Issue 1 (III): January - March, 2020 Part - 4
ISSN 2394 - 7780

IMPLEMENTATION OF SPEED CONTROL OF DC MOTOR IN MATLAB USING FUZZY LOGIC CONTROLLER TECHNIQUES

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ABSTRACT
A direct current (DC) motor should be operated at a precise and steady frequency for a varying load. In a DC motor, speed can be controlled by means of manual control or by automatic control apparatus. But speed regulation is an altogether different thing – where the natural variation of speed due to changing load is not considered while trying to maintain the speed. This paper attempts to control the speed of DC motor based on the fuzzy logic controller (FLC) and simulate the fuzzy rules in MATLAB/Simulink environment. FLCs are designed to attain the control of a DC motor speed using both field current and armature voltage by changing the these in the constant power region and constant torque region, respectively. The fuzzy controllers are proposed to be based on each other such that the one set of rules are fired at a time for two controllers, having similar predecessors but different outcomes. Simulations show the efficacy of the proposed fuzzy logic control method.

Keywords—DC motor, speed controller, fuzzy logic, torque, power, field, armature

INTRODUCTION
A machine that generates mechanical energy by generating current flow through the coils inside it is called a DC motor. It is capable of providing high starting torque and the chances to control speed across a wide range. Some applications of DC motor include domestic appliances, automotive and industrial uses. It is mainly preferred for its wide range speed operations, versatility and cheapness. It is also known as adjustable speed machine. To settle the speed of a DC motor to desired value, controllers are designed based on the application. Non-linearity of a DC motor results in some problems while applying a general speed control like proportional, integral or derivative algorithms in a speed controller. The non-linear properties of the motor like friction and saturation result in degradation of the performance of these control methods. PID is a conventional control method, usually used in industries for speed control system DC motor. It is an all-inclusive control loop feedback technique and has simplified form.

However, the controller has to be reset for varying ranges of operation. An effectively efficient system for speed control is being design to overcome the complications of conventional methods of control. A separately excited DC motor, shown in Fig. 1, is the most appropriate configuration used for applications of varying speed for longer durations because of its precise speed control, good reliability, controllable torque and lucidity. Fig. 2 indicates its performance characteristics when armature resistance is gradually increased.

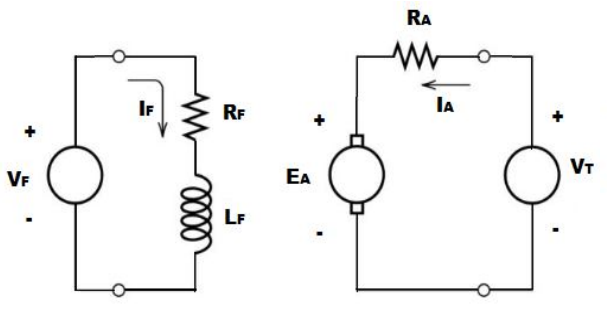

Fig. 1. Separately excited DC motor

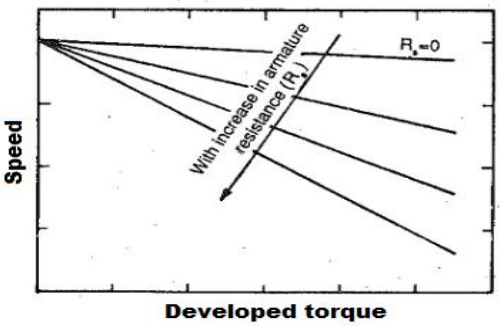

Fig. 2. Performance Characteristics

OBJECTIVES
1. To control the speed of dc motor using independence of armature voltage and field control method
2. To design and build an effective fuzzy logic controller for the dc motor speed control over a broad range (0-2000rpm)

OVERVIEW
- **DC Motor**

A DC Motor is an electromechanical energy converting device. There are two types of DC machines. A DC motor converts DC electrical potential into mechanical potential. Although the fact that the battery is a

ISSN 2394 - 7780

significant wellspring of DC electric power, it can supply restricted capacity to any machine, there are some demands where extensive DC energy is required, such as electroplating, electrolysis, etc.

Where, R_a = Armature resistance, L_a = Armature inductance, J_m = Inertia of Rotor,

B_m = Co-efficient of viscous friction, K_m = Constant torque, K_b = Constant Back e.m.f.

Table 1. DC motor parameters

Parameters	Values
Ra	11.4 Ω
La	0.1214 H
Jm	0.02215 kgm^2
Bm	0.002953 Nms/rad
Km	1.28Nm/A
Kb	0.0045 Vs/rad
Kp	1
Ki	1

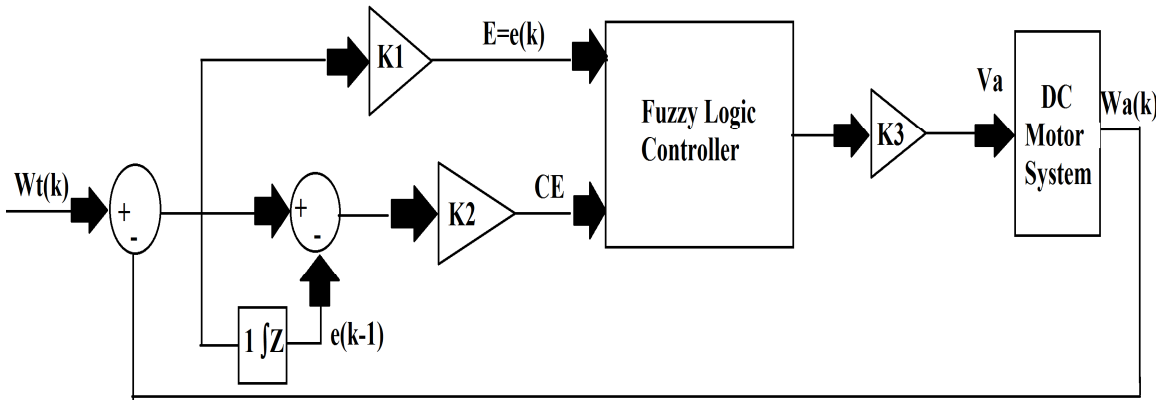

Fig. 3. DC motor model

- **Purpose of speed control**

Basically, a machine's purpose is to drive any load. Machines are used broadly in factories, traction systems, etc where variable speed is needed as per the requirement. In traction systems, we need to slow down the engine on approaching the station whereas in between two locations, high speed is needed. DC motors have the easiest speed control methods hence they are again slowly being preferred over AC motors.

In DC motor, we control speed using following:

1. Armature resistance
2. Field flux
3. Armature voltage.

FUZZY LOGIC CONTROLLER

Fuzzy logic is indicated by means of the human language. Fuzzy logic has been used widely in the design of speed control of DC motor. The approximation law of the fuzzy function used contains 25 rules. FLC uses linguistic rules decided by experts used for speed and current regulation.

Input information into appropriate semantic factors are performed which emulate human basic leadership. FLC system basically consists of input fuzzy membership function, output fuzzy membership function and fuzzy rules. The factors in a FLC are semantic instead of numeric. Fuzzy sets are only an expansion of crisp sets, as it enables a component to a place with more than single set.

- **Fuzzification**

The way towards changing over a numerical variable genuine number or fresh factors into a linguistic variable fuzzy number is called fuzzification; the transforming process of the numeric input into fuzzy input. All the participation capacities have asymmetrical shape with all swarming close to the root enduring state which licenses higher accuracy at unfaltering state.

ISSN 2394 - 7780

- **De-fuzzification**

The de-fuzzification interface is a genuine control activity acquired from the after effects of fuzzy inference engine. It is liable for changing over the fuzzy control activity gathered by the basic leadership rationale into a non fuzzy control activity that is perceived by the framework. De-fuzzification is a path toward making a quantifiable result in crisp logic given sets and relating cooperation degrees.

The utilization of fuzzy logic controller produces required output in a semantic variable fuzzy part. As per certifiable necessity, the semantic variable must be changed to fresh output speed control of dc motor utilizing fuzzy logic controller. There are many techniques of de-fuzzification available, but a usual and helpful de-fuzzification method is center of gravity (COG).

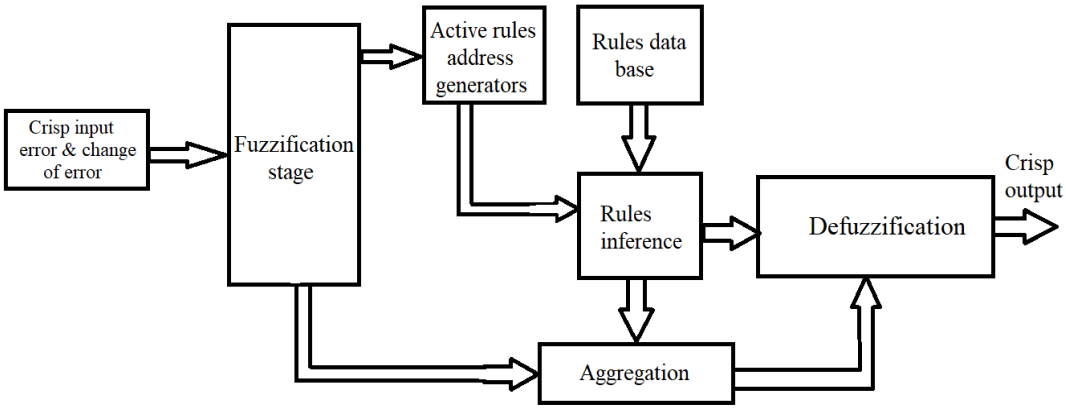

Fig. 4. Block diagram of Fuzzy Logic Controller

- **Inference engine**

Information base includes defining the representation as IF-THEN statement governing the relationship between input and output variable in terms of membership function. The requirement for the use of a FLC emerges for the most part in circumstances where, the description of the technological process is available only in word form, not in analytical form.

It is not possible to identify the parameters of the process with precision. The controlled specialized procedure has a fuzzy character. The description of the procedure is excessively unpredictable and it is more sensible to express its illustration in plain language words.

METHODOLOGY

Table 2. Rule Data Base

		Error				
		NL	**NS**	**Z**	**PS**	**PL**
Changing in error	**NL**	NL	NL	NS	NS	Z
	NS	NS	NS	NS	Z	PS
	Z	NS	Z	Z	Z	PS
	PS	NS	Z	PS	PS	PL
	PL	Z	PS	PS	PL	PL

Where, NL= Negative large, NS= Negative small, PL= Positive large, PS= Positive small, Z= zero. As per the real world requirement of the linguist variable have changed to crisp output.

- **Center of gravity (COG):**

For unique set of COG called as center of gravity singletons, where the abscissa of center of gravity is the crisp value of the fuzzy set, it is calculated as follows:

$$\mu_{Cogs}=\frac{\sum_i \mu_x(xi)xi}{\sum_i \mu_x(xi)} \quad \text{..... (1)}$$

Dc motors are convenient for extensive range of speed control and they are variable speed drive. The controlling of the speed dc motor manually or automatically follow through International speed variations

ISSN 2394 - 7780

carried out to the controlling of the speed dc motor

$$\frac{\propto (v_a - i_a r_a)}{\emptyset} = \frac{(v_a - i_a r_a)}{k_a \emptyset}$$

…. (2)

$$K_a = \text{Armature constant} = \frac{PZ}{2\pi a}$$ …. (3)

From equation (2) it is clear that for dc motor there are basically three techniques of speed control are as following:

1. Variance of resistance in armature circuit,
2. Variance of field flux,
3. Variance of armature terminal voltage.

MATLAB SIMULAION MODEL OF FUZZY LOGIC CONTROLLER

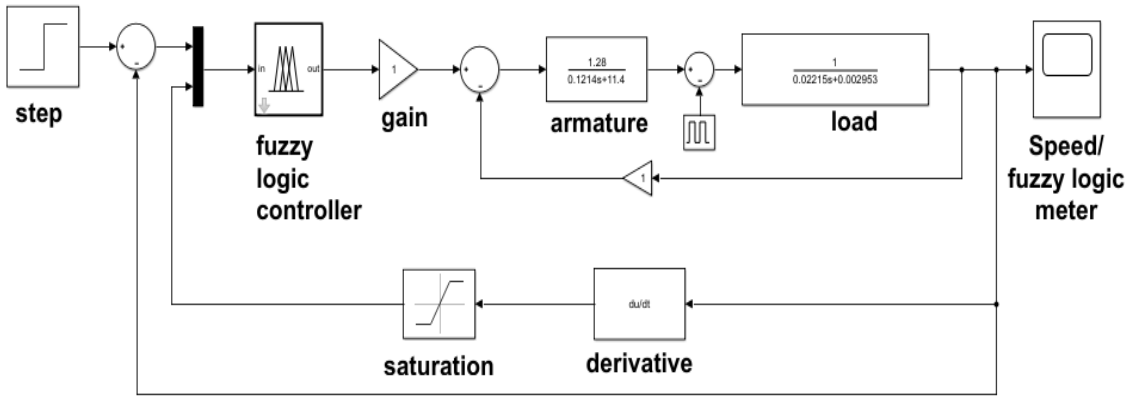

Fig. 5. Simulaion of Fuzzy Logic Controller

MATLAB/Simulink is used as a simulation tool. The fig. 5 shows the simulation model of Fuzzy Logic Controller. At first instant, a unit step signal is fed to the closed circuit fuzzy logic machine control system. The signal corresponds to the supply of 1V and hence starts operating. Different loads are applied to DC motor which runs using Fuzzy Logic Controller in order to compare and maintain the speed.

Mux has multiple input and single output. The output signal obtained is passed through the FLC. It works in two variables (0 and 1) as per simulation signals. FLC works according to the values varying from (0, 0.1, .. , 0.9, 1), for which the speed of motor varies from very high to low, respectively. Then these signals again pass through the gain and starts converting from revolution per second to radian per second. DC motor runs as per set value whereas armature works on "Laplace Transformations". Feedback is provided to the system because the transient response (noise) should be removed so as to let the system work properly.

REVIEW ON OBSERVATIONS

The controller designed has been simulated for 10Nm & 30Nm loads, percentage of overshoot (%M_p), and steady state error (e_{ss}) is observed from the review papers, and FLC out-performs the conventional PI controller in terms of Rise time (T_r), Overshoot, Steady state error (e_{ss}), settling time(T_s).

Table 3. Performance analysis of controller

Time characteristics	Controller			
	PID		FLC	
	10 Newton	30N	10N	30N
Rise time (Tr)	0.8727	0.141	0.7600	0.036
Settling time (Ts)	2.978	2.243	2.6200	1.8
Overshoot	0.120000%	0.05245%	0.0008264%	0
Steady state error(e_{ss})	-0.393	-0.288	0.0062	-0.0045

ISSN 2394 - 7780

CONCLUSION

The speed of D.C motor is controlled by Fuzzy logic controller. According to the comparison of results of the review outputs, it is proved that FLC is better than conventional PID method. FLC has linguistic rules, which are used and the motor speed is observed.

In FLC, there is no overshoot observed, settling time is less and while applying the load in the beginning or in the running condition, FLC has lighter effects and it takes a few seconds to settle compared to the conventional PID method. Hence, it is detected that the process of FLC provides better performance characteristics and improves the control of DC motors.

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IOT BASED ENERGY EFFICIENT VIRTUALIZATION FRAMEWORK WITH PEER TO PEER NETWORKING

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ABSTRACT

In this paper the IoT task processing requests are served by peers. IoT objects and relays that hosts virtual machines (VMs) represent the peers in the peer-to-peer network. In our project, we are constructing an Energy Efficient IoT based Networking Algorithm (EEINA) based on Mixed Integer Linear Programming (MILP) model. The heuristic model will achieve more power efficiency and large number of execution of tasks when compared to the MILP model. The total power consumption can be categorized into two parts: Firstly, the uplink and downlink traffic induced power consumption in objects and relays. Secondly, the processing induced power consumption in objects and relays by task processing in objects and hosted VMs. Due to channel impairments and network congestion, link failures may occur and hence retransmission may become necessary. These retransmissions can have an impact on power consumptionIn this paper the IoT task processing requests are served by peers. IoT objects and relays that hosts virtual machines (VMs) represent the peers in the peer-to-peer network. In our project, we are constructing an Energy Efficient IoT based Networking Algorithm (EEINA) based on Mixed Integer Linear Programming (MILP) model. The heuristic model will achieve more power efficiency and large number of execution of tasks when compared to the MILP model. The total power consumption can be categorized into two parts: Firstly, the uplink and downlink traffic induced power consumption in objects and relays. Secondly, the processing induced power consumption in objects and relays by task processing in objects and hosted VMs. Due to channel impairments and network congestion, link failures may occur and hence retransmission may become necessary. These retransmissions can have an impact on power consumption.

Keywords: Energy, IOT, efficient, network.

I. INTRODUCTION

Internet of Things is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to external environment.[1-3]. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established. Over 9 billion things (physical objects) are currently connected to the Internet, as of now. In the near future, this number is expected to rise to a whopping 20 billion. There are four main components used in IoT:

1. Low-power embedded systems: Less battery consumption, high performance are the inverse factors play s significant role during the design of electronic systems.
2. Cloud computing: Data collected through IoT devices is massive and this data has to be stored on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system.[5]
3. Availability of big data: We know that IoT relies heavily on sensors, especially real-time. As these electronic devices spread throughout every field, their usage is going to trigger a massive flux of big data.[4]
4. Networking connection: In order to communicate, internet connectivity is a must where each physical object is represented by an IP address. However, there are only a limited number of addresses available according to the IP naming. Due to the growing number of devices, this naming system will not be feasible anymore. Therefore, researchers are looking for another alternative naming system to represent each physical object.

   The ability to run multiple virtual networks that each has a separate control and data plan co-exist together on top of one physical network. It can be managed by individual parties that are potentially confidential to each other Network virtualization provides a facility to create and provision virtual networks – logical switches, routers, firewalls, load balancer, Virtual Private Network (VPN) and workload security within days or even in weeks.[13].

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With an increasing proportion of the world's population living in urban areas, probably the greatest potential for saving energy lies in designing more efficient cities. This has been known for many years and has led to the development of a large number of mathematical models designed to optimize urban energy systems. Despite the wide variety of models available, many are specific to particular energy pathways or contain specific equations for each type of technology, making them difficult to apply to a very broad spectrum of problems. Further, many models only consider a network of conversion technologies and there are very few that can include storage and transport technologies in a flexible and general manner. So we are trying to use mixed-integer linear programming (MILP) model for the simultaneous design and operation of urban energy systems. It is based on a flexible value web framework for representing integrated networks of resources and technologies. The resources represent any energy or material involved in the provision of services such as heat and electricity; whereas the technologies represent any type of technology for conversion, transport or storage of resources. It can be applied to urban energy systems problems at different temporal and spatial scales.[6-10].

In peer-to-peer networking, the peers are computer systems which are connected to each other via the internet. Files can be shared directly between systems without the central server.

The major problem in existing system is more energy consumption and hence greening the associated networks, which grabbed the attention both in educational and industrial domains. Energy is also wasted when the server is overloaded. It is also found that transporting data between data centres and home computers can consume even larger amounts of energy than storing it. [13-16]. The disadvantages are: energy consumption is more, inefficient processing capabilities and communication failures.

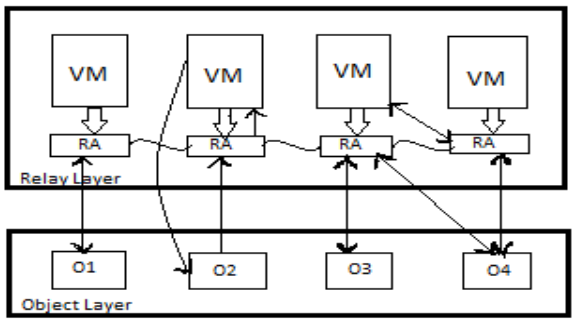
I. LITERATURE SURVEY

Several Peer-to-Peer (P2P) protocols and applications have been developed to allow file distribution/sharing, video and music streaming, and data and information dissemination.[17,18]. These P2P systems are regularly used by a large number of users, both in desktop and mobile environments, and they generate a remarkable portion of the overall Internet traffic. However, many common P2P protocols and applications were designed neglecting the energy problem. In fact, they often require always-on devices in order to work properly, thus producing significant energy waste. The problem is even more relevant in the mobile context, since the battery lifetime of mobile devices is limited[11,12]. Therefore, energy efficiency in P2P systems is a highly debated topic in the literature. New P2P approaches more energy efficient than traditional client/server solutions have been proposed. In addition, several improvements to existing P2P protocols have been introduced to reduce their energy consumption. In this article, we present a general taxonomy to classify state-of-the-art approaches to the energy problem in P2P systems and applications. Then, we survey the main solutions available in the literature, focusing on three relevant classes of P2P systems and applications: file sharing/distribution, content streaming, and epidemics. Furthermore, we outline open issues and provide future research guidelines for each class of P2P systems.[17]. The heuristic results were evaluated when EEINA algorithm was executed in an Intel Core i5, 2.7 GHz processor with 16 GB RAM.

II. PROPOSED SYSTEM

The proposed architecture consists of two layers in which the first layer represents the IoT objects. The relay devices that are present in the upper layer are used for traffic transportation between the peers. In this framework, each object is capable of processing four types of tasks that are required by other objects. The task processing capabilities and task requirements for the IoT objects are specified by the MILP model parameters. Each relay node has the ability to host VMs in order to process the tasks requested by IoT objects. The Mixed Integer Linear Programming (MILP) considers the architecture shown in figure 1.

In this model we will consider 3 scenarios such as relays only, objects only and hybrid scenario. In first case, the object sends the task request to its respective relay for processing information and relay sends the response(result) after processing the request back to the object.



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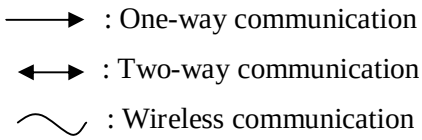

Fig 1: The proposed architecture with P2P communication.

In this case there is two-way communication between object and relay. In the second case, the object sends the task request to its corresponding relay and the relay send the request to their Virtual machine for processing the request since the relay doesn't have the requested information. The virtual machine processes the request and sends the result directly to the requested object. This case possesses a one-way communication in a cyclic form. The third case consists of communication between two objects. In this scenario, the first object sends the task request to the relay to process information that is available in the second object. The relay receives the request from the object 1 and sends the request to the object 2. The object 2 then sends back the requested information to the relay which in turn sends the response to the first object. This communication has two-way communication and the relay acts as a mediator between two objects. The last case is quite different from the other three cases. This case includes an object that sends the task request to its respective relay for processing the information. But, when the relay sends the request to its respective virtual machine, it does not contain the requested information. Then, the relay requests the information from the neighboring virtual machine. The virtual machine sends the requested information back to the relay for forwarding it to the object. This case includes two-way communication between object, relay and neighboring virtual machine.

The MILP model is divided into two parts. The first part is used for maximizing the number of logical end-to-end connections between objects, relays and also between both objects and relays. Maximizing this number means maximizing the number of served tasks. The second part helps in minimizing total power consumption of all elements in a network. The total power consumption can be categorized into two parts: The uplink and downlink traffic induced power consumption in objects and relays and the processing induced power consumption in objects and relays by task processing in objects and hosted VMs.

To determine the total power consumption (TPC), the heuristic determines the type and the optimum place of the peer to be used to serve the processing tasks according to the serving constraints of each peer. The serving constraints can be summarized as follows:

i. The processing task should not have been served by any other peer before.

ii. The uplink traffic of each candidate peer should not exceed the maximum limit.

iii. The downlink traffic of each candidate peer should not exceed the maximum limit.

iv. The upload slots of each object should not exceed the specified maximum number.

v. The number of candidate relays hosting VMs should not exceed the specified maximum number of serving relays.

vi. There should be sufficient processor capacity in each candidate peer to accommodate the processing task workload.

The general serving constraints can be changed according to the type of serving peer. All the serving constraints are considered if the candidate is relay. Constraint (v) is not applied if the serving candidate is an object (not the task requester). For the internal processing scenario, the heuristic should check constraints (i) and (vi) because the requested task is served by the requester object internally and as a result, there will be no external data processing neither traffic flow. For each task requested by an object, the heuristic first checks all the candidate relays hosting VMs in the network.

Algorithm for Total Power Consumption (TPC)

1. For each task $k \epsilon K$ Do
2. For each object requesting a task $i \epsilon 0$ Do
3. For each candidate relay hosting VM that can serve a requested task $j \epsilon R$ Do
4. If all serving constraints are met Then
5. $U (i, j, k) = 1$
6. Calculate P_j^{rp}

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7. End If
8. End For
9. End For
10. End For
11. For each task k ϵ K Do
12. For each object requesting a task i ϵ 0 Do
13. For each candidate object that can serve a task j ϵ 0 Do
14. Case (i = j)
15. If all serving constraints are met Then
16. U (i, j, k) = 1
17. Calculate P_j^{op}
18. End If
19. End Case
20. Case (i ≠ j)
21. If all serving constraints are met Then
22. Do Tit for Tat
23. U (i, j, k) = 1
24. Calculate P_j^{op}
25. End If
26. End Case
27. End For
28. End For
29. End For
30. For Each IoT object i ϵ 0 Do
31. Calculate P_i^{otr}
32. End For
33. For Each relay sending and receiving traffic to and from other relays (α ϵ R)
34. Calculate P_α^{rtr}
35. End For
36. For Each relay receiving task requests from objects and sending task results to objects (α ϵ R)
37. Calculate P_α^{rtr}
38. End For
39. Calculate no. of served tasks

NST = $\sum_{i\in 0}\sum_{j\in p}\sum_{k\in K} U(i,j,k)$

40. Calculate total power consumption (TPC)

TPC = $\sum_{j=0} p_j^{op}+\sum_{j\in VM} p_j^{rp}+\sum_{i\in 0} p_i^{otr}+\sum_{p\in R} p_\alpha^{rtr}$

Fig 2: IoT heuristics algorithm

The above heuristic algorithm first checks relays hosting VMs due to the power efficiency of their processors compared to the power efficiency of the objects only processors. It also checks the relays first due to their high

ISSN 2394 - 7780

ability to serve all types of requested processing tasks. The serving constraints of the first candidate relay are investigated by the heuristic. The heuristic loops for the rest of the relays hosting VMs for all requested tasks by all objects. It finally calculates all the processing induced power of all serving relays.

The algorithm can be categorised into two sub parts. The first part is used for calculating the power consumption when relays hosting virtual machines are used to process the task requests. If the three constraints mentioned in the algorithm are satisfied then U (i, j, k) = 1. Here, U (i, j, k) is the binary variable which is set to 1 if peer i processes task k requested by object j, otherwise it is set to 0. The amount of power calculated in the first case determines processing induced power consumption of each relay (P_j^{rp}). The second part is used for calculating power consumption when the objects are used to process the task request. After checking the satisfiability of the three constraints, the heuristic algorithm moves to check whether object i = object j. if i=j then U (i, j, k) =1 else we do tit for that. The amount of power calculated in the second case determines processing induced power consumption of each object (P_j^{op}). When the amount of other corresponding powers necessary for this algorithm is determined then, algorithm moves forward to calculate the number of served tasks determined by NST. Finally, the algorithm calculates the total power consumption which is determined by TPC.

I. RESULTS

The EEINA heuristic is based on two main processes:

VMs accommodation in relays to serve objects requested tasks and Routing the traffic between network nodes.

The number of relays is equal to the number of objects in the developed heuristic algorithm and they are very large compared to the total number of tasks. Therefore, the time complexity to serve the objects requests can be expressed as O(N2) where N is the total number of relays/objects. On the other hand, routing the traffic between network nodes is based on the minimum hop algorithm which has time complexity O(N). The total time complexity is a polynomial time complexity expressed as O(N2).

The results obtained from the EEINA algorithm are capable of processing a greater number of task requests in a short span of time as well as with the greater efficiency. It should be noted that in the hybrid scenario the MILP model consumes higher power than the heuristic when serving higher than 70% of the requested tasks because of the higher VMs utilization as clearly shown in Fig. 3.

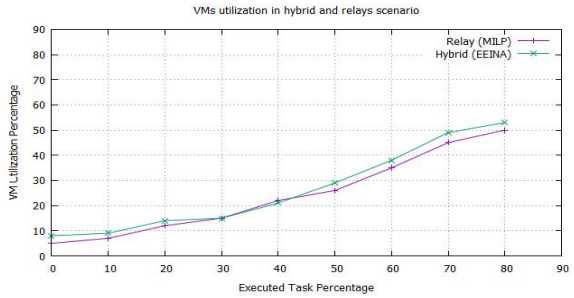

Fig. 3: VMs utilization in hybrid and relays only scenario.

The higher utilization of VMs results from the internal processing by the objects at higher percentage of tasks execution. In the MILP model (objects only scenario), if the tasks are not served internally by the objects then the model optimizes the choice of the serving objects according to the fairness constraint in addition to the distances from the requesting objects to the serving objects in order to reduce the power consumption. In the heuristic, the search for serving objects is carried out sequentially regardless of their locations. This results in the relays consuming more power especially in cases where the tasks are sent to remote serving objects.

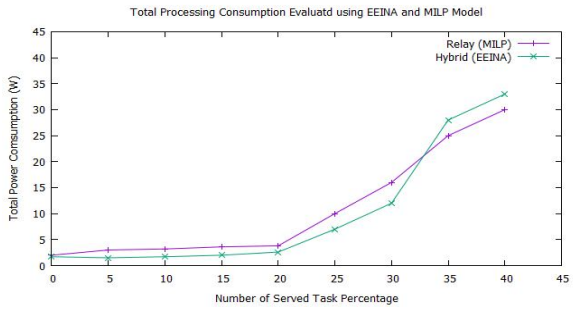

Fig. 4: Total power consumption evaluated using heuristic and MILP model.

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Fig. 4 presents the total power consumption of both MILP and EEINA heuristic versus the percentage of served tasks. It is clearly seen that the power consumption of the MILP and EEINA heuristic are comparable. The highest percentage of served tasks that can be achieved is 77% by the hybrid scenario in the MILP model. A similar observation can be made about the difference between the power consumed by relays (due to traffic) in both hybrid and relays only scenarios. In the heuristic, the relays consume higher traffic induced power than in the MILP. This is similar to the objects only scenario. It is also caused by sending the requests far apart in order to be served by the candidate serving relays.

V. CONCLUSION

We have designed an energy efficient model for IoT virtualization framework with P2P network. Based on the work done, we maximize the number of processing task served by peers and minimize the total power consumption of the network. The work show better results compared to traditional approaches.

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RECOGNIZE OBJECTS FOR VISUALLY IMPAIRED PEOPLE BASED ON COMPUTER VISION

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ABSTRACT
Visually impaired people are often unaware of dangers in front of them, even in familiar environments. Moreover, in foreign environments, they require assistance to reduce the chances of colliding with something. Due to lack of vision, these people are much more dependent on their sense of hearing to perform their day to day activities. This study proposes a making of a simple wearable device such as glove for solving the unawareness of the surrounding of the visually impaired people which allows them to navigate smoothly with greater awareness of their surroundings. The wearable device has a camera, a gyroscope, an audio feedback system, and Raspberry Pi embedded inside it. The camera will continuously capture the image of the surrounding and the Raspberry Pi will align the image using the data from the gyroscope, process for any danger or objects in the image and output the result using the audio feedback system. This study has analysed Faster R-CNN, SSD (Single Shot MultiBox Detector) and YOLO (You only look once) [1] for their accuracy and rate of object detection. This research also studied di erent operating scenarios of the device which includes operation at night and operation in various orientations. The results of object recognition system while using YOLO have an accuracy of 59.7% [2] and 10fps during realtime operation, which is su cient for assisting visually impaired people in realizing the types and localities of the objects around them.

Keyword: Object detection, Raspberry PI, Vision impairment, YOLO.

INTRODUCTION
Visual impairment is the decreased ability to see, which causes problems that are not correctable by usual means, such as glasses, contact lenses or medical treatments. Visual impairment causes people di culties in their normal daily activities such as driving, reading, socializing, and walking. According to facts [3] by WHO (World Health Organization), globally, it was estimated that approximately 2.2 billion people have a vision impairment or blindness out of which 205.3 million have a moderate or severe distance vision impairment or blindness and 826 million people have near vision impairment. Near vision-impairment can be corrected by the simple use of corrective glasses or contact lenses. Whereas severe vision- impairment or blindness is untreatable and people su ering from such impairment have no choice but to use a certain aiding device such as a walking cane to help them navigate. Visual impairment can limit people's ability to perform everyday tasks and can a ect their quality of life and ability to interact with the surrounding world. The need for this research was that there have been fewer aids that help the visually impaired. Visually impaired people have been struggling to detect and locate objects, so there was a strong motivation to build a device that would do the detection and identification of the objects that lie in front of the user. This task is done by first detecting the object towards which the device is pointed, the algorithms then identify the object and then give audio feedback about what the object lies in front of them.

DISCUSSION
This research focuses on helping these people to ease their navigation and increase awareness of the objects in the surrounding. This study proposes a making of a simple wearable device such as glove for solving the unawareness of the surrounding of visually impaired people which allows visually impaired people to navigate smoothly with greater awareness of their surroundings. The wearable device has a camera, a gyroscope, audio feedback system and Raspberry Pi embedded inside it. The camera will continuously capture the image of the surrounding and the Raspberry Pi will align the image using the data from the gyroscope, process for any danger or objects in the image and output the result using the audio feedback system. To achieve a balance between maximum accuracy and su cient rate of processing. This study have analysis some object algorithm namely Faster R-CNN, SSD (Single Shot MultiBox Detector) and YOLO (You only look once) for their accuracy and rate of object detection.

This review considers the following papers to get a proper view of the current updates and advances in the field and what solutions were suggested.

- **Realization and Improvement of Object Recognition System on Raspberry Pi 3B+:**

The paper proposed a lightweight convolution neural network based on the depth wise separable convolution. However, the system did not have a modular and compact design. Convolution neural networks are slower for modern real-time problems. A faster algorithm can be used to increase the frame rate of the system.

ISSN 2394 - 7780

- **Development of a Wearable Household Objects Finder and Localizer Device on Raspberry Pi 3:**

Uses YOLO image detection algorithm and audio feedback of the image detected. Pre- recorded audio is required for every object detected, that serves as a constraint to the system. Used for object and face detection. Audio synthesizer can be used

- **Using Popular Object Detection Methods for Real Time Forest Fire Detection:** They evaluated the experiments through three popular object detection methods, Faster R-CNN, YOLO (tiny-yolo-voc, tiny-yolo-voc1, yolo-voc 2.0, yolov3), and SSD.

- **An Object Detection System Based on YOLO in Tra□c Scene:**

A good object detection system has been built. There are 2 channels in the system. One is OYOLO responding to high speed requirement and the other is YOLO + R-FCN which meet the need of high accuracy.

On reviewing the papers, this study landed on the following conclusion

- The studied system uses an RCNN which is slow when compared to newer and faster algorithms such as SSD, YOLO and R-FCN, the system can be updated with one these algorithms.

- The other system uses prerecorded audio for each class of object. So, whenever a new class is added to the object recognition model, new audio for that class is also required. Instead, an audio synthesizer i.e. Text-to-Speak system can be used to generate audio.

- YOLO is the best suited algorithm for the required purpose. YOLO compensate for its lower accuracy with high frame rate for detection

1. FASTER RCNN

Faster RCNN Faster RCNN is a network that does object detection. As explained by its name, it's faster than its descendants RCNN and Fast RCNN. This network has use cases in self-driving cars, manufacturing, security, and is even used at Pinterest. How Faster RCNN works:

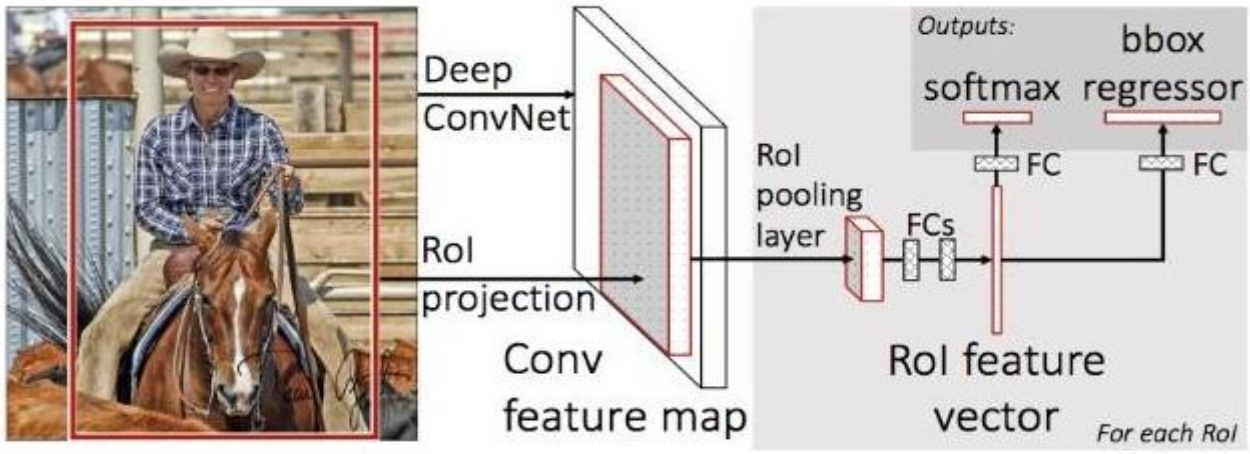

Fig. 1 F-RCNN basic architecture

- Run the image through a CNN to get a Feature Map

- Run the Activation Map through a separate network, called the Region Proposal Network(RPN), that outputs interesting boxes/regions

- For the interesting boxes/regions from RPN use several fully connected layer to output class +Bounding Box coordinates

The approach is like the R-CNN algorithm. But, instead of feeding the region proposals to the CNN, it feed the input image to the CNN to generate a convolutional feature map. From the convolutional feature map, it identifies the region of proposals and warp them into squares and by using a RoI pooling layer it reshapes them into a fixed size so that it can be fed into a fully connected layer. From the RoI feature vector, it uses a softmax layer to predict the class of the proposed region and the o□set values for the bounding box. The reason "Faster R-CNN" is faster than R-CNN is because it doesn't have to feed 2000 region proposals to the convolutional neural network every time. Instead, the convolution operation is done only once per image and a feature map is generated from it. The working of Faster RCNN in fig. 1.

ISSN 2394 - 7780

2. SINGLE SHOT MULTIBOX DETECTOR

This concept was released at the end of November 2016 and reached new records in terms of performance and precision for object detection tasks, scoring over 74% mAP (mean Average Precision) at 59 frames per second on standard datasets such as PascalVOC and COCO. To better understand SSD, let's start by explaining where the name of this architecture comes from:

- **Single Shot**: this means that the tasks of object localization and classification are done in a single forward pass of the network.
- **MultiBox**: This is the name of a technique for bounding box regression developed by Szegedy et al.
- **Detector**: The network is an object detector that also classifies those detected objects

As seen in the fig 2., SSD's architecture builds on the venerable VGG-16 architecture but discards the fully connected layers. The reason VGG-16 was used as the base network is because of its strong performance in high quality image classification tasks and its popularity for problems where transfer learning helps in improving results. Instead of the original VGG fully connected layers, a set of auxiliary convolutional layers (from conv6 onwards) were added, thus enabling to extract features at multiple scales and progressively decrease the size of the input to each subsequent layer. The bounding box regression technique of SSD is inspired by Szegedy's work on MultiBox, a method for fast class-agnostic bounding box coordinate proposals. Interestingly, in the work done on MultiBox an Inception-style convolutional network is used. The 1x1 convolutions that you see below help in dimensionality reduction since the number of dimensions will go down (but "width" and "height" will remain the same). MultiBox's loss function also combined two critical components that made their way into SSD:

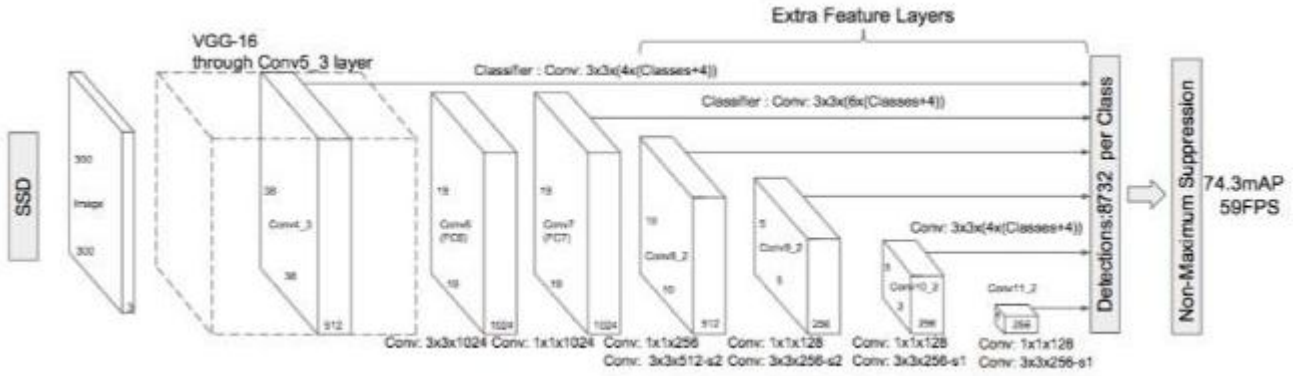

Fig. 2 Architecture of Single Shot Multibox Detector; input is 300x300x3

- **Confidence Loss**: This measure how confident the network is of the objectness of the computed bounding box. Categorical cross-entropy is used to compute this loss.
- **Location Loss**: This measure how far away the network's predicted bounding boxes are from the ground truth ones from the training set. L2-Norm is used here

3. YOLO

Table-1: Comparison with respect to accuracy (mAP) and frame rate (fps)

Algorithm	Input Image	mAP	Frame Rate
SSD	500x500	46.5	19
R-FCN	1000x1000	51.9	12
Tiny YOLO	608x608	23.7	24.4
YOLOv3	608x608	57.3	20

Object detection repurposes classifiers to perform detection. Instead, YOLO frame object detection as a regression problem to spatially separated bounding boxes and associated class probabilities. A single neural network predicts bounding boxes and class probabilities directly from full images in one evaluation. Since the whole detection pipeline is a single network, it can be optimized end-to-end directly on detection performance YOLO reframe object detection as a single regression problem, straight from image pixels to bounding box coordinates and class probabilities.

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YOLO model has several advantages over classifier-based systems. It looks at the whole image at test time, so its predictions are informed by global context in the image. It also makes predictions with a single network evaluation unlike systems like R-CNN which require thousands for a single image. This makes it extremely fast, more than 1000x faster than R- CNN and 100x faster than Fast R-CNN. Table 1. shows comparison between different algorithms with respect to accuracy (mAP) and frame rate (fps).

CONCLUSION

This study aims at building an understanding about different object detection algorithms. The study highlights the advantages and disadvantage of these algorithms. Unlike traditional CNN algorithms that scan the image thousands of times for detection, YOLO only scans once making it a suitable choice. This helps in lowering the detection times as well as giving us a better realtime FPS score for detection. Even though YOLO has faster detection time than Faster-RCNN but Faster-RCNNs have better accuracy. Though this disadvantage has been overcome by further versions of YOLO. Hence YOLO was better suited for the purpose of object detection for visually impaired.

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