A PROJECT REPORT
ON

"MACHINE CONTROL USING WEB PORTAL "

Submitted to
UNIVERSITY OF Mumbai

In Partial Fulfillment of the Requirement for the Award of

BACHELOR'S DEGREE IN
Electronics and telecommunication ENGINEERING

BY

Imran Inamdar ROLL NUMBER 16DET55
Aaquib Shaikh ROLL NUMBER 16DET65
Asadali Shaikh ROLL NUMBER 16DET66

UNDER THE GUIDANCE OF
PROF. Geeta Desai

DEPARTMENT OF Electronics and telecommunication ENGINEERING
Anjuman-I-Islams Kalsekar Technical Campus
Sector 16, New Panvel, Navi Mumbai
2018-2019

AFFILIATED TO
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CERTIFICATE

This is certify that the project entitled

"MACHINE CONTROL USING WEB PORTAL"

submitted by

Imran Inamdar	**ROLL NUMBER16DET55**
Aaquib Shaikh	**ROLL NUMBER 16DET65**
Asadali Shaikh	**ROLL NUMBER 16DET66**

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Electronics and telecommunication engineering) at Anjuman-I-Islams Kalsekar Technical Campus, New Panvel under the University of Mumbai. This work is done during year 2018-2019, under our guidance.

Date: / /

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Director

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ABSTRACT

Using internet of things (IoT) to connect things, service, and people for intelligent operations has been discussed and deployed in many industry domains such as smart city, smart energy, healthcare, food and water tracking, logistics and retail, and transportation. However, scarce information is available for IoT usage in industrial automation domain for reliable and collaborative automation with respect to e.g., enabling scalable collaboration between heterogeneous devices and systems, offering predictable and fault-tolerant real-time closed-loop control, and inclusion of intelligent service features from edge devices to the cloud. In this report, present specific industrial IoT challenges due to these constraints, and discuss the potentials of utilizing some technical solutions to cope with these challenges.in are project we are focusing on temperature monitoring using sensor.in website there is a indicator which indicate the temperature. We also focus on controlling speed and intensity of the devices. We want to make website user friendly as anyone can use it without any problem.

Contents

List of Figures

Chapter 1

INTRODUCTION

Automation is one of the increasing need with in industries as well as for domestic applications. Automation reduces the human efforts by replacing the human efforts by system which are self-operated, The Internet is one way of the growing platform for automation, through which new advancement are made through which on easily monitor as well control the system using internet. As we are making use of Internet the system becomes secured and live data monitoring is also possible using IoT system. Within industries the various hazardous gas is being processed, hence to provide security to those employ working within those industries, it becomes important issue to work on their security, if leakage of gas takes place then these system alerts by turning ON alarm which notifies the employers. This system also helps us take some crucial decision from any point of the world within internet network. WIFI shield is being used to act as service point between network and connecting network. Cloud vendors currently provide state of the art services for IoT operations. This architecture uses the IoT and the web hosting services of the Cloud. The Client layer interacts with the IoT service; and the web hosting component hosts a RESTful web service. The IoT Service on Cloud manages addition and removal of a device, its connectivity, seamless communication with other Cloud services. It must establish secure connections to the devices using SSL, TLS or some security mechanism.The Industrial Internet of Things originally described the IoT (Internet of Things) as it is used across several industries such as manufacturing, logistics, oil and gas, transportation, energy/utilities, mining and metals, aviation and other industrial sectors and in use cases which are typical to these industries.internet of things is a technology that deals with bringing control of physical devices over the internet. Here we propose efficient industry automation system that allows user to efficiently control industry appliances/machines over the internet. For demonstration of this system we use 3 loads as industrial appliances or machines and a motor to demonstrate as an industrial motor. Our system uses an Avr family microcontroller

for processing all user commands. A wifi modem is used to connect to the internet and receive user commands. On sending commands through the internet they are first received by our wifi modem. The modem decodes information and passes it to the microcontroller for further processing. The microcontroller then switches loads and operates the motors as per receivers commands. Also it displays the system state on an LCD display. Thus we automate entire industry using online GUI for easy industry automation.

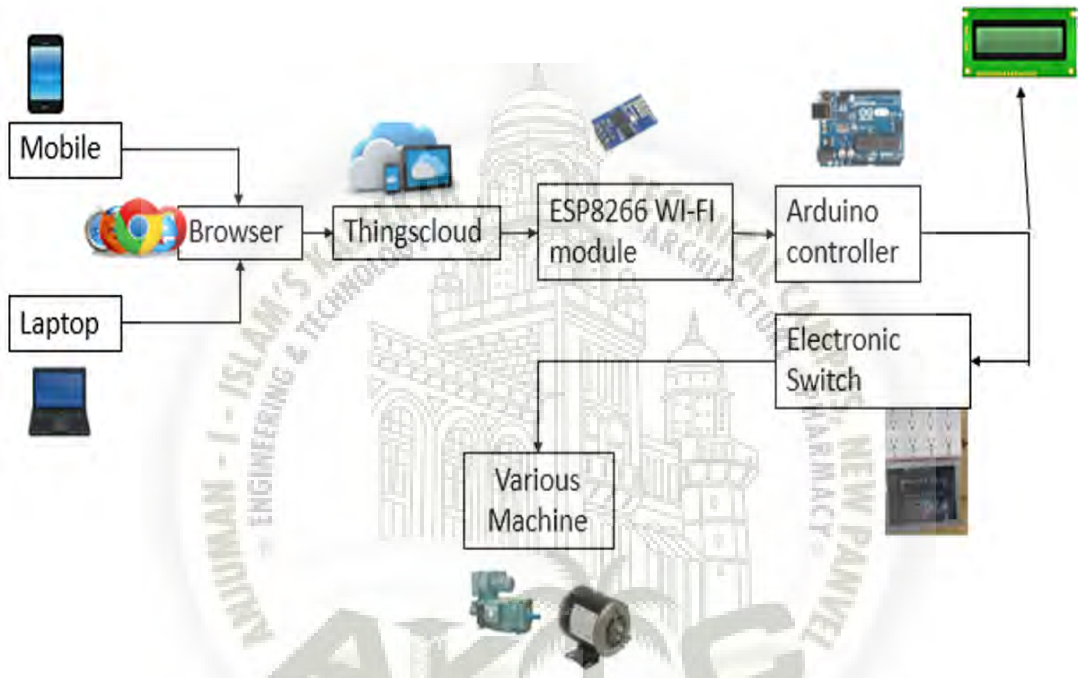

Figure 1.1: BASIC BLOCK DIAGRAM

The project aims at designing an advanced home automation system using normal web server and Wi-Fi technology. The devices can be switched ON/OFF and sensors can be read using a Personal Computer (PC) through Wi-Fi.Automation is the most frequently spelled term in the field of electronics.The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations. Considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the house.Wi-Fi (Short for Wireless Fidelity) is a wireless technology that uses radio frequency to transmit

data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet.The controlling device for the automation in the project is a Arduino UNO. The data sent from PC over Wi-Fi will be received by Wi-Fi module connected to Arduino UNO. Arduino UNO reads the data and decides the switching action of electrical devices connected to it through Relays.

While the cost of living is going up, there is a growing focus to involve technology to lower those prices. With this in mind the Smart Home project allows the user to build and maintain a house that is smart enough to keep energy levels down while providing more automated applications. A smart home will take advantage of its environment and allow seamless control whether the user is present or away. With a home that has this advantage, you can know that your home is performing at its best in energy performance.By implementing this system, it is possible to explore a variety of different engineering challenges, including software programming, PCB design, Wi-Fi, TCP/IP protocols, Web Server logic design, and other aspects. This automation system provides great insights to the challenges of software and hardware design.

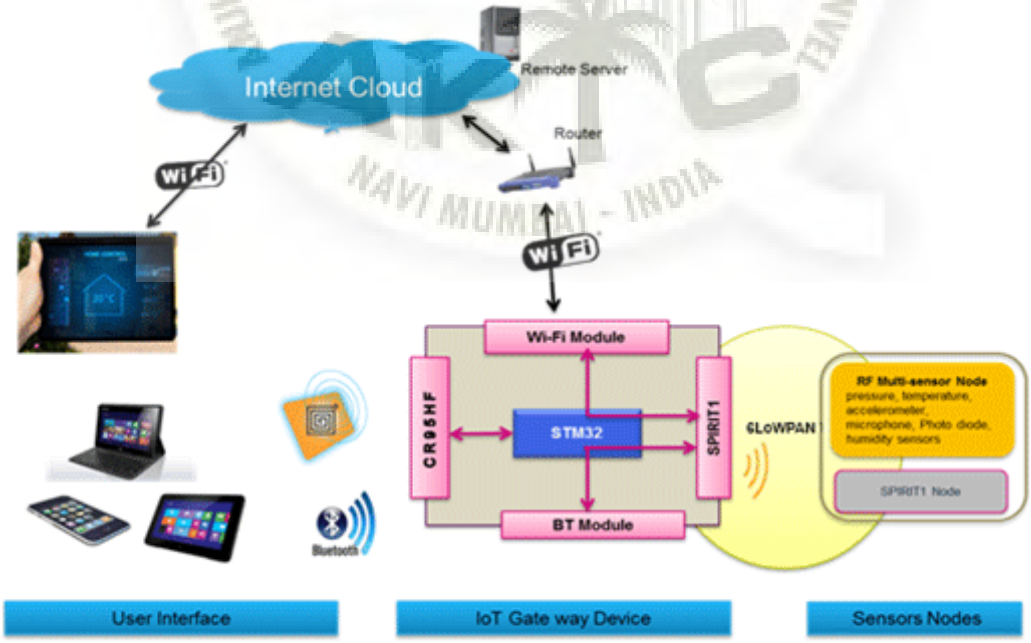

Figure 1.2: Block Diagram

- lesser influence of human factor to technological process;
- improved production reliability;
- increased production speed and quality;
- prevention of emergency situations;
- improved production control.

IoT is proved to be an emerging technological innovation.In the current context, it is now possible that an helmet of atwo wheeler can interact with a car for avoiding collision.Connected toothbrush can now monitor and make one's experience pleasurable .A three dimensional senor of theelectric brush can connect with Smartphone apps and providereal time feedback to the person .Many scopes will be created for technology companies torelease offerings as per the behaviour of consumers. It may sohappen that Netflix can know when a person is sad and aloneby monitoring the smart watch, smart thermostat and in-homecamera. Subsequently, Netflix may offer a movie to changethe mood[12]. In a consumer electronics show in Los Vegas,Samsung informed that the company would invest 100 milliondollar for progress of IoT. The company will also promote anopen technology ecosystem for facilitating the usage of IoT.If we talk about IOT applications in an organized manner, these are broadly divided into Industrial and Consumer segments. The industrial segment covers industrial and retail automation which largely contributes to the development of smart cities. On the other hand, the consumer segment is mainly driven by personal interest and covers smart lifestyle, home, health fitness automation. Likewise, enterprises and consumers using IOT solutions will be complementing the IOT growth in our country.

1.1 History Of Automation

Automation is the technology by which a process or procedure is performed without human assistance. Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated.

Automation is the technology by which a process or procedure is performed with minimal human assistance.[1] Automation [2] or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated.

Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals. In control complexity it can range from simple on-off control to multi-variable high level algorithms.

In the simplest type of an automatic control loop, a controller compares a measured value of a process with a desired set value, and processes the resulting error signal to change some input to the process, in such a way that the process stays at its set point despite disturbances. This closed-loop control is an application of negative feedback to a system. The mathematical basis of control theory was begun in the 18th century, and advanced rapidly in the 20th.Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. Complicated systems, such as modern factories, airplanes and ships typically use all these combined techniques. The benefit of automation include labor savings, savings in electricity costs, savings in material costs, and improvements to quality, accuracy and precision.

The World Bank's World Development Report 2019 shows evidence that the new industries and jobs in the technological sector outweigh the economic effects of workers being displaced by automation. The term automation, inspired by the earlier word automatic (coming from automaton), was not widely used before 1947, when Ford established an automation department.[2] It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s.

The concept of a network of smart devices was discussed as early as 1982, with a modified Coke vending machine at Carnegie Mellon University becoming the first

Internet-connected appliance, able to report its inventory and whether newly loaded drinks were cold or not. Mark Weiser's 1991 paper on ubiquitous computing, "The Computer of the 21st Century", as well as academic venues such as UbiComp and PerCom produced the contemporary vision of the IoT. In 1994, Reza Raji described the concept in IEEE Spectrum as "[moving] small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories".[10] Between 1993 and 1997, several companies proposed solutions like Microsoft's at Work or Novell's NEST. The field gained momentum when Bill Joy envisioned device-to-device communication as a part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999.

The term "Internet of things" was likely coined by Kevin Ashton of Procter Gamble, later MIT's Auto-ID Center, in 1999,though he prefers the phrase "Internet for things". At that point, he viewed Radio-frequency identification (RFID) as essential to the Internet of things, which would allow computers to manage all individual things.

A research article mentioning the Internet of Things was submitted to the conference for Nordic Researchers in Norway, in June 2002, which was preceded by an article published in Finnish in January 2002. The implementation described there was developed by Kary Frmling and his team at Helsinki University of Technology and more closely matches the modern one, i.e. an information system infrastructure for implementing smart, connected objects.Defining the Internet of things as "simply the point in time when more 'things or objects' were connected to the Internet than people", Cisco Systems estimated that the IoT was "born" between 2008 and 2009, with the things/people ratio growing from 0.08 in 2003 to 1.84 in 2010. The history of the IIoT begins with the invention of the programmable logic controller (PLC) by Dick Morley in 1968, which was used by General Motors in their automatic transmission manufacturing division. These PLCs allowed for fine control of individual elements in the manufacturing chain. In 1975, Honeywell and Yokogawa introduced the world's first DCSs, the TDC 2000 and the CENTUM system, respectively. These DCSs were the next step in allowing flexible process control throughout a plant, with the added benefit of backup redundancies by distributing control across the entire system, eliminating a singular point of failure in a central control room.

With the introduction of Ethernet in 1980, people began to explore the concept of a network of smart devices as early as 1982, when a modified Coke machine at Carnegie Mellon University became the first internet-connected appliance, able to

report its inventory and whether newly loaded drinks were cold. As early as in 1994, greater industrial applications were envisioned, as Reza Raji described the concept in IEEE Spectrum as "[moving] small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories".

The concept of the internet of things first became popular in 1999, through the Auto-ID Center at MIT and related market-analysis publications. Radio-frequency identification (RFID) was seen by Kevin Ashton (one of the founders of the original Auto-ID Center) as a prerequisite for the internet of things at that point. If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. Besides using RFID, the tagging of things may be achieved through such technologies as near field communication, barcodes, QR codes and digital watermarking.

The current conception of the IIoT arose after the emergence of cloud technology in 2002, which allows for the storage of data to examine for historical trends, and the development of the OPC Unified Architecture protocol in 2006, which enabled secure, remote communications between devices, programs, and data sources without the need for human intervention or interfaces.

One of the first consequences of implementing the industrial internet of things (by equipping objects with minuscule identifying devices or machine-readable identifiers) would be to create instant and ceaseless inventory control. Another benefit of implementing an IIoT system is the ability to create a digital twin of the system. Utilizing this digital twin allows for further optimization of the system by allowing for experimentation with new data from the cloud without having to halt production or sacrifice safety, as the new processes can be refined virtually until they are ready to be implemented. A digital twin can also serve as a training ground for new employees who won't have to worry about real impacts to the live system.

1.1.1 Home automation

Home automation (also called domotics) designates an emerging practice of increased automation of household appliances and features in residential dwellings, particularly through electronic means that allow for things impracticable, overly expensive or simply not possible in recent past decades. The rise in the usage of home automation solutions has taken a turn reflecting the increased dependency of people on such automation solutions. However, the increased comfort that gets added through these automation solutions is remarkable.

The first smart homes were ideas, not actual structures. For decades, science fiction has explored the idea of home automation. Prolific writers, such as Ray Bradbury, imagined a future where homes were interactive, and seemingly ran themselves. In Bradburys cautionary short story, There Will Come Soft Rains he describes an automated home that continues to function even after humans have died out. Its all well and frightening, until you consider the actual benefits of home automation, and then the idea becomes more comforting than chilling. Although the idea of home automation has been around for some time, actual smart homes have only existed a short while. This timeline focuses on hardware; meaning actual inventions leading up to the smart homes we know today and can expect from the near future.Although the idea of home automation has been around for some time, actual smart homes have only existed a short while. This timeline focuses on hardware; meaning actual inventions leading up to the smart homes we know today and can expect from the near future.

1901 1920 The invention of home appliances Although home appliances arent what wed consider smart, they were an incredible achievement in the early twentieth century. These achievements began with the first engine-powered vacuum cleaner in 1901. A more practical electricity-powered vacuum was invented in 1907. Throughout two decades refrigerators would be invented, as well as clothes dryers, washing machines, irons, toasters, and so much more. It was a fantastic time for anyone who was employed as a maid by a very affluent family. 1966 - 1967 ECHO IV and the Kitchen Computer Although it was never commercially sold, the ECHO IV was the first smart device. This clever device could compute shopping lists, control the homes temperature and turn appliances on and off. The Kitchen Computer, developed a year later, could store recipes, but had the unfortunate tagline, If she can only cook as well as Honeywell can computer and therefore sold no models.

1991 Gerontechnology Gerontechnology combines gerontology and technology and makes the lives of senior citizens easier. In the 1990s, there was a lot of new research and technology in this sector. Remember, Ive fallen and I cant get up? Life Alert is one example of gerontechnology. 1998 Early 2000s Smart Homes Smart homes, or home automation, began to increase in popularity in the early 2000s. As such, different technology began to emerge. Smart homes suddenly became a more affordable option, and therefore a viable technology for consumers. Domestic technologies, home networking, and other gadgets began to appear on store shelves. Todays Smart Homes Todays smart homes are more about security and living greener. Our smart homes are sustainable, and they help to ensure that our homes arent ex-

pending unnecessary energy. They also help alert us to intruders (whether were home or not). Current trends in home automation include remote mobile control, automated lights, automated thermostat adjustment, scheduling appliances, mobile/e-mail/text notifications, and remote video surveillance. Connectivity and interactivity are driving the way families live and manage their homes. So while we are expected to be in more places due to business travel, childrens school schedules and social activities, these new smart systems provide cutting edge connectivity to your household, even when youre far away. And when the house is occupied, the high level of automation enables more convenience, control and safety from any part of your property. It all adds up to fewer worries and increased enjoyment of life, which is something we would all welcome, writes ADT technologies, who some say have lower home security costs than other competitors. The Future of Home Automation CNN prophesies that the smart home of the future will be a bit like what weve seen in the animated series, The Jetsons. Look forward to digital cutting boards (digital everything, really), molecular cooking devices, and so much more.

1.1.2 Laboratory automation

Automation is essential for many scientific and clinical applications. Therefore, automation has been extensively employed in laboratories. From as early as 1980 fully automated laboratories have already been working.] However, automation has not become widespread in laboratories due to its high cost. This may change with the ability of integrating low-cost devices with standard laboratory equipment. Autosamplers are common devices used in laboratory automation. Lab Automation System The model consist of different sensors like temperature, gas, motion and LDR. Initially the Nodemcu esp8266 connects to the internet through WiFi.When the connection is established it will start reading the parameters of sensors like p1, p2, p3 etc. The threshold levels for the required sensors are set as t1, t2, t3 etc. The sensor data are sent to the web server and stored in the cloud. The data can be analyzed anywhere any time. If the sensor parameters are greater than the threshold level then the respective alarm a1, a2, a3 etc. will be raised and the required actuation is done for the controlling of the parameters. In the proposed model the temperature, gas leakage, motion in the house is monitored.The temperature and the motion detection is stored in cloud for analysis. If the temperature exceeds the threshold level then the cooler will turn on automatically and it will off when the temperature comes to control. Similarly when there is a leakage of gas in the house alarm is raised giving the alert sound. The required lights are turned on/off automat-

ically by detecting the light outside the house. The user can also monitor the electric appliances through the internet via web server.

Functions of Automation System : The proposed lab automation system can control the following appliance

- Lights on/off/dim;
- Fan on/off;
- On/off different appliance;

Software design Front End Design: HTML is a format that tells a computer how to display a web page. The documents themselves are plain text files with special ”tags” or codes that a web browser uses to interpret and display information on your computer screen. HTML stands for Hyper Text Markup Language; an HTML file is a text file containing small markup tags. The markup tags tell the Web browser how to display the page. An HTML files must have an htm or html file extension. Cloud Storage: Cloud computing is the practice of using remote servers on the internet to manage, store and process data instead of using a personal computer. When the connection is established it will start reading the parameters of sensors. Experimental setup of HAS A model house is built for the lab automation system Relay is used toswitch the electrical appliances like light, fan etc. The Nodemcu esp8266 is placed in store room or garage. The Nodemcu esp8266 is connected with WiFi card with the antennas for the connectivity with Iinternet. When the connection is established it will start reading the parameters of sensors. Experimental setup of HAS A model house is built for the lab automation system Relay is used toswitch the electrical appliances like light, fan etc. The Nodemcu esp8266 is placed in store room or garage. The Nodemcu esp8266 is connected with WiFi card with the antennas for the connectivity with Internet.

ARDUINO ESP8266 ESP8266 is an impressive, low cost WiFi module suitable for adding WiFi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone WiFi connected devicejust add power! The feature list is impressive and includes: 802.11 b/g/n protocol Wi-Fi Direct (P2P), soft-AP Integrated TCP/IP protocol stack. NodeMCU is an open source IoT platform.In the above figure is a nodemcu esp8266 microcontroller used in the proposed lab automation system installed in the laboratory. This microcontroller comes with the inbuilt Wi-Fi module.The above figure

shows the connection procedure of the relays used in the lab automation with the AC mains. The NC terminal of the relay is been connected in parallel to the ground line of the wire. The COM of the relays is been connected to the 230V supply line of the switch board circuit.The above figure shows the practical implementation and working of the lab automation system installed in the laboratory. The circuit is installed on the wall and the inbuilt Wi-Fi module is used to connect and control the Lights and Fans of the laboratory.

GUI: The above figure shows the HTML based webpage used to control the ON/OFF functionality of the lights and fans in the laboratory. This page can be used to control the lab automation system by connecting to the Wi-Fi of the NodeMcu esp8266. The Wi-Fi is password protected at the time of setup.

1.1.3 Industrial automation

Industrial automation deals primarily with the automation of manufacturing, quality control and material handling processes. General purpose controllers for industrial processes include Programmable logic controllers, stand-alone I/O modules, and computers. Industrial automation is to replace the decision making of humans and manual command-response activities with the use of mechanised equipment and logical programming commands. One trend is increased use of Machine vision to provide automatic inspection and robot guidance functions, another is a continuing increase in the use of robots. Industrial automation is simply require in industries. The integration of control and information across the enterprise enables industries to optimise industrial process operations. Energy efficiency in industrial processes has become a higher priority. Semiconductor companies like Infineon Technologies are offering 8-bit micro-controller applications for example found in motor controls, general purpose pumps, fans, and ebikes to reduce energy consumption and thus increase efficiency. The rise of industrial automation is directly tied to the fourth industrial revolution, which is better known now as Industry 4.0. Originating from Germany, Industry 4.0 encompasses numerous devises, concepts, and machines. It, along with the advancement of the Industrial Internet of Things (formally known as the IoT) which is Internet of Things is a seamless integration of diverse physical objects in the Internet through a virtual representation. These new revolutionary advancements have drawn attention to the world of automation in an entirely new light and shown ways for it to grow to increase productivity and efficiency in machinery and manufacturing facilities. Industry 4.0 works with the IIoT and software/hard-

ware to connect in a way that (through communication technologies) add enhancements and improve manufacturing processes. Being able to create smarter, safer, and more advanced manufacturing is now possible with these new technologies. It opens up a manufacturing platform that is more reliable, consistent, and efficient that before. Implementation of systems such as SCADA are an example of software that take place in Industrial Automation today.

First time automation in industries was done through the use of steam and water power.As the advancement took place, electricity was introduced and was used in industries for mass production. Fig 2 shows the use of steam power in industries in olden days. This machine was used in the first safe and successful steam power plant introduced by Thomas Newman in 1712.the same circumstances that have led to the explosion in smart consumer gadgets, such as universal wireless connectivity, cloud computing, cheap sensors, and better artificial intelligence, are also being used in conjunction with big data to power the next generation of industry, as well.This new technological layer, called the Industrial Internet of Things (IIoT), is transforming massive industries like manufacturing, energy, mining, and transportation and itll have a multi-trillion dollar impact on the economy as a whole.

The Birth of the Industrial Internet Todays infographic comes to us from Kepware, and it shows how these technological forces have emerged over time to make the IIoT possible.Timeline of the Industrial Internet of Things The road to the creation of the IIoT started in 1968, when engineer Dick Morley made one of the most important breakthroughs in manufacturing history.That year, Morley and a group of geek friends invented the programmable logic controller (PLC), which would eventually become irreplaceable in automating assembly lines and industrial robots in factories.Here are some other major innovations that were instrumental in making the IIoT possible:

- 1983: Ethernet is standardized;
- 1989: Tim Berners-Lee creates Hypertext Transfer Protocol (HTTP);
- 1992: TCP/IP allows PLCs to have connectivity;
- 2002: Amazon Web Services launches, and cloud computing starts to take hold
- 2006: OPC Unified Architecture (UA) enables secure communications between devices, data sources, and applications.

- 2006: Devices start getting smaller, and batteries and solar energy are becoming powerful and more economical.
- 2010: Sensors drop in price, enabling them to be put into pretty much everything

And today, the IIoT is a big deal: its transforming the backbone of major industries by adding a new layer of technology that helps companies optimize operations, track and analyze equipment, implement predictive maintenance, make sense of massive amounts of data, and make real-time decisions that were never before possible.

1.2 Statement of Project

1.2.1 Problem Statement

Walled Off Internet

According to the World Economic Forum, the growing number of cross border attacks will start pushing national governments towards breaking up the internet in national, or even regional walled gardens. .

Cloud Attacks

Given that a large amount of the data that will run the Io T will be stored in the cloud it is likely that cloud providers will be one of the principle targets in this kind of war.

Understanding IoT

In 2018, the real issue is how to increase the ability for people to understand the changes and their implications more clearly, and to take concrete actions to take advantage of the potential upside.

Botnet Problems

Millions of new connected consumer devices make a wide attack surface for hackers, who will continue to probe the connections between low-power, somewhat dumb devices and critical infrastructure, Shaun Cooley, VP and CTO at San Jose, California based Cisco website said.

1.2.2 Other Issues

To build the system which can monitor the sensor data and upload it over internet and also capable of taking some curical decision within industries using the IoT

1.2.3 About Project

IOT or internet of things is a technology that deals with bringing control of physical devices over the internet. Here we propose efficient industry automation system that allows user to efficiently control industry appliances/machines over the internet. For demonstration of this system we use 3 loads as industrial appliances or machines and a motor to demonstrate as an industrial motor. Our system uses an ESP family microcontroller for processing all user commands. A WIFI modem is used to connect to the internet and receive user commands. On sending commands through the internet they are first received by our WIFI modem. The modem decodes information and passes it to the microcontroller for further processing. The microcontroller then switches loads and operates the motors as per receivers commands. Also, it displays the system state on an LCD display. Thus, we automate entire industry using online GUI for easy industry automation.

1.2.4 Motivation

Reduce Worker Fatigue and Effort or Labour-Intensive Operation

Typically, Humans Dislike Banal, Repetitive Tasks. However, Computer Systems Perform Them Without Complaint. Tasks That Lack Variability Provide A Place for Automated Systems to Shine, But This Also Holds True for Systems Utilizing Advanced Sensors and Integration. If the Task Requires Conditions Not Suited to Human Comfort or Focus, Consider Automation.

Prevent Products or Materials from Being Damaged or Destroyed

Humans Make Mistakes When They Fatigue. This Embodies the Sentiment of the Human Condition. Mistakes Using Tools Mean Damaging Raw Materials, Components, Assemblies, And End Products

Prevent Non-Conforming Product from Shipping

Computers Controlling Robots Do Not Forget Steps. Neglecting to Put in A Screw Requires A Human Touch. A Machine Not Doing It Yields an Error to Be Addressed. Does the Process Require Doing Something in A Specific Order to Improve Yield? Automated Systems Will Not Violate the Instruction Set. Moreover, Automated Systems May Employ Inspection Capabilities. Tune the System and Allow to The Data to Roll in Without Preference or Bias.

Increase Efficiency

Improving Processes for Efficiency Makes A Company More Competitive, But Do People Always Do the Same Thing in The Same Way Every Time They Do It? No, Human Variation Exists. Automated Systems Allow for Improvements That Benefit from Consistent Execution. Perfect Planning and Training Does Not Defend Against the Human Touch.

Collect Better Data

Remove the Accidental Data Entry or Missed Data Point from Logging. Make the Method of Collecting Sensor and Process Data Regulated.

1.3 Objectives and Scope

1.3.1 Objective: -

The Objective of Automation Is to Develop, Evaluate and Demonstrate The Switching and Monitoring In Industry. Industry Automation Various Application Makes Comfortable and Easier Way Such As

- To Reduce the Power Consumption.;
- To Do Work Effectively and Timely Manner;
- It Is Helpful for The Security Purpose.;
- Develop Solutions to Monitor, Understand, Assess and Anticipate the Machine,The Machine and The On/Off Situation.
- Develop Solutions Allowing the Owner to Plan and Operate Machine.
- Observe Required Parameter Anytime and Anywhere.

The goal of this project is to develop a home automation system that gives the user complete control over all remotely controllable aspects of industry.The automation system will have the ability to be controlled from a central host PC, the Internet, and also remotely accessed via a Pocket PC with a Windows Mobile based application.
To develop a system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent Decision using concept of IoT. And also design the system to Take Intelligent Decision and Control Devices.

1.3.2 Scope: -

Iot Is an Ecosystem of Connected Physical Objects That Are Accessible Through the Internet. And We Are Very Sure of This Thing That Living Is Almost Impossible in This Era Without Internet. People Have Started Using More And More Devices That Are Connected to Internet Instead of Un-Internet Devices.
For Example, A Smart Thermostat That Is Able to Automatically Gauge the Temperature of a Room and Then Adjust the Central Heating and Cooling Units as Necessary.
A Washing Machine That Automatically Detects Its Contents and Programs Itself to Be Finished Washing at A Specified Time. These Are All Goals That Engineers Are Working Toward and Depend Not Only on Advances in Data-Mining Technologies

but Also in Big Data Computing.The Future Healthcare Service Provider Will Consider the Smart Room an Effective Way of Providing Remote Healthcare Services, Especially to The Elderly and Disabled Who Do Not Require Intensive Healthcare Support.

Now industry are being replaced by Automation and robotics. All process and work are carried out by machines and robotics process automation. Every industrial sector like manufacturing, process industries, chemical, food beverages, Oil Gas , Transport, machine tools every where Industrial automation is used. India has just stepped in Industrial Automation field , So now over period of time IOT, IIOT and Artificial Intelligence this type of technologies will merging with Operational Technologies like PLC SCADA DCS and that is the reason future will be bright in Automation. There will be multiple openings Job opportunities in IT as well as OT sectors, IT companies are hiring as Anayst, Tester and developer for SCADA or IIOT application software .OEM or OT companies are hiring as PLC SCADA programmer, Maintenance Engineer, Operator in Food processing industries or Chemical Plant, Commissioning engineer for Installation commissioning of Automation hardware. Big companies like SIEMENS,GE, ABB, Fanuc, Honeywell , Mitsubishi are the best OEM in industrial automation and they are providing their service and product world wide.Artificial intelligence , IOT, Machine Learning also now a days integrated with PLC SCADA. PLC SCADA is used for Controlling and monitor the systems with logical programming.

Automation is nothing, it will simplify the system. Suppose we are going to talk about industrial automation, then we have to understand what is industry? Industry is the place where goods and things are produced. Each and every products, goods and things has value. These values (cost of the product) are fixed in two ways.

- Raw material involved
- Energy, Manpower and machines involved

Chapter 2

Literature Survey

2.1 Home Implementation Based on Internet and WiFi Technology

Author: YAN Wenbo, WANG Quanyu, GAO Zhenwei

In this paper, we proposed a flexible, low cost smart home system based on Internet and WiFi. We come up with the concept of Smart Units and Home Proxy. The combination of remote server and home proxy is a new scheme for remote control in which XMPP is used. Low cost WiFi module is used to make smart units. Relative apps based on different platforms can be developed and android app is used to demonstrate the system. We use home proxy to solve the synchronization problem and the system supports multiuser. Also one phone can register different Home proxies, thus one phone can control more than one smart home system or smart office system. So the remote server can provide services for different homes and offices and the system is more likely to be promoted.

2.2 Design of Server Room Temperature and Humidity Control System using Fuzzy Logic Based on Microcontroller

Author: Febryan Hari Purwanto, Ema Utami, Eko Pramono

In this paper Server room is a very important asset for a company because in there are servers that contain applications and company databases that are very valuable for the sustainability of a company, therefore the condition of the server room such as temperature, humidity, power and all IT equipment in this room should always be monitored in real time. One way that can be used to control and monitor the temperature and humidity of server room is to use an Internet of Thing (IoT) based system. This research proposed the design of server room temperature and humidity control

system using fuzzy logic based on microcontroller Wemos D1 as an infrared transmitter remote control to control temperature and mode setting in Air Conditioner to control temperature and humidity of server room. Fuzzy logic based on microcontroller for control the temperature and humidity of server room was successfully designed and successfully implemented into microcontroller with simulation test results using matlab obtained the value that match with the results on the microcontroller with average AC Temperature Set output deviation 0.03500 and average AC Mode Set output deviation 0.01225. The system is also designed to be able to monitor data temperature, humidity and electricity voltage online using the website and can provide early warning message through social media twitter.

2.3 IoT based Monitoring and Control System for Home Automation

Author: Pavithra.D, Ranjith Balakrishnan

In this paper, we have introduced the event of a home management and security system exploitation using Raspberry pi and Internet of Things technology. The system is suitable for real-time home safety monitoring and for remotely controlling the home appliances and protection from fire accidents with immediate solutions. The system may be employed in many places like banks, hospitals, labs etc that dramatically cut back the hazard of unauthorized entry. Proof may be given to the safety department if any theft issue happens.The various future applications may be used by controlling various household devices of house with internet, Industrial automation and management through internet, machine-driven fireplace exit systems and improvement of security problems in extremely restricted areas.

2.4 IOT Based Greenhouse Environment Monitoring and Controlling System using Arduino Platform

Author: Vimal P V, Dr. K S Shivaprakasha

An Arduino based greenhouse monitoring and controlling system is designed. DHT11 sensor, Soil Moisture sensor,LDR sensor and pH sensor are the main sensors used in this project which give the exact value of temperature, humidity,moisture content, light intensity and soil pH respectively.This system is designed for controlling and monitoring environmental parameters in greenhouse by a simple SMS from anyplace via the GSM network. Ethernet is also used to send the data parameters to

mobile phone which eliminates the SMS charges. This system reduces the power consumption, maintenance and complexity. This project can be used in agricultural field, in nursery and in botanical garden.

2.5 Mobile based Horne Automation using Internet of Things(IoT)

Author: Kumar Mandula, Ramu Parupalli, CH.A.S.Murty, E.Magesh.

In this paper, a prototype smart horne automation using loT is presented. This research work will be carried forward by integrating relays to Arduino board for controlling home appliances from a remote location in a real scenario. As an extension, authors propose a generic loT framework and use cloud computing infrastructure for connecting and managing

2.6 Real-Time remote monitoring and operation ofIndustrial Devices using IoT and Cloud

Author: H.S.Raju, Sanath Shenoy

The proposed solution was tested on a limited number of physical devices. It was found that for 2 physical industrial devices connected to network at real-time could be monitored and operated without any glitches. This use case could be extended for a multiple number of industrial devices connected to the IoT hub. We could also consider the performance, reliability, scalability etc. of the above approach for more number of devices communicating concurrently at real-time.

2.7 Internet of Things (IoT) Communication Protocols

Author:Shadi Al-Sarawi1, Mohammed Anbar2 , Kamal Alieyan3 , Mahmood Alzubaidi

This paper will be an attempt to review different communication protocols in IoT. In addition, it will compare between commonly IoT communication protocols, with an emphasis on the main features and behaviours of various metrics of power consumption security spreading data rate, and other features. This comparison aims at presenting guidelines for the researchers to be able to select the right protocol for different applications. This paper will also review and compare between IoT communication protocol which is realized as a clear insight for the readers of different IoT communication protocol vision, their pros and cons, and their power speed and

range consumption. The IoT environment consists of an enormous number of smart devices, but with many constraints. Processing capability storage volume, short in power life and radio range are among of these constraints. Therefore, the IoT implementation requires a communication protocols that can efficiently manage these conditions.

2.8 IoT platform for Condition Monitoring of Industrial Motors

Author:A.Ajitha, J.Laxmi Prasanna , D.Swathi, D.Shyamala

The most used machine in any section of the society including industries is Induction machine. Preferably three phase induction motors are used in industrial drives. The desirable features of induction motor like robust in construction, low maintainance cost, high starting torque, efficiency and reliability makes difference from other motors. The rating of induction motors varies from few watts to tens of Megawatts that suits to various industrial applications Besides their reliability, Induction motors are also subjected to many faults. The parts of induction motor that are most vulnerable to faults are bearing, stator winding, rotar bar and shaft. Different faults occurring in induction motors includes stator faults, Rotar faults, bearing faults and winding faults. Considering factors for failure of industrial motors includes lubrication, motor ventilation, electrical factors, alignments and motor load that results in motor vibrations or motor temperature rise to critical levels.

2.9 IoT-type Electric Fan

Author:Wen-Chung Tsai , You-Jyun Shih, Ting-Ming Tsai

Recently, smart-phone is popular for high speed internet connectivity. Consequently, applying wireless network and telecommunication technology such as WiFi and LTE (Long Term Evolution) to IoT (Internet of Things) network system is a promising technology. Therefore, IEEE [1] and 3GPP [2] have started to discuss related IoT application issues to face of the rise of different IoT interconnection patterns. The current discussions focus on the functional architecture, service requirement, and application of Machine-type [3] related issues such as M2M (Machine-to-Machine) communication requirements [4]. The mentioned efforts show that the need of further development of electronic appliances to fit various requirements of IoT applications. Direct Current (DC) inverter motor has been widely applied to air-conditioning products in recent years. Compared to the traditional fixed-frequency Alternating Current

(AC) motor, DC inverter technology can avoid repeatedly starting and stopping the operation of motor. So that DC inverter motor can achieve approximately 30 percent to 35 percent power saving compared to the transitional fixed frequency AC motor. Recently, DC inverter motor has extended its application to more and more household electric appliances, such as refrigerator, washing machine, and electric fan.

IoT-type electric appliances have gradually came into peoples daily lives. To adapt to the quick evolution of application requirements, the implementation system must be able to integrate multi-microprocessors and various kinds of peripheral controllers. So that programming-able device such as FPGA (Field-Programmable Gate Array) [5] and FPGAbased microprocessor such as ALTERA NIOS II [6] have gradually attracted attentions of market and industry. Due to huge computing efforts for multimedia applications and quickly evolving standards of electric products, such programming-able device with parallel processing ability has its advantages in the development of IoT-type electric appliances. Developers can conditionally select the resilient features of hardware and software to achieve an optimal tradeoff between product cost and system performance.

2.10 An IoT Based Smart Home Automation System

Author:Md. Sadad Mahamud, Md. Saniat Rahman Zishan, Syed Ishmam Ahmad, Ahmed Rezaur Rahman, Mehedi Hasan, Md.Lutfur Rahman
We are moving towards to world of Internet. Where every physical object will be controlled and communicated with the internet. A research shows that, Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 will be 75.44 billons [1]. With the advent of vocal recognition software, such as Amazon Alexa, there is a large demand for home automation [2]. Our main goal is to develop a way to efficiently and affordably transform a preexisting home into a smart home. In this paper we proposed a low cost, less power consumption IoT based system. By using this system, the registered person can control his/her home appliances from anywhere anytime. Also, the registered person can monitor his/her home electrical appliances. We created a custom-made private server for monitoring and controlling the system. The server is communicated with the ESP32 Wi-Fi module. By assessing the server, the registered person can turn on/off his home appliances. And as it is a private home server it is also secreted. The home server is created based on OSI model of network architecture. As the world home automation system market

is expected to grow from USD 32.11 Billion in 2015 to USD 78.27 Billion by 2022, at a CAGR of 12.46 between 2016 and 2022 using IoT system [3]. So, it important to feel the change of upcoming era and make the changes. Thats why in this paper we proposed a system where user can use a cost-effective smart home automation system.

Chapter 3

BASIC CONCEPT

The process of controlling or operating various equipment, machinery, industrial processes, and other applications using various control systems and also with less or no human intervention is termed as automation. There are various types of automation based on the application they can be categorized as home automation, industrial automation, autonomous automation, building automation, etc.,. In this article, let us discuss about wireless home automation using IOT (Internet of Things).

There are various techniques to control home appliances such as IOT based home automation over the cloud, home automation under WiFi through android apps from any smartphone, Arduino based home automation, home automation by android application based remote control, home automation using digital control, RF based home automation system and touch screen based home automation.

The essential components and materials for home automation using IOT project can be listed as a Wi-Fi module, Opto-coupler, TRIAC, resistors, capacitors, diode, regulator, loads (home appliances). There are various eCommerce websites that are providing facility to purchase all the required components online such as a project kit consisting of individual components essential to design a particular project from www.edgefxkits.com, Edgefx also offers ready-made kit-plug and play type project kits and (Do It Yourself) DIY project kits for engineering students and electronic hobbyists.

This is a IoT automation project. not like others which only fetch the sensor data to the internet. i used there technique to control the devices by reading to that web api using wifi module esp8266. with this technique we can monitor , control the devices from anywhere in the world. today i,m controlling a led , just like hello world program for IoT world.There are many instructables about IoT and home automation.but most of them is all about writing the sensor data to the web, making weather stations etc. but i wanted to control devices using internet just like people do it with GSM using sms command.So, finally i did it with the help of esp8266 our loving

wifi module and world's best board arduino uno. we just need to modify the data using web api and arduino will react on that. here it will turn board led on and off.
We live in an exciting time where more and more everyday items things are becoming smart! Things have sensors and can communicate to other things and can provide control to more things. The Internet of Things, IoT, is upon us in a huge way and people are rapidly inventing new gadgets that enhance our lives. The price of microcontrollers with the ability to talk over a network keeps dropping and developers can now tinker and build things inexpensively.
IoT based home automation project is done using low cost ESP8266 ESPino ESP-12 WiFi Module, It uses relays and few simple components, complete code is provided, for more details on software setup go through IoT getting started tutorial. You can control four electrical devices and also you can monitor temperature. ESP-12 is low cost module we are using here.
Home automation is the new trend in consumer electronics. Nowadays, people not only want a well furnished house but also want a smart home to live in. The basic concept of home automation is controlling the home appliances with a remote control. The modern day smart homes may have many additional features where the user could interact with the consumer appliances through augmented reality or have various smart features like telephony, contacts management, time keeping utilities, audio and video playback all integrated in smart devices especially designed to be part of the smart home.

As the most basic thing in a smart home is controlling appliances through a remote control, it needs to be implemented first. The remote controlling of home appliances can be implemented in various ways like by using IR remote, RF remote control, Bluetooth, Mobile network, Wi-Fi and also internet. When internet controlled smart home is designed, the appliances are usually connected to an intelligent circuitry which can connect with an internet hotspot or connection with the help of a Bluetooth device or a Wi-Fi module. Internet controlled smart home is the most popular trend in the home automation industry. It is because in such home automation system, a user can control home appliances and even can manage home security from anywhere. Like, the user may be working at his office and from there itself he can operate home devices like starting a motor or operating a washing machine just by accessing a web application online.
In this project, a simple home automation system controlled through a web server has been designed. Instead of making a complicated relay circuit for controlling regular home appliances, two LED lights are controlled in this home automation demo.

The LED lights are directly interfaced with the ESP8266 Wi-Fi module which connects to a web application by linking to a internet hotspot. In a complicated smart home system, where regular home appliances might be controlled, there the module would have need to interface with a microcontroller circuit which itself might be controlling a relay circuit.

The ESP8266 Wi-Fi module is a programmable Wi-Fi circuit which can be programmed and loaded with an Arduino Sketch. The module has two General Purpose Input Output (GPIO) pins which can be used to interface the LED lights directly. Since, this is just a demo application, the concept of internet controlled home automation is here demonstrated by simply controlling these two LEDs directly interfaced to the ESP8266 module. For learn more about programming the ESP8266 Wi-Fi module using Arduino IDE, go through the following tutorial - Getting started with ESP8266 In this project, the web application used is a simple web page from which the LED light can be switched ON and OFF. The webpage can be loaded to an actual server for access from anywhere or it can also be run from localhost. In this project, the web page controlling the LED light is run from the localhost and the Wi-Fi module is connected to a PC via FTDI USB serial converter for loading program to it.

Speed Control:- Speed control is also possible with the L298N motor driver. All you need is feed PWM signals to the motor enable pins. The speed of the motor will vary according to the width of the pulses. The wider the pulses, the faster the motor rotates. How fast the motor rotates for a given pulse width will vary from motor to motor even if they look exactly the same. Thus, the actual pulse width must be derived through experiment.

3.1 TECHNICAL DETAIL

3.1.1 PROJECT REQUIREMENT

Software requirement

1)NODE RED: -Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.in fig 3.2 the web-site is for user interface. And in fig 3.3 the website is for the flow of the website.// It is a model that lends itself very well to a visual representation and makes it more accessible to a wider range of users. If someone can break down a problem into discrete steps they can look at a flow and get a sense of what it is doing; without having to understand the individual lines of code within each node.

- Flow-based Programming:// Invented by J. Paul Morrison in the 1970s, flow-based programming is a way of describing an applications behavior as a network of black-boxes, or nodes as they are called in Node-RED. Each node has a well-defined purpose; it is given some data, it does something with that data and then it passes that data on. The network is responsible for the flow of data between the nodes.

- Runtime/Editor:
  Node-RED consists of a Node.js-based runtime that you point a web browser at to access the flow editor. Within the browser you create your application by dragging nodes from your palette into a workspace and start to wire them together. With a single click, the application is deployed back to the runtime where it is run. The palette of nodes can be easily extended by installing new nodes created by the community and the flows you create can be easily shared as JSON files.

- History:
  Node-RED started life in early 2013 as a side-project by Nick OLeary and Dave Conway-Jones of IBMs Emerging Technology Services group. What began as a proof-of-concept for visualising and manipulating mappings between MQTT topics, quickly became a much more general tool that could be easily extended in any direction.It was open-sourced in September 2013 and has been

developed in the open ever since, culminating in it being one of the founding projects of the JS Foundation in October 2016.

2)Amazon Web Service: -It is a subsidiary of Amazon.com that provides OnDemand cloud computing platforms to individuals, companies and governments, on a paid subscription basis. The technology allows subscribers to have at their disposal a virtual cluster of computers, available all the time, through the Internet.in fig 3.4 show the amazon web services website.

The AWS technology is implemented at server farms throughout the world, and maintained by the Amazon subsidiary. Fees are based on a combination of usage, the hardware/OS/software/networking features chosen by the subscriber, required availability, redundancy, security, and service options. Subscribers can pay for a single virtual AWS computer, a dedicated physical computer, or clusters of either. As part of the subscription agreement,[6] Amazon provides security for subscribers' system. AWS operates from many global geographical regions including 6 in North America.

In 2017, AWS comprised more than 90 services spanning a wide range including computing, storage, networking, database, analytics, application services, deployment, management, mobile, developer tools, and tools for the Internet of Things. The most popular include Amazon Elastic Compute Cloud (EC2) and Amazon Simple Storage Service (S3). Most services are not exposed directly to end users, but instead offer functionality through APIs for developers to use in their applications. Amazon Web Services' offerings are accessed over HTTP, using the REST architectural style and SOAP protocol.

Amazon markets AWS to subscribers as a way of obtaining large scale computing capacity more quickly and cheaply than building an actual physical server farm.[8] All services are billed based on usage, but each service measures usage in varying ways. As of 2017, AWS owns a dominant 34 percent of all cloud (IaaS, PaaS) while the next three competitors Microsoft, Google, and IBM have 11 percent, 8 percent, 6 percent respectively according to Synergy Group.

3)MQTT LENS: -It is an ISO standard (ISO/IEC PRF 20922) publish-subscribe-based messaging protocol. It works on top of the TCP/IP protocol. It is designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is limited. The publish-subscribe messaging pattern requires a message broker. In fig 3.5 we can see the user interface of MQTTlens.

An MQTT system consists of clients communicating with a server, often called a

”broker”. A client may be either a publisher of information or a subscriber. Each client can connect to the broker.Information is organized in a hierarchy of topics. When a publisher has a new item of data to distribute, it sends a control message with the data to the connected broker. The broker then distributes the information to any clients that have subscribed to that topic. The publisher does not need to have any data on the number or locations of subscribers, and subscribers in turn do not have to be configured with any data about the publishers.

If a broker receives a topic for which there are no current subscribers, it will discard the topic unless the publisher indicates that the topic is to be retained. This allows new subscribers to a topic to receive the most current value rather than waiting for the next update from a publisher.When a publishing client first connects to the broker, it can set up a default message to be sent to subscribers if the broker detects that the publishing client has unexpectedly disconnected from the broker.

Clients only interact with a broker, but a system may contain several broker servers that exchange data based on their current subscribers’ topics.A minimal MQTT control message can be as little as two bytes of data. A control message can carry nearly 256 megabytes of data if needed. There are fourteen defined message types used to connect and disconnect a client from a broker, to publish data, to acknowledge receipt of data, and to supervise the connection between client and server.MQTT relies on the TCP protocol for data transmission. A variant, MQTT-SN, is used over other transports such as UDP or Bluetooth.

MQTT sends connection credentials in plain text format and does not include any measures for security or authentication. This can be provided by the underlying TCP transport using measures to protect the integrity of transferred information from interception or duplication.

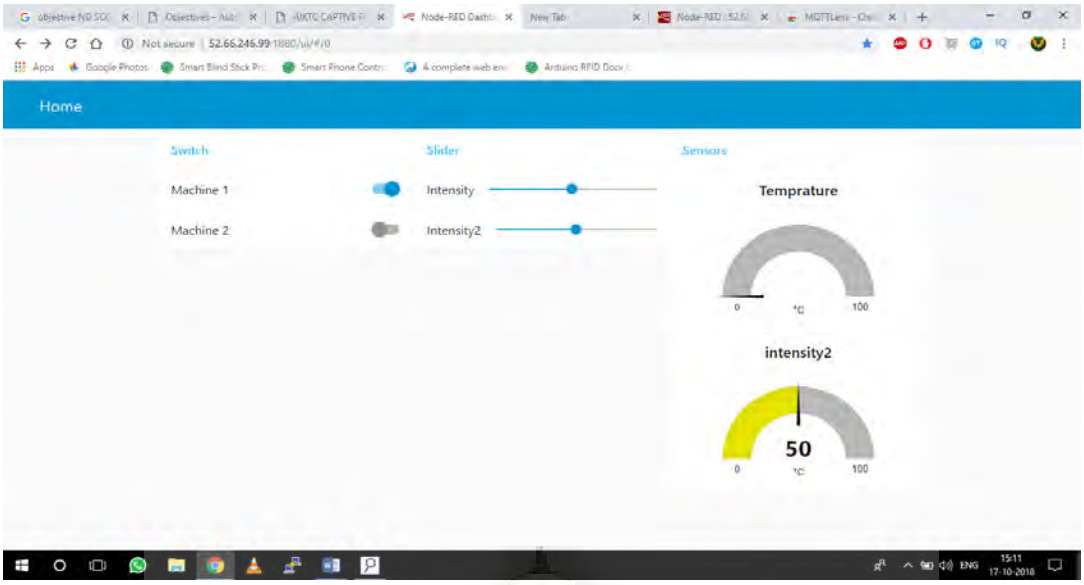

Figure 3.1: NODE RED

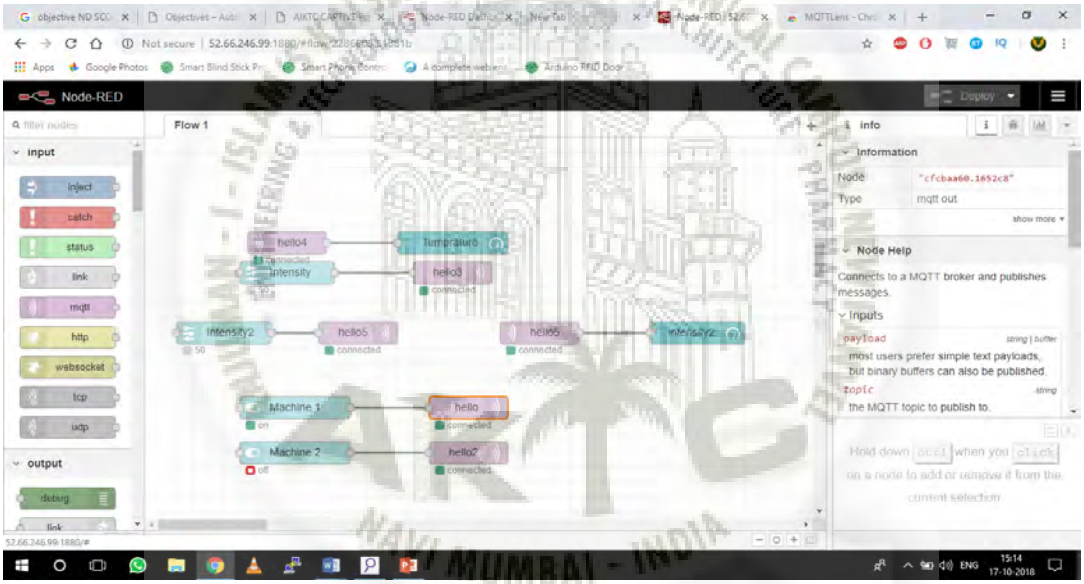

Figure 3.2: NODE RED

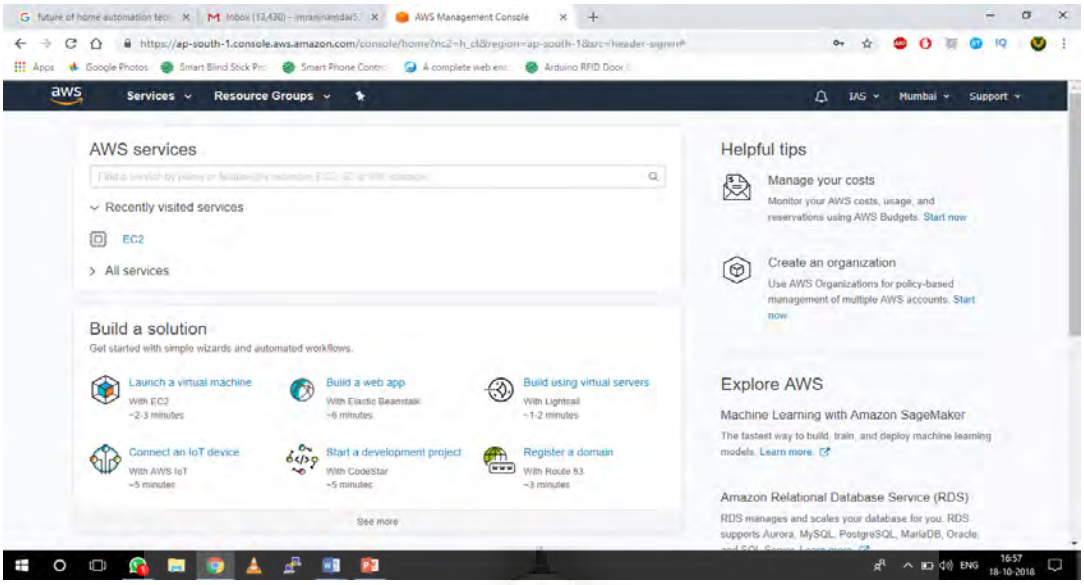

Figure 3.3: AMAZON WEB SERVICE

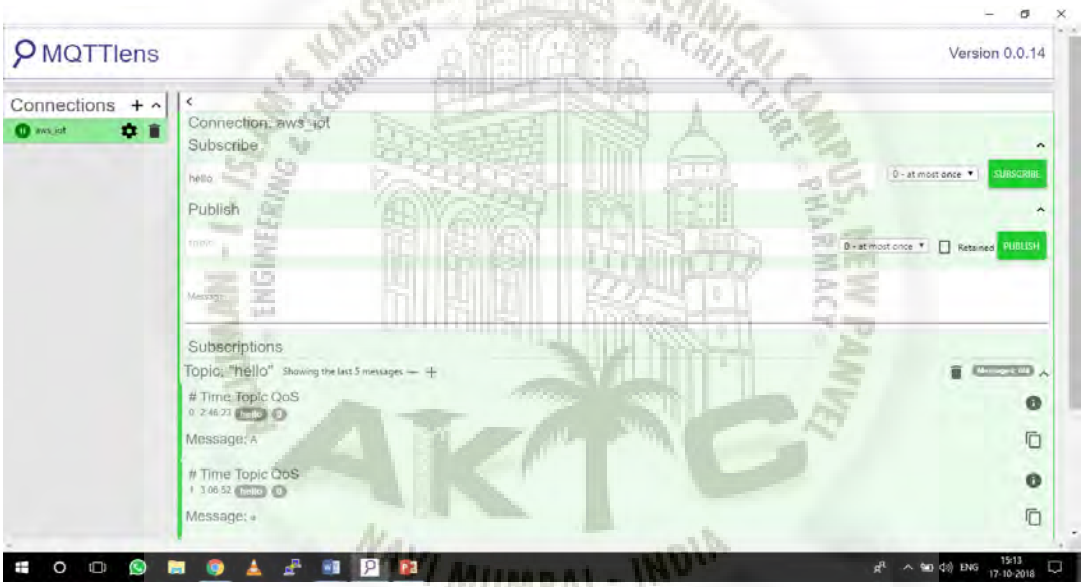

Figure 3.4: MQTTlens

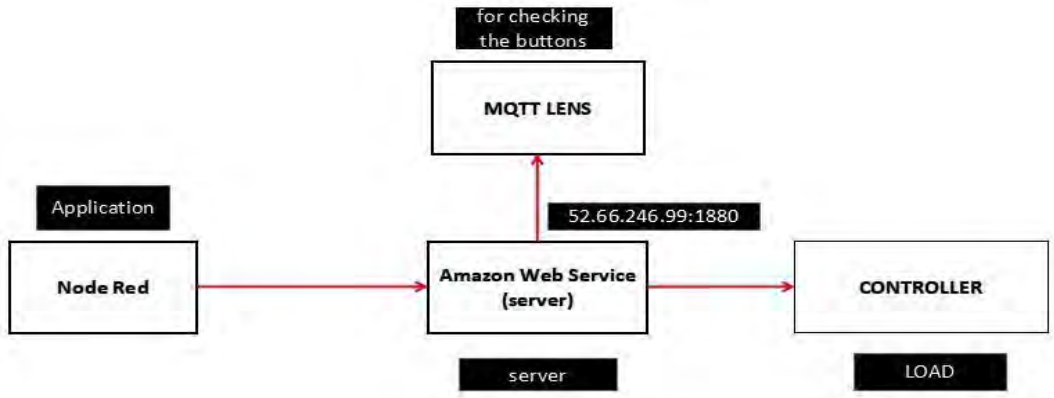

Figure 3.5: WEBSITE FLOW

Hardware requirement

1)ESP WIFI MODULE: -The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer Espressif Systems. Processor: L106 32-bit RISC microprocessor core based on the Tensilica Xtensa Diamond Standard 106Micro running at 80 MHz[5] Memory:

- 32 KiB instruction RAM
- 32 KiB instruction cache RAM
- 80 KiB user-data RAM
- 16 KiB ETS system-data RAM
- External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included)
- IEEE 802.11 b/g/n Wi-Fi
- Integrated TR switch, balun, LNA, power amplifier and matching network
- WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI
- IC (software implementation)[6]
- IS interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 10-bit ADC (successive approximation ADC)

Figure 3.6: ESP WIFI module

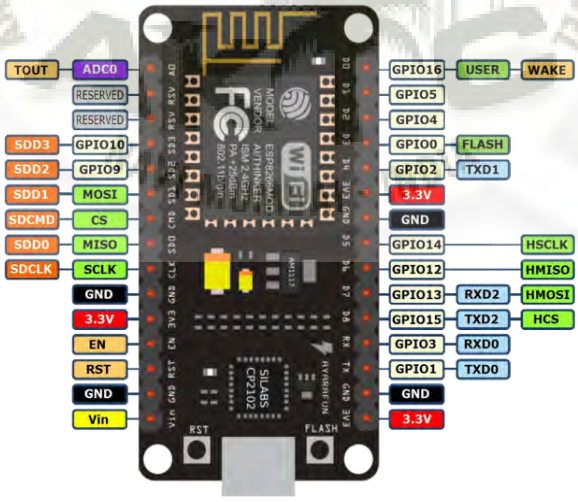

Figure 3.7: ESP WIFI module

2)Arduino UNO:-The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc.The board is equipped with sets of digital and analogy input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has

14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.

It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Although the hardware and software designs are freely available under copyleft licenses, the developers have requested the name Arduino to be exclusive to the official product and not be used for derived works without permission. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino-compatible products commercially released have avoided the project name by using various names ending in -duino.

An early Arduino board with an RS-232 serial interface (upper left) and an Atmel ATmega8 microcontroller chip (black, lower right); the 14 digital I/O pins are at the top, the 6 analog input pins at the lower right, and the power connector at the lower left.Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) with varying amounts of flash memory, pins, and features. The 32-bit Arduino Due, based on the Atmel SAM3X8E was introduced in 2012. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields. Multiple and possibly stacked shields may be individually addressable via an IC serial bus. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Some designs, such as the LilyPad, run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optiboot bootloader.[27] Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistortransistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable

via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used with traditional microcontroller tools, instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

An official Arduino Uno R2 with descriptions of the I/O locations The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila,[a] Duemilanove,[b] and current Uno[c] provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solderless breadboards.

Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably. Many enhance the basic Arduino by adding output drivers, often for use in school-level education, to simplify making buggies and small robots. Others are electrically equivalent but change the form factor, sometimes retaining compatibility with shields, sometimes not. Some variants use different processors, of varying compatibility.

Figure 3.8: ARDUINO

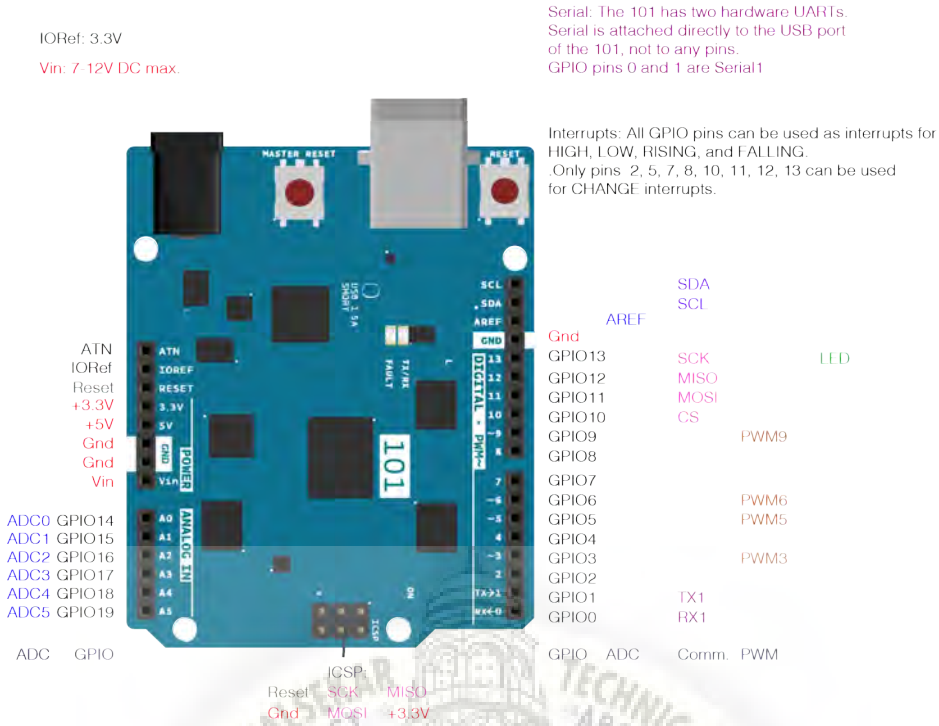

Figure 3.9: ARDUINO

DHT11 Sensor: -The DHT sensors are made of two parts, a capacitive humidity sensor and a thermistor. There is also a very basic chip inside that does some analog to digital conversion and spits out a digital signal with the temperature and humidity. The digital signal is fairly easy to read using any microcontroller.

DHT11 Digital temperature and humidity sensor is a calibrated digital output record of temperature and humidity, DHT11 The upgrade product. Application-specific digital temperature and humidity sensor module and semiconductor, ensure high reliability and excellent long-term stability. DHT11 With a single bus, and standards I2C Two kinds of communication and single bus communication mode is fully compatible with DHT11 Standard bus interface makes it simple and quick to system integration.

With super small size, low power consumption, suitable for a wide variety of applications.I2C Communication uses standard communication sequence, the user can directly I2C Communication on the bus, no additional wiring, simple to use. Two way switch, users are free to choose, easy to use, should be a broad range of areas. Products for the 4 Lead, convenient connection, provides special packages according to user needs.

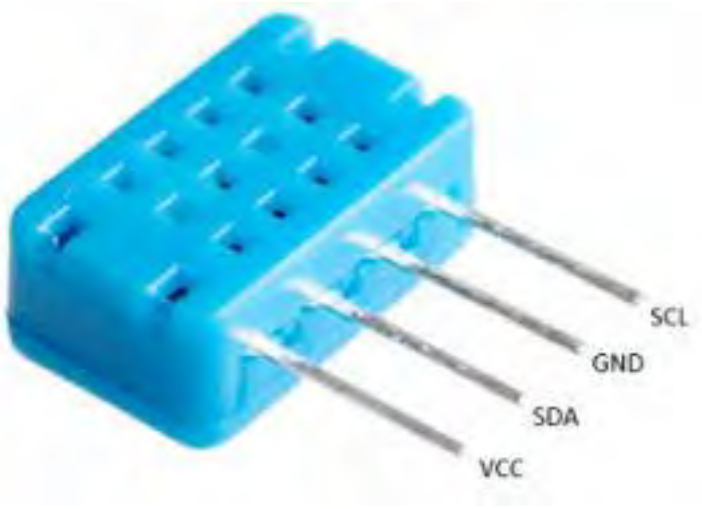

Figure 3.10: DHT11 SENSOR

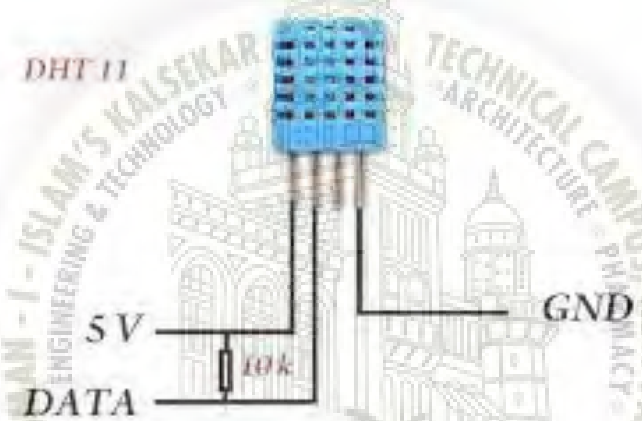

Figure 3.11: DHT11 SENSOR

Motor:- 5v motor is used for speed control and controlled via varying its rpm speed. The dc motor is just for check whether switching is done properly or not and also to check speed is change as per requirement or not. We can replace motor with other devices who has to control.DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Figure 3.12: MOTOR

BULB:- Bulb is Basically is used as an indicator to check whether the command is transmitting perfectly or Not.it is only for checking the switching. We can replace with it any device we want to control its on/off situation. light bulb is a device that produces light from electricity. In addition to lighting a dark space, they can be used to show an electronic device is on, to direct traffic, for heat, and many other purposes. Billions are in use, some even in outer space.

Early people used candles and oil lamps for light. Crude incandescent lights were made in the early and middle 19th century but had little use. Improved vacuum pumps and better materials made them shine longer and brighter late in the century. Electric power stations brought electricity to urban and later rural areas to power them. [2] Later gas discharge lights, including fluorescent lights, use less electricity to make more light.

Figure 3.13: BULB

MOTOR DRIVER:-The L298N is an integrated monolithic circuit in a 15- lead Multiwatt and PowerSO20 packages. It is a high voltage , high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the in-put signals .The emitters of the lower transistors of each bridge are connected together rand the corresponding external terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at a lower voltage.
Most of the microcontrollers operate on very low voltage (5v) and current while the motors require higher voltages and current So, the microcontrollers cannot provide them such higher current. For this purpose we use motor driver ICs. Motor driver is a little current amplifier. It takes a low current signal and gives out a high current signal which can drive a motor. It can also control the direction of motor. Motor drives are of many kind depending upon the maximum supply voltage, maximum output current, rated power dissipation, load voltage and number outputs etc. Here we are going to discuss motor driver L298N. It is used in dc motor speed control project and you can interface dc motor easy with microcontroller using this motor driver. and also in bluetooth controlled robot using pic microcontroller. you can check line follower robot for more about its applications.

Features 1) High operating voltage, which can be up to 40 volts; 2) Large output current, the instantaneous peak current can be up to 3A; 3) With 25W rated power; 4) Two built in H-bridge, high voltage, large current, full bridge driver, which can be used to drive DC motors, stepper motors, relay coils and other inductive loads. 5) Using standard logic level signal to control. 6) Able to drive a two-phase stepper motor or four-phase stepper motor, and two-phase DC motors. 7) Adopt a high-capacity filter capacitor and a freewheeling diode that protects devices in the circuit from being damaged by the reverse current of an inductive load, enhancing reliability 8) The module can utilize the built-in stabilivolt tube 78M05 to obtain 5v from the power supply. But to protect the chip of the 78M05 from damage, when the drive voltage is greater than 12v, an external 5v logic supply should be used. 9) Drive voltage: 5-35V; logic voltage: 5V 10) PCB size: 4.2 x 4.2 cm.

Figure 3.14: Motor Driver

Figure 3.15: Motor Driver pin IC

Chapter 4

MYHODOLOGY

Step 1: In order to establish connection between the client and the server, the internet option in the Smart phone is enabled
Step 2: Now the Smartphone is connected to the Amazon Web Service server.
Step 3: The Amazon Web Service Server will be connected to the Arduino Uno and read the Data Continuously without any break.
Step 4: -Each electronic/electrical appliance in the system is connected to the digital pins on the Arduino Uno Board.
Step 5: A C-program is loaded on to the microprocessor chip on the Arduino Uno Board which specifies what action is to be performed on receiving particular inputs
Step 6: A RED-NODE Application has been used which enables the end user to monitor and control the appliances from any remote location
Step 7: Socket Programming has been used to achieve client-server communication
Step 8: Successful controlling and monitoring of appliances.

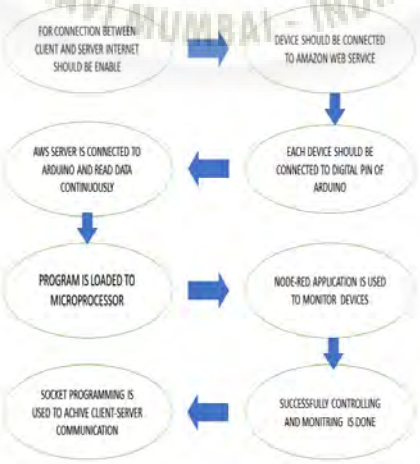

Figure 4.1: FLOWCHART

Chapter 5

RESULT

1)Step1:-after applying the power to the node mcu and relay driver,we connect with the node mcu by using wifi.

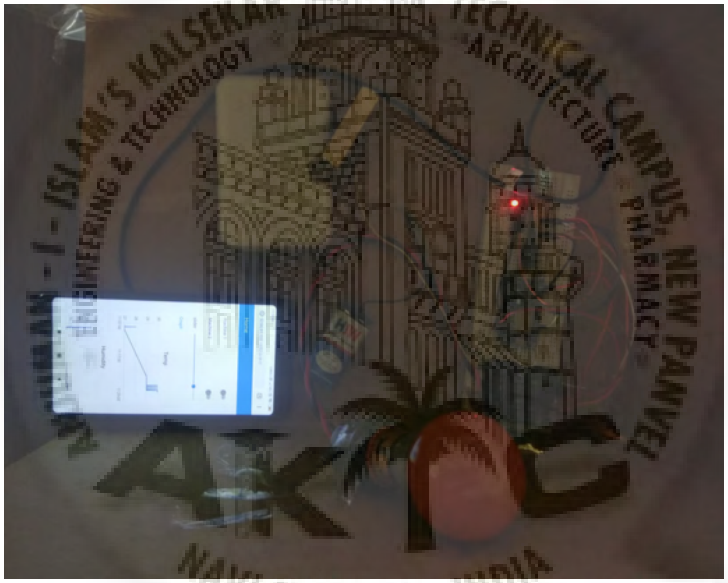

Figure 5.1: Both Switches Are Off

2)step2:-then turn on the machine 1 in Node-Red and observe the output.the light bulb will turn on.

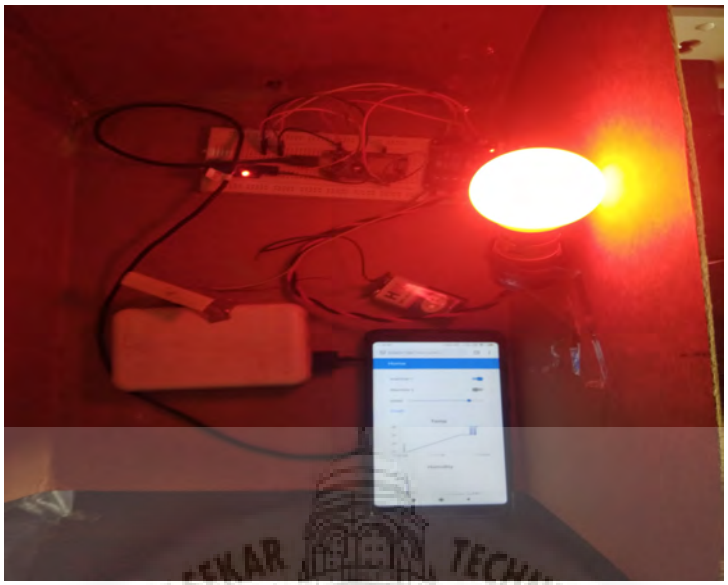

Figure 5.2: Bulb Turn On

3)Step3:Now Turn on the machine 2 on Node-Red and See the result..motor will turn on.

Figure 5.3: Motor Turn On

4)Now Observe the Temperature on the Node-Red Application.

Figure 5.4: Node-Red control

Figure 5.5: Node-Red Dashboard

Chapter 6

Conclusion

6.1 Conclusion

The project we have undertaken has helped us gain a better perspective on various aspects related to our course of study as well as practical knowledge of electronic equipments and communication. We became familiar with software analysis, designing, implementation, testing and maintenance concerned with our project. In this Critical sensor monitoring, authentication is commanding the system and wireless network are the challenges faced by the industries such as nuclear plants and power plants. The one wire protocol used for the temperature sensor helps for sensing temperature over a large area. As the user operates the system by a secret code the authorization problem has been solved. The GSM network used helps in controlling the system from a distant area. The micro controller used helps in interfacing many input/output devices at a time. These extensive capabilities of this system are what make it so interesting. From the convenience of a simple cell phone, a user is able to control and monitor virtually any electrical devices. The end product will have a simplistic design making it easy for users to interact with. This will be essential because of the wide range of technical knowledge that homeowners have.
The goal of the project was to design a system, which should be easy to implement, and short ranged. The project is implemented through on-board Wi-Fi, which is inbuilt in the mobile phones having an Android as its system.We conclude that by implementing these system we can access the live data and also control the device interfaced with our system Earlier we used to monitor the things by using RFID system where it was only used for-short distance communication. To reduce the manual overhead,the thing which we are introducing is automation of industries using internet of things which can overcome the RF-ID shorter distance problem. Using IOT in industries we can monitor and control the industrial machinery's more easily.
Nowadays we need everything computerized. Earlier we can only monitor the sit-

uations with the help of cameras. In industries to reduce manual overhead we have implemented Internet of Things (IoT) in Industry to monitor as well as to inform the responsible person to take appropriate measures, but this will partially fulfill our requirement. As sometimes it will be late in this process and it will harm to property as well as life. For this purpose we are developing a system for Industrial Automation using IoT with the help of Artificial Intelligence to make system automated which will take intelligent decisions.In this project, we have a tendency to area unit managing the commercial machine mistreatment the advanced technology below embedded systems mistreatment Arduino , we have a tendency to did management the stepper motor mistreatment GRBL library to control the motive force and if any human movement or unbroken the hand close industrial machine suddenly pair motion sensing element sight and stop or on alarm. The Industrial machine control and monitoring system has been experimentally proven to work satisfactorily by connecting sample appliances to it and the appliances were successfully controlled from a wireless mobile device. The client was successfully tested on a multitude of different mobile phones from different manufacturers, thus proving its portability and wide compatibility. Thus a low-cost Industrial machine control and monitoring system was successfully designed, implemented and tested.

6.2 Future Scope

The PSOC micro controller can be used for implementation of more complex systems for complex tasks like controlling different systems like nuclear plants and reactors in the industry. It can also be used in the system where there is a need of instrumentation, inverting and non-inverting amplifiers. The project we have undertaken can be used as a reference or as a base for realizing a scheme to be implemented in other projects of greater level such as weather forecasting,temperature updates, device synchronization, etc. The project itself can be modified to achieve a complete Home Automation System which will then create a platform for the user to interface between himself and his household.

Its the technology of today which is touching and transforming the every aspect of our real life. IOT has given a concept of Machine to-Machine (M2M) communication. Companies like Microsoft and SAP are implementing strategy to capitalize on the Internet of Things so that you can just stop your business and start making it thrive. IOT is going to have huge impact on home automation and building automation system where every convenience will be taken care of by the interconnected

devices on IOT. It is also deployed on large scale for example in Song-do , South Africa , the first of its own kind fully equipped and wired smart city is near to completion (known as Ubiquitous City). With the personal electronics good connected to Internet will enable us to author our lives. In medical science field, IOT has given a privilege to devices and system to sense for coming disease and to prevent it ,for eg: It can make a person healthier with wearable that can predict heart attack and cardiovascular strokes.

As per a report of Thesunsdaily, consumers will start initiating the usage of IoT in a better way during 2015 and on wards compared to past usage. It is expected that IoT products with inter operable capability will dominate the market. Awareness of IoT products is also vital for market penetration along with security features. Even very few Americans are aware of the usage of these products. As per a study of Consumer Electronics Association and Parks Associates found only 10 percent of the household in USA fully understood the usage of these products. Many interesting IoT products like automatic door locks, Wi-Fi connected ceiling fans, light switches,LED bulbs, smart watches,3-D printers and smart clothes will be popular among consumers.My-Brain Technology in France has developed "Melomind". This EEG Headset can measure a human's brain waves and adjust music in a Smartphone app as they change. This product can be used as a digital meditation aid. A smart baby pacifier can measure the temperature of a baby and transmit the same to the Smart-phone of parents. IoT is proved to be an emerging technological innovation.

In the current context, it is now possible that an helmet of a two wheeler can interact with a car for avoiding collision. Connected toothbrush can now monitor and make one's experience pleasurable .A three dimensional senor of the electric brush can connect with Smart-phone apps and provide real time feedback to the person .Many scopes will be created for technology companies to release offerings as per the behaviour of consumers. It may so happen that Netflix can know when a person is sad and alone by monitoring the smart watch, smart thermostat and in-home camera. Subsequently, Netflix may offer a movie to change the mood[12]. In a consumer electronics show in Los Vegas, Samsung informed that the company would invest 100 million dollar for progress of IoT. The company will also promote an open technology ecosystem for facilitating the usage of IoT.

6.3 FUTURE OF IOT

Future of the IoT: IOT is believed to change the entire way people communicate, work and live. Now there will be connectivity for everyone, everything and everywhere. It is going to have an influential impact on how the businesses and government interact with the world. According to NASSCOM, the global market size of IOT is expected to touch USD 3 trillion by 2020. In this landscape, start-ups are playing the biggest role in enabling IOT services in the consumer as well as the industrial segment. In India, there are more than 60 percent start-ups working on the lines of IOT with their highly technical and technological skills.

IOT proves to have a huge scope as it provides a unique opportunity for businesses to turn data into insights. There are a number of contributing factors as well that drive the adoption of IOT such as improved sensors, device connections, the evolution of lifestyle and mobility. These factors alone will drive the adoption of IOT in India. By 2020, Indias IOT market is expected to reach by USD 15 billion as per NASSCOMs report. To provide an improved internet experience, many companies and start-ups have emerged as big players in the IOT market. In India, nearly 120 companies and 70 percent start-ups are offering IOT enabled solutions. From 2015 till now, around 60 USD million has been invested in IOT which has given birth to a new way of working and living.

If we talk about IOT applications in an organized manner, these are broadly divided into Industrial and Consumer segments. The industrial segment covers industrial and retail automation which largely contributes to the development of smart cities. On the other hand, the consumer segment is mainly driven by personal interest and covers smart lifestyle, home, health fitness automation. Likewise, enterprises and consumers using IOT solutions will be complementing the IOT growth in our country.

The shift towards IOT will result in more improved and efficient businesses. Use of IOT enabled devices will make enterprises adopt better technology in their businesses. Several industry experts and analysts have predicted IOT as one of the essential strengths of every business sector by 2020.From Logistic industry to IT industry, IOT will have a crucial role to play in the development of these sectors. Adoption of IOT will help businesses in saving costs at greater margins. There will also be an exponential drop in the expenses of manufacturing, administration, and selling of goods. All these factors contribute to an IOT enabled supply chain. This will bring out more opportunities for retailers and wholesale giants to have simplified business operations.

Chapter 7

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Figure 7.1: Node-Red control

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