AISSMS

INSTITUTE OF INFORMATION TECHNOLOGY

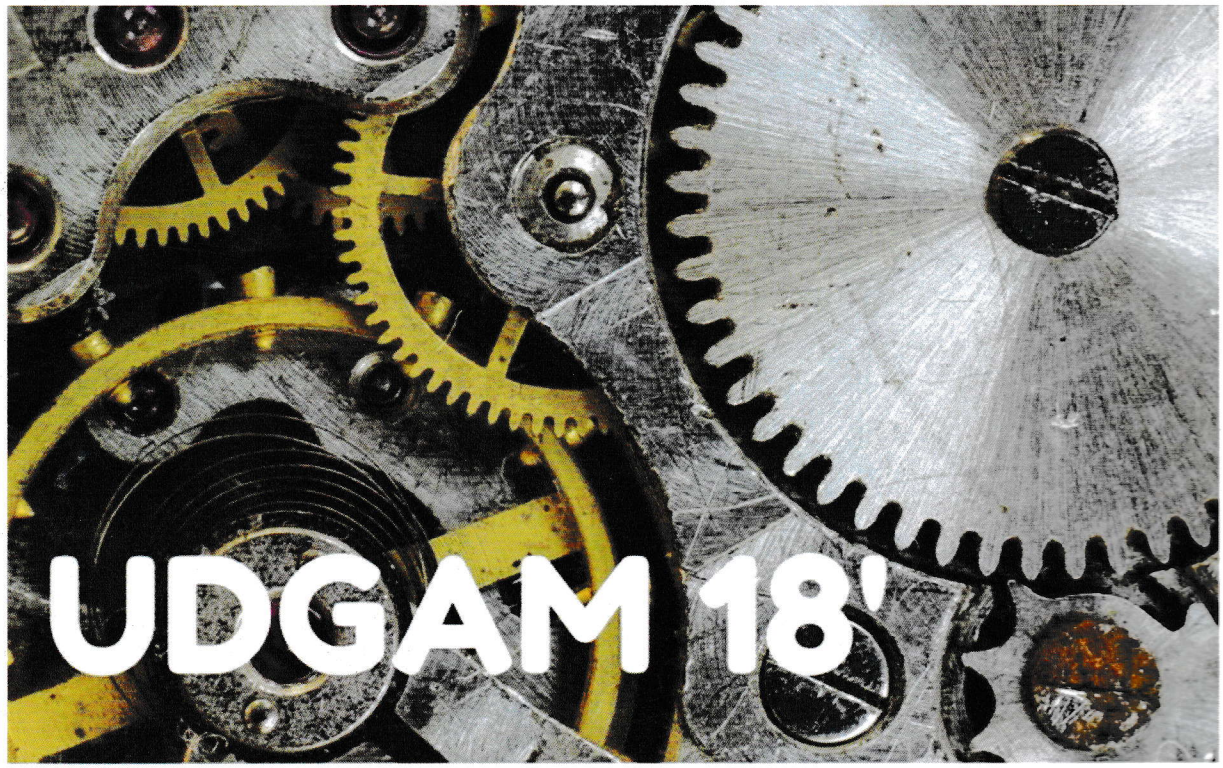
ADDING VALUE TO ENGINEERING

Department of Instrumentation Engineering

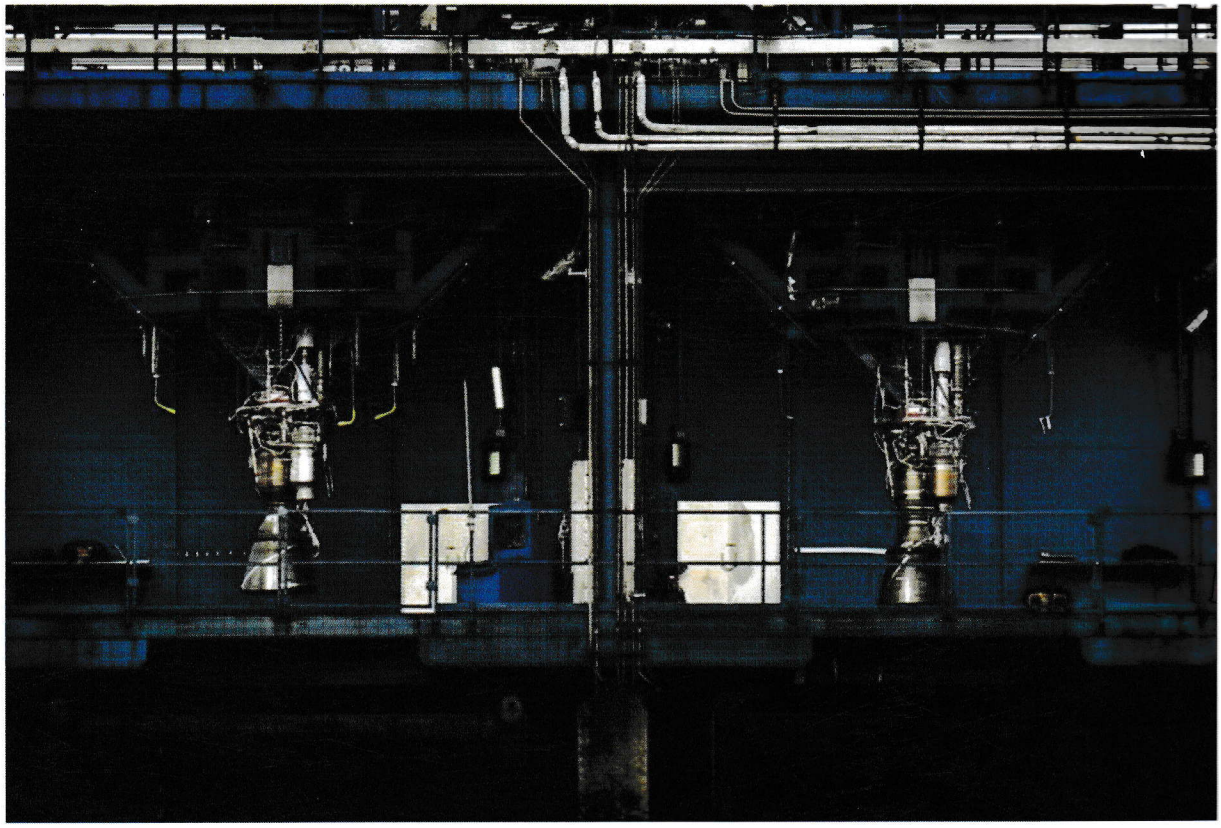
Department of

Instrumentation Engg

UDGAM 2018



RISE ABOVE INFINITY



All India Shree Shivaji Memorial Society's

INSTITUTE OF INFORMATION TECHNOLOGY, PUNE

Department of Instrumentation Engineering

VISION

To be a nationally known department of Instrumentation Engineering that will serve as a source of knowledge and expertise for the society by rendering value added education.

MISSION

To impart dynamic education and develop engineers, technocrats, and researchers to provide services and leadership for development of the nation.

PEOs of Department

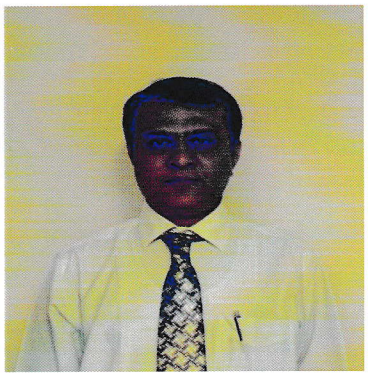
1. To train the students professionally competent to apply the concepts of mathematics, science and engineering along with modern tools to solve real life problems in Instrumentation engineering and related fields.
2. To develop practical skills in students by providing them more practical knowledge.
3. To train students to perform independently, as a leader & as a team member in their chosen profession through continuous learning.
4. To acquaint the students with social & ethical responsibility and soft skills.
5. To inspire students for higher education, competitive exam and entrepreneurship.

PROGRAM OUTCOMES (Pos) 2016-17

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components of processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MESSAGE



Its my pleasure to present this issue of technical magazine "UDGAM". The purpose of this magazine is to provide opportunity and platform for the young technocrats to express their talent which will also be beneficial to all others to enhance their technical knowledge.

It is very true that all technocrats must know the basic fundamentals as well as should be able to acquire new knowledge technology quickly for global competition and move demanding engineering required and regulation. Keeping this in front, it is essential to develop new way to get the information easily. I believe that this magazine will serve this purpose.

I forward my wishes to the editorial team of this magazine for taking great efforts for the issue of the department.

Hereby I appeal all budding technocrats to join us and share their knowledge and make the magazine more dynamic, transparent and professional.

Mr. H.P. Chaudhari

Head of department

Instrumentation Dept.

AISSMS IOIT, Pune.

TEACHER'S EDITORIAL

Dear Readers,

'To me, the greatest pleasure of writing is not what it's about, but the inner music the words make.' -Truman Capote.

In agreement with the above quote, I find writing as the most valuable literary expression. The inculcation of passion for creative thinking and writing amongst the students which is one of the major objectives set by our Department.

I am thankful to all the blooming writers who have responded to my call and penned their ideas for "UDGAM" magazine which means to rise. I also acknowledge constant hard work of the student editor Subhash konar who proved to be as catalysts in mobilizing the students to write their views and efficiently edited the write ups. I would also like to extend my sincere thanks to our Head of Department Mr. H.P Chaudhari for his constant support and guidance through the entire process of planning and publication of this magazine.

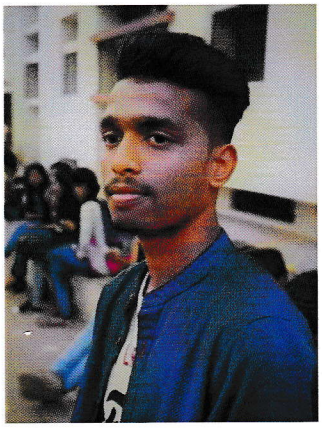
Finally, from the entire team of fusions I wish all the readers a happy reading!

Namrata S. Nagdeo.

Assistant Professor

Chief Editor to UDGAM.

CHIEF EDITOR'S WORD



It gives us immense joy and satisfaction to finally re-introduce our very own college magazine "UDGAM". Just like the gods and the asuras churned the ocean of milk to extract the nectar, we have tried to churn out creativity from this mess of science. A lot of effort has gone into the making of this issue. The best thing about this issue is that it represents the creative side of Instrumentation students to a fair degree-something that we think we all need to reconnect with. Amidst the busy schedule of all those assignments and problem sheets that make you want to bang your head on the wall, we tend to lose track of all the other simpler things that we are capable of, things that we could have been proud of, that can bring one satisfaction.

The essential purpose of Udgam is to inform, engage, inspire and entertain a diverse readership -- including alumni, faculty, staff, students and parents -- by presenting an intimate, timely and honest portrait of the Department -- its people, its programs, its history, its challenges, its resources and its mission. By maintaining the respect and interest of its readers, the magazine aspires ultimately to inform their opinion of the Department and to strengthen their commitment to its welfare.

Chief Editor,

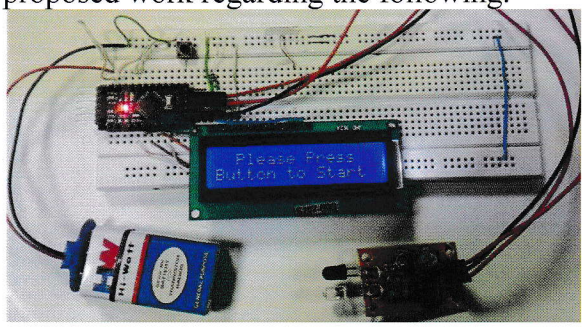
Subhash Govindrajan Konar,

SE Instrumentation

1) HOMEMADE TACHOMETER

1.INTRODUCTION

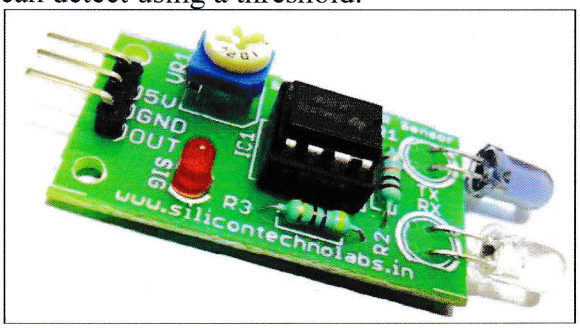
As the world is growing out to the verge to technology the circuits and component structure of devices is rapidly shooting up. Thus the risk of things getting spoilt is directly matching up the pace. There are various instruments available to keep these sophisticated components safe and
one such device is the contactless tachometer. A contactless tachometer is a device which uses infrared sensor and a microcontroller like 8056 or arduino to measure up the speed of the running motor and based on a pre set value the
cut off circuit present cuts off the supply of the motor when its speed starts to grow above the desired or the recommended value. The speed of the motor grows only and only when the incoming voltage grows and if the voltage gets out a particular range it can damage the motor or the circuit. This type of tachometer can also be installed before any type circuit and a motor or a fan can be used to judge the voltage based the rotational speed of the motor. Thus providing away to safeguard different types of devices. In this paper we discussed through various researches what development has been done in the contactless tachometer and auto cutoff System and our proposed work regarding the following.



2. SYSTEM ARCHITECTURE

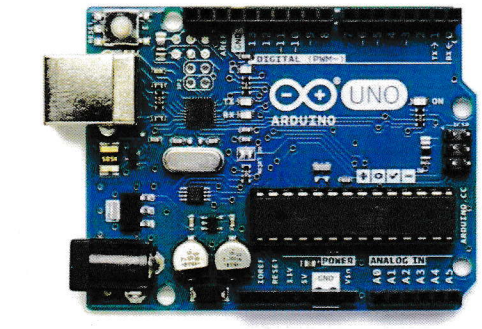
A.) IR Sensor

It is an electronic device that is used to sense infrared radiations either by generating or detecting infrared radiations. The IR Sensors function by using a certain light sensor to detect a light wavelength in the IR spectrum. By
the use of an LED, which produces light at the same wavelength as the sensor detects, we can study the intensity of the received light. At the time when the object is near sensor, the light from the LED bounces off the object and into
the light sensor. This results in increment in energy on a large scale intensity, which we can detect using a threshold.



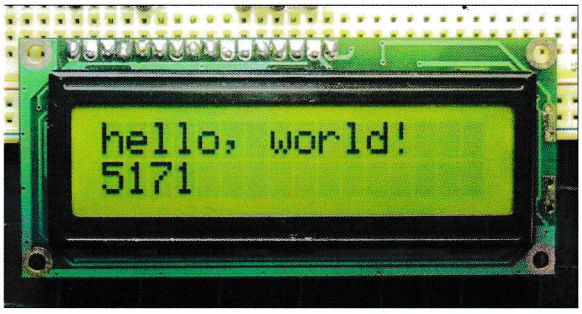
B.) Arduino UNO

This embedded system belongs to the family of ATMEL. It consists of a single board that is capable of performing various operations. It is a 8 bit microcontroller with 32kb of flash memory and its pin diagram shows it having 14 digital and 6 analog pins used for various purposes like interfacing. It has a clock speed of 16 MHz.



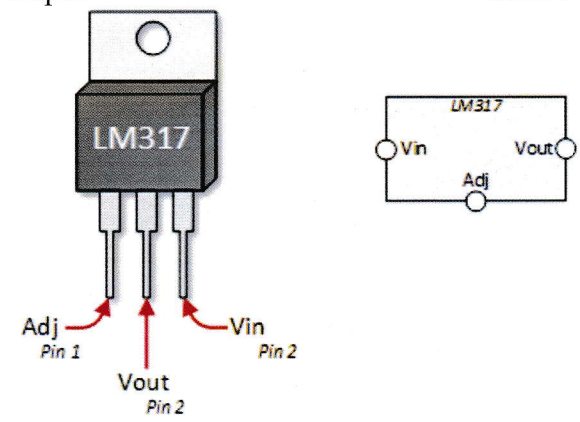
1.3 LCD 16x2

It is known as Liquid Crystal Display. The use of 16x2 characters LCD is of utmost importance. It is used to display the readings obtained of the rpm of the motor as well if the readings are less or more than required.



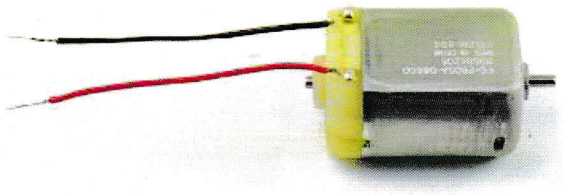
1.4 Voltage Regulator(IC 317)

This is a voltage regulator IC comprising of 3 terminals Input Output and adjustment and is conceptually an op amp having a high output current.



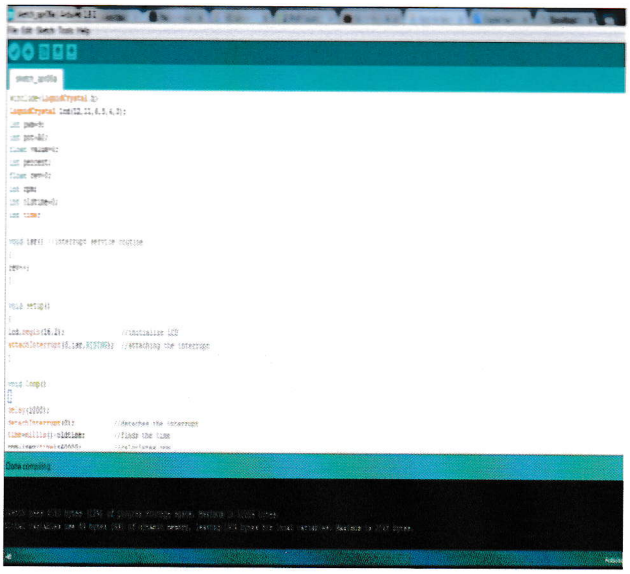
1.4 DC Motor

A DC motor can be termed as a device or a transducer as it basically converts direct current energy into mechanical eneergy. It basically follws the princliple of electromagnetism. Whenever a direct current is passed through it a magnetic field is produced due to which the motor starts to rotate.



3. SOFTWARE ARCHITECTURE

The software used to program the arduino uno is arduino.



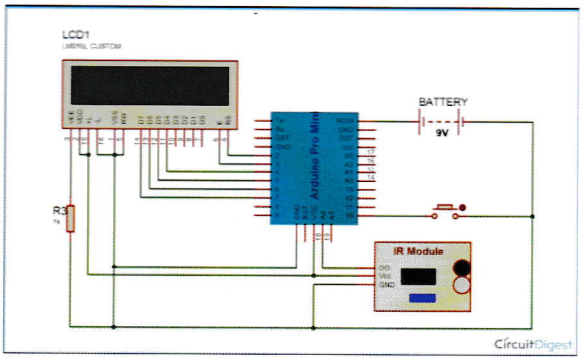


Fig. Connections diagram.

4. WORKING OF THE CIRCUIT

As we all know that microcontroller plays a vital role in every part of electronics industry therefore we also haveused arduino uno board which is based on the ATmega 328P microcontroller. The IR sensor present consist of a LED and a photodiode . A motor will rotate in front of the sensor, the light emitted from the LED will get reflected form the wheel and would fall on the photo diode thus the infrared sensor
would give out a pulse as a input to the arduino uno. The arduino uno is programmed to take 3 consecutive readings and take out their average .This average of three reading will be displayed to the 16X2 LCD screen. Also the arduino board will be set up to particular value for the speed of the motor , when the motor speed or the revolutions count would succeed the specified value a cut off circuit placed will come into function which is voltage regulator IC (LM371). Thus cutting up the power supply of the motor.

Akanksha A Bhosale,
Subhash G Konar,
S.E Instrumentation.

2. OBSTACLE DETECTION SMART CAR

1.) Introduction:-

From its initiation in the 1950s, modern robots have come a long way and rooted itself as an immutable aid in the advancement of human kind. In the course of time, robots took many forms, based on its application, and its size varied from a giant 51 feet to microscopic level. In the course of technological developments of robots, one aspect remained instrumental to their function, and that is mobility. The term "obstacle avoidance" is now used in modern robotics to denote the capability of robot to navigate over an unknown environment without having any collision with surrounding objects (Duino-Robotics,2013). Obstacle avoidance in robots can bring more flexibility in manoeuvring in varying environments and would be much more efficient as continuous human monitoring is not required. This project developed an obstacle avoiding robot which can move without any collision by sensing obstacles on its course with the help of three ultrasonic distance sensors. Robots guided with this technology can be put into diversified uses, e.g., surveying landscapes, driverless vehicles, autonomous cleaning, automated lawn mower and supervising robot in industries. The robot developed in this project is expected to fulfill the following objectives:

• The robot would have the capacity to detect obstacles in the path and stop its motion in that direction and move backwards.

• After obstacle detection, the robot would change its course to a relatively open path by making autonomous decision.

• It would require no external control during its
operation.

• It can measure the distance between itself and the surrounding objects in real-time.

• It would be able to operate effectively in unknown environment.

2.) WORKING PRINCIPLE:-

The robot in this project detects obstacles with the help of three ultrasonic distance sensors to measures the distance to surrounding objects. Although the project is started with a single ultrasonic sensor, two more sensors is added since the robot had blind spots in its right and left direction for which it was having collision while manoeuvring. Unlike the projects discussed above, our project concentrates on coordinating multiple ultrasonic sensors for manoeuvring without collision and also maintaining a minimum travel distance. The robot was designed to detect the presence of any object within the specified threshold distance. If any object is found within this distance, it is designated as an obstacle and the robot will turn away from it. The three ultrasonic sensors are placed in the frontal section of the robot at the right, middle and left position. The three sensors emit an ultrasonic pulse every 300 ms which echoes from the neighbouring objects. Using time

difference between the input and echo, the Arduino calculates the distance to the obstacle from which the echo is coming by using the constant speed of sound340 m/s. When one of the sensors detects obstacle within the threshold distance, the robot changes its direction. Along with these basic movements, the robot is designed to handle a more complex situation when all three sensors have obstacles within the specified range. In this case, the robot will move backward for 10 ms and again check the distance to objects with the help of right and left sensors. The robot will then compare the two distances and move in the direction where the distance
is larger.

a) The Arduino Platform

There are numerous hardware platforms in use
based on which obstacle avoiding robots or in general mobile robots are built. We have selected the Arduino board as the microcontroller platform and its software counterpart to carry out the programming. Arduino is anopen-source platform which is an integration of hardware (microcontroller) and software components. The microcontroller can read input in the form of light or sound through a sensor and convert it into an output
(e.g., driving a motor) according to the instruction given by the Arduino programming (Arduino, 2015). Arduino Integrated Development Environment or Arduino Software (IDE) is used which is also open sourcelike the Arduino Uno board (Arduino, 2015). It is much popular software used by many for its simplicity
and the ability to communicate with all Arduino boards. Arduino Software version 1.6.5 is used to write the code in C programming language which is then uploaded to the Arduino microcontroller through an USB cable. The software saves the code in a file with .ino extension. While there are many other microcontroller platforms available, Arduino gained much popularity which attributed to its distinctive features.

3.) PROJECT GLIMPSES:-

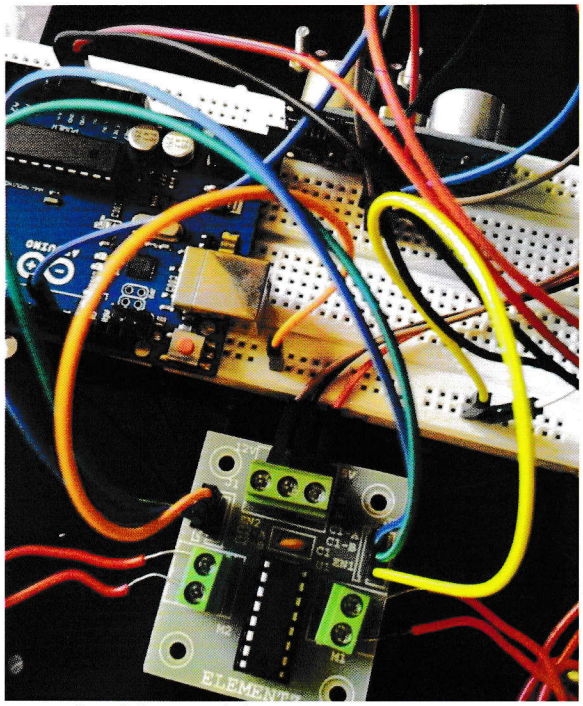


fig. After work image

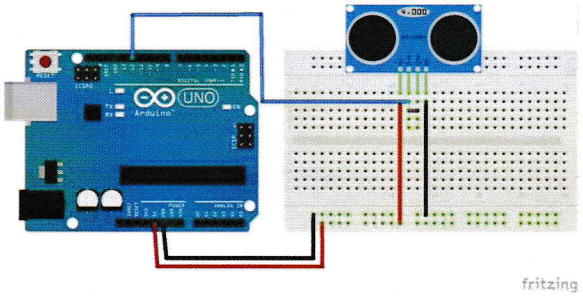


fig. Basic circuit digram

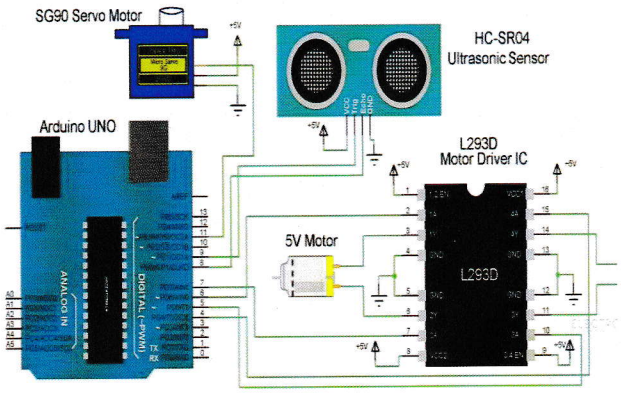


fig. Connections digram

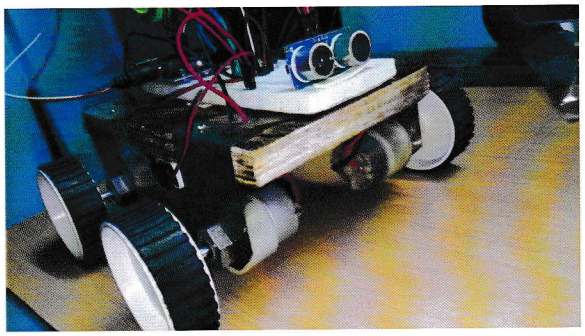


fig. Final Model

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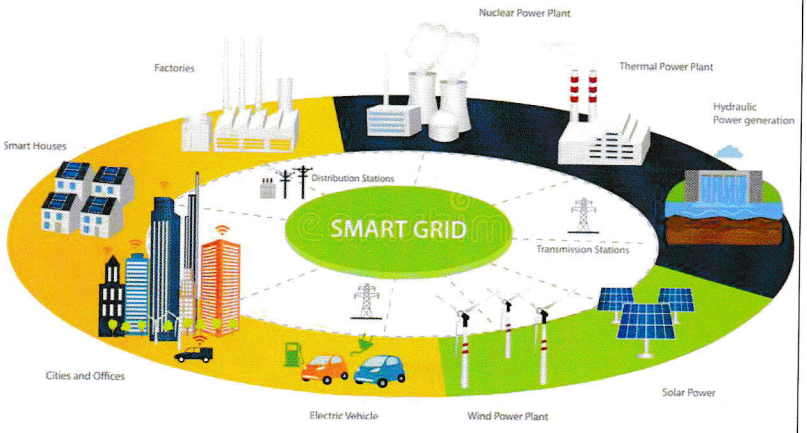
Satej N bodhe,
Shivani R Ukrande,
S.E. Instrumentation.

3.Concept of Smart Grid and Internet of Things

Introduction:-

The term internet of things (IOT) is an intelligent network that is greatly achieving ground in the modern world. The IOT highlight the vision of a global structure of interconnected system. At present, the application research of (IOT) technology in smart assets like smart machines, digital twin, smart retail and smart grid has been treading topic in the global field.Smart grid is features of smart city. It is monitoring and management system of energy consumed. the utility and consumer. By using smart grid which has a smart meter, a consumer and utility gets daily electricity consumption reading. Also if the bill is not paid on time, the utility can cut the electricity supply remotely through internet. Throughout the



generation, transmission, distribution in energy consumption IOT helps Smart Grid systems to support various network functions by using devices (such as sensors, actuators and smart meters), as well as by providing the connectivity, automation and tracking for such devices.

Why a smart grid?

Smart grid is a new and modern power grid, which has advanced sensor measurement technology, information and communication technology, decision-making technology, automatic control technology, and energy power technology and grid infrastructures. Compared with the traditional grid, smart grid has been improved in the optimization of power control, the flexibility of grid

structure, optimizing the allocation of resources, and improving the power quality of services. Therefore, smart grid has many characteristics including strong, self-healing, compatibility, economy, integration and optimization and so forth .

Internet of Things, namely "the Internet in which the things are connected to each other", is

the continuation and growth of Internet-based network. According to the agreed protocols, with IoT technologies like radio frequency identification technology, sensor technology, smart technology and nanotechnology, the communication information can be exchanged, and the intelligent recognition, positioning, tracking, monitoring and management can be achieved.

Features:

1. More efficient transmission of electricity.
2. Quicker restoration of electricity after power disturbances.
3. Reduced operations and management costs for utilities, and ultimately lower power costs for consumers.
4. Time saving technology.
5. Tamper detection to reduce electricity theft.

Shravni Thombre,
S.E. Instrumentation.

IoT Based Heart Rate Monitoring System

Ranveer Kumar Singh
AISSMS Institute of Information Technology, Pune-01

ABSTRACT

A method of measuring/monitoring heart rate of a person using a wearable device and storing the data into a cloud by interfacing through an android application is presented in this paper. The systems capability to store data helps the user to send the same to a medical practitioner for further analysis. This can help people in remote locations with limited medical facilities to undergo regular digital health check-up. And maintain a progress health report,which is automatically stored in the cloud. Keywords IoT - Internet of Things ECG - Electrocardiograph WiFi - Wireless Fidelity

INTRODUCTION

Human health condition is predictable by the ECG data. Number of abnormalities and diseases can be detected by analysing data from ECG. Present day technology offer a wide range of wearables like fitband through which one can know his pulse rate. Which are/can be linked through a mobile application to a cloud based data based system for each person, to send the data to any doctor for analysis periodically. There has been many researches for determination of pulse rate and monitoring the heart beat [1]. Few of the researches also show a way for corrective action incase of any serious abnormality or dis-function [2].Provision to store the information [3], to a local database with a secured registered unique login ID , and even predict the cause of death by referring to the data stored into the database[4]. This paper demonstrates a IoT based ECG module with arduinouno microcontroller unit to obtain the data from the sensor and store it to a cloud database using ESP8266 WiFi Module. Further, sharing of the data by user through his personal login via an android application.

OVERVIEW OF THE SYSTEM

The aim of the system is to design and implement a system capable of measuring the heart rate of a person, and to facilitate to share the data with his doctor for a digital periodic health check-up . The heart rate measurement is achieved using an infrared emitter detector pair, this sensor detects the change in the intensity of the emitted and received infrared wave due to absorption by the blood flow. The output of the sensor is amplified by a 741 op-amp integrated circuit. The output of the amplifier is given to a low pass filter, for removal of the noise signal which
interfere with the data signal from the A.C. main. The processed signal is fed to the microcontroller for further processing the output data of the sensor into presentable graphic data i.e. ECG .which can be view on personal computer. This graphical data is then stored into Database cloud through the WiFi module .The serial communication is aided by microcontroller. Care is taken in selecting a microcontroller of higher memory space for speed of transmission. The user can view his heart beat data by accessing the cloud through the android application through personal login. The personal login

prevents identity mis-interpretation and also adds security to the process.

ARCHITECTURE OF THE SYSTEM

Sensor unit The following consideration are taken while designing the sensor unit: 1) Lightweight, small in size, compact and portable 2) Easy user friendly interface the data with android application 3) Sensing, measuring, collection, and storage in an efficient and secure way.For the sensor unit a regular clip type based heart rate sensor is used for monitoring the heart rate which is used in the present day hospitals.The idea is to incorporate the infrared sensor technology into the fit bands which is wearable. The sensor interprets the heart beat data as an analog signal and store it to the database. The sensor is capable of monitoring the real time heart rate data of the human body. For monitoring it sends all the collected data to the management unit to show the results.

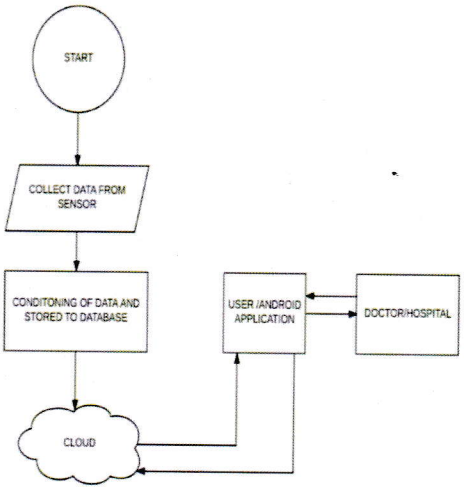


Fig1.Proposed architecture of the system

MANAGEMENT UNIT

The data collected from the sensor through the monitoring body is worked upon and conditioned into digital data so as to store as well as retrieved it from the database. Management unit process the data from cloud and shows the result to the user. The system is tuned to collect a large chunk of data from the body under test/operation for a defined time duration so as to process the heart rate data. The processing algorithm is defined as private and is unaltered, this step also add an encryption possibility at manufacturers end . This unit displays the heart rates in form of a digital electro-cardiograph .Suitable advice and early warnings can be given to the user through the mobile application on his regular log entry of the heart monitoring through the android application. Now the system also holds provision to show the result in a personal computer with access to internet. The management unit is capable of performing as follows:

1) Display the digital electrocardiograph

2) Storage of the data

3) Normal heart condition and comparison of the user's heart condition

4) It is also can maintain a health progress report.

CONCLUSION

In this paper the future aspect of a user friendly IoT based interaction of a patient and the medical facilities is presented.

Ranveer Kumar Singh,
S.E. Instrumentation.

Design and Implementation of Physiotherapeutic Exoskeleton and controlling it using Brain Waves

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AISSMS IOIT, Savitribai Phule Pune University,
Kennedy Road, Pune-411001.

Field of Innovation- Biomedical

Abstract-EEG is brain signal processing technique that allows gaining the understanding of the complex inner mechanisms of the brain and abnormal brain waves have shown to be associated with particular brain disorders. The analysis of brain waves plays an important role in diagnosis of different brain disorders. We will be showing different brain signals by comparing, analyzing and simulating datasets which is already loaded in the MATLAB software to process the EEG signals. MATLAB provides an interactive graphic user interface (GUI) allowing users to flexibly and interactively process their high-density EEG. Supervised learning(Regression/logistic) algorithms and neural networks back propagation algorithms with multiple hidden layers can be used to process the data collected from the brain over a long period of time and thus develop an understanding of the patient's brain. An exoskeleton for a human arm (which will provide physiotherapy to the patients as well as enhance their power) will be controlled using the processed data from the brain signals collected from the patient. Partially paralyzed people who are not able to make bodily movements or people who have met with severe accidents who needs physiotherapy, can be fitted with our robotic exoskeleton on their arm. This exoskeleton will be pneumatically controlled or have motorized control. A controller will be fitted on to the physiotherapeutic exoskeleton for controlling it and to be connected with the brain signal processing unit attached to the head of the patient. Thus the patient will be able to control the movement of the arm through their brain. The main aim of this project is to make the robotic exoskeleton feasible, smaller in size, cost efficient, easy to use, power efficient and also a very comforting and supporting assistant with very smooth function.

Keyword- EEG, Signal processing, MATLAB, Brainwaves, Diagnosis, Physiotherapeutic Exoskeleton, Machine Learning, Neural Network(NN), Back Propagation Algorithms.

I Introduction

There are many people in this world who are suffering partial paralysis or suffering from strokes and also those people who have met with an accident and require physiotherapy to recover. There is no universal efficient solution which can treat them or provide them support in their daily lives. Physiotherapy and rehabilitation is very

costly and inefficient and thus an universal solution which can replace all existing systems and which can take over to form a single unit which provides physiotherapy, rehabilitation, and enhances strength of elderly people and that too at cheaper rates is what we are trying to achieve. Thus a simple yet efficient robotic exoskeletal arm which can provide rehabilitation as well as physiotherapy controlled by brain waves of the patient itself in real time. II Brainwave Controlled Robotic Arm(Present technology)

The basic assumption of project reports the design, construction and a testing replica of the human arm which aims to be dynamically as well as kinematically accurate. The delivered device tries to resemble the movement of biological human hand by reading the signals generated by brain waves. The brain waves are sensed by sensors in the Mindflex headset and generate alpha, beta and gamma signal. Then this signal is processed by the microcontroller and the movement is then generated to the artificial hand via servo motors. Patients that suffer from amputee below the elbow can benefit from this bio-robotic arm.

This artificial arm uses Arduino Uno platform continuously for analyzing the incoming EEG signals and map them to appropriate actions. This system consists of two important sections. The first one is brainwave headset provided by

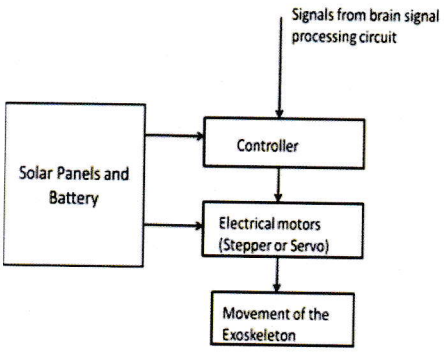
Neurosky Mind wave and the other one is Bluetooth module which is used for reception of the signal. Signal acquisition is done by Bluetooth module HC-05. The other section is Arduino which process incoming data and map into the robotic arm. Neurosky mind wave headset and Arduino will be interlinked with the help of Bluetooth wireless communication and on the other hand, the robotic arm or artificial arm is connected to the Arduino. The attention and meditation level is the parameter to control the three action of the artificial arm. These values can be classified into two different ranges. For this two ranges, a specific action is set. These actions will be performed by the Arduino according to the incoming raw EEG signals.

III Proposed Design

In our project we will be including various features such as EEG montages - Montage means the placement of the electrodes. The EEG can be monitored with either a bipolar montage or a referential one. Bipolar means that just to use two electrodes on the scalp on all the sides and for reference electrode for one side of the brain. The referential montage means only having a common reference electrode in both the side of the brain. In this part we will be showing how brainwaves will vary according to the placement of electrodes. The signal from the montage will be amplified, filtered and further passed on to the PC for simulation on MATLAB to form the Brain-Computer Interface (BCI). Partially paralyzed people who are not able to make bodily movements or people who have met with severe accidents who need physiotherapy, can be fitted with our robotic exoskeleton on their arm. This exoskeleton will be pneumatically controlled or have motorized control. A controller will be fitted on to the physiotherapeutic exoskeleton for controlling it and to be connected with the brain signal processing unit attached to the head of the patient. Thus the patient will be able to control the movement of the arm through their brain. The Exoskeleton will be

3D printed in order to make it light weight and easily wearable by the patient. The exoskeleton would not be bulky as the motorized control will be carried out using a large number of small steppers, servos.

IV Hardware Design



B Control Parameters-

Our proposed design of the robotic exoskeleton consists of 5 axis to control 5 movements of the human arm which are of-

1) Shoulder
2) Elbow
3) Forearm
4) Wrist
5) Fingers.

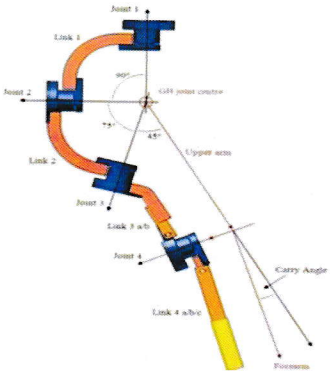
C Controllers-

1) Arduino
2) Raspberry pi/Dragonboard

Arduino-

A Working Physiotherapeutic Exoskeleton for human arm-

Partially paralyzed people who are not able to make bodily movements or people who have met with severe accidents who need physiotherapy, can be fitted with our robotic exoskeleton on their arm. This exoskeleton will be brought into action using electrical motors and will be controlled



Use of particular motors for that particular movement-

1) For Fingers 2 BO motors are going to be used.
2) And for all other movements stepper/servo motors are going to be used.

The Mindflex head gear will be connected to the arduino through Rx and Tx connections. The arduino will then transfer the data to the laptop/Matlab for further processing through the serial port.

Raspberry pi/Dragonboard-

The out from the Matlab will be provided to the Raspberry pi/Dragonboard which will control the motors of the robotic exoskeleton. The Raspberry pi/Dragonboard will be mounted on the Exoskeleton.

D Neurosky Mindwave Headset-

The human brain is formed up of billions of interconnected neurons; the patterns of interaction between the neurons are portrayed as thoughts and emotional states. Each interaction between neurons creates associate discharge. On these charges are not possible to live from outside the skull. This activity created by many thousands of synchronic discharges aggregates into waves which may be measured. Totally different {completely different} brain waves square measure the results of different patterns of the neural interaction. These patterns cause waves characterized by completely different amplitudes and frequencies. The contraction of muscles is additionally related to distinctive wave patterns. Of these patterns is however some Neurosky devices observe blinks.

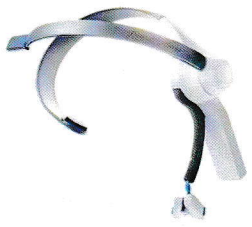


Fig.3 Neurosky Headset

V Brain Signal Processing and Simulation-

Signal processing is the enabling technology for the generation, transformation, and interpretation of information. At different stages of time our brain reacts differently. These brain signals used for various purposes so that it is possible to study the functionalities of brain properly by generating, transforming and interpreting the collected signal. This process is known as brain signal processing.

Types of Brainwaves-

1)Infra-low(< 0.5Hz)

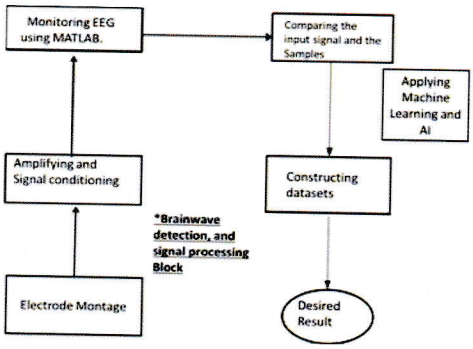
2)Delta(0.5-3Hz)

3)Theta(3-8Hz)

4)Alpha(8-12Hz)

5)Beta(12-38Hz)

6)Gamma(38-42Hz)



1 Interfacing

In our project we will be including various features such as EEG montages - Montage means the placement of the electrodes. The EEG can be monitored with either a bipolar montage or a referential one. Bipolar means that just to use two electrodes on the scalp on all the sides and for reference electrode for one side of the brain. The referential montage means only having a common reference electrode in both the side of the brain. In this part we will be showing how brainwaves will vary according to the placement of electrodes. The signal from the montage will be amplified, filtered using Arduino controller and then be further passed on to the PC for simulation on MATLAB to form the Brain-Computer Interface (BCI). The data from Arduino will be collected and stored to form dataset using MATLAB and then the EEG signal will be simulated and output will be generated which will be passed on to the Raspberry pi/Dragonboard

for the controlling of the Exoskeleton. A dataset will be formed and then trained using Neural Network(NN) Architecture for smooth and real time working of the Exoskeleton.

2 Signal Acquisition

Signal acquisition is the method of sampling signals that measure universe conditions. This converts the resulting samples into digital numeric values which might be manipulated by a computer. The signals scan by Neurosky Mind wave headset is distributed to Bluetooth module. The headset only detects, processes, and converts the signals into digital type.

3 Signal Transmission

Bluetooth HC 05 Module Signal transmission is completed between the Bluetooth HC-05 and microcontroller. Bluetooth HC-05 could be a wireless communication protocol. It's utilized in 2 devices for sending as well as receiving the data. It's free to use within the wireless communication protocol whereas the range of the Bluetooth is a smaller amount than different wireless communication protocols like Wi-Fi and Zigbee. It operates at the frequency of the 2.41 GHz. The HC 05 Bluetooth module is that the most popular module within the Indian market. It's largely utilized in the embedded projects. It's simple to use and straightforward, its worth is low. These modules are designed for the clear wireless association setup. It is extremely simple to use within the Bluetooth interface protocol.

4 Attention and Meditation Level based Control

NeuroSky Mind wave device forwards brainwave signals to the software application. This information will then be used to train a classification system. This artificial arm uses Arduino Uno platform continuously for analyzing the incoming EEG signals and map them to appropriate actions. Signal acquisition is done by Bluetooth module HC-05. Neurosky mind wave headset and Arduino will be interlinked with the help of Bluetooth wireless communication and on the other hand, the robotic arm or artificial arm is connected to the Arduino. The attention and meditation level is the parameter to control the three action of the artificial arm. These values can be classified into two different ranges. For this two ranges, a specific action is set. These actions will be performed by the Arduino according to the incoming raw EEG signals.

5 Machine Learning Approach-

Through Machine learning algorithms the working of the physiotherapeutic arm and its movements can be synchronized with precision with the patients mind and can provide real time movements with less amount of delay. Supervised learning(Regression/logistic) algorithms and

neural networks with multiple hidden layers can process the data collected from the brain over a long period of time and thus develop an understanding of the patients brain. These algorithms would help the system to predict the movement of the exoskeleton at that particular movement and thus cause real time functioning of the exoskeleton with minimum delay between the functioning and the thought process of the patient. The hidden layers of the neural networks algorithm would provide sorting of supervised data collected from the sensors attached to the brain with accuracy and precision. This would help us find the particular signature frequency which triggers the movement of our arm and this will help us in the field of prosthetic to move towards simplified yet efficient prosthetic study. Machine Learning can help the Exoskeleton to adjust to external parameters and thus develop an understanding of the physical environment. Thus mapping different movements in our brain according to the particular body movement would become easy.

Final Product Details-

The project will demonstrate the concepts about analyzing of the brain signal, it's processing using MATLAB, applying, machine learning and AI algorithms for precise mapping of Brain waves and also about controlling an efficiently designed physiotherapeutic exoskeleton for a human arm using brain wave signals and efficiently adjusting the exoskeleton with the patient.

Conclusion

As per our schedule the working of the project, system architecture, finalizing of the component has almost been completed. The Exoskeletal robotic arm design has been 50% completed. The Neural Network/Attention level based control process is still under the process. In all 30% of our work is completed as designing is the main part of any project to be successful. The project will demonstrate the concepts about analyzing of the brain signal, it's processing using MATLAB, machine learning and AI approach or Attention based mapping and control for precise mapping of Brain waves and also about controlling an efficiently designed physiotherapeutic exoskeleton for a human arm using brain wave signals and efficiently adjusting the exoskeleton with the patient and making it user friendly and compatible

Venkatesh bhamidipati,
B.E. Instrumentation.

Dreamz

A dream, something which is fictions but ought to be real when it comes to getting what we want.

It's the matter of the category it falls in.... for some its day dream for some it's the dreams which are seen when we are sleeping....to some they are life.....to some a nightmare.

For me my dreamz meant "lil" things, they were the one which come before the dawn ended & the dusk raised i.e. the peak period when a day ends & new life begins.

It's the time from 4 to 6am, the best one; it was about something carved in my mind very sweet, little, something that's worth dying for.....it was my heaven.

My carving of dreamz in my unconscious mind never knew the facts of being practical, nor did had an if's & buts.....Something which came very pure & in white canvas where I could fill in my own colors & which was worth to me like heaven, something priceless.

Your dreams when seemed to be getting shattered.....it's the time. When you lose your interest in all the activities around; you ought to become a person above "Worldly pleasures" ..... the one who reacts insensitive to no matter what's happening around & with him.

Even dreams have a thin line between the one which are real & to the one which are anticipated or for the one which are our imagination never to grow more for a big time fall or a nightmare.

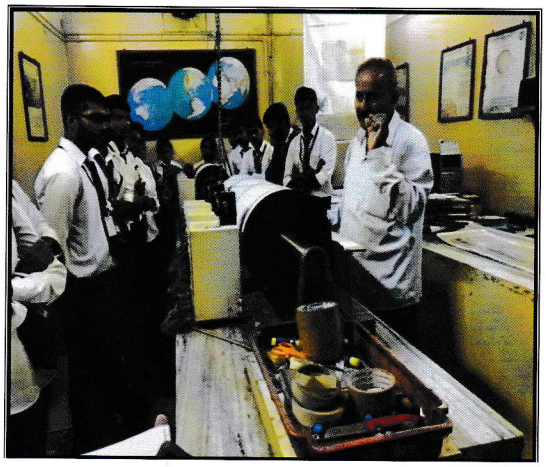
One says one can be dam practical & try to be realistic to the every bit thought that comes across in the mind.....But the irony is the unconscious mind spokes up the inner mind.....the flash of the images in the picture through makes a different argument altogether.....something which can be dealt with a realistic & practical thought.....but just a 1 bit effort one can make to fringe that fiction in real.

Ms. Namrata S. Nagdeo

Assistant Professor.

SE INSTRUMENTATION GALLERY

SE students conducted the social visit at **"Shreevatsa"** Sassoon Road, Pune on 28/07/2017 alonwith Ms.N.S.Nagdeo & Mrs.D.R.Shende.



SE visit at Indian Meteorological Department as an IV for the subject of Sensors and Transducer on 17/07/2017 along with Ms.N.S.Nagdeo and Mr.H.P.Chaudhari.

Expert Lecture by Mr. Rajendra Ghadge from Rockwell Automation) on Tuesday 21/08/2017 on the topic "Wireless Sensor Networks

SENSEDUCERS which is projects related to sensors and transducers exhibition is held on 02/08/2017 by Ms.N.S.Nagdeo