A SURVEY OF SMART HOME IOT DEVICE CLASSIFICATION USING MACHINE LEARNING BASED NETWORK TRAFFIC ANALYSIS

A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

V.S.B ENGINEERING COLLEGE

KARUR, 639111

ABSTRACT

The Internet of Things (IoT) is revolutionizing the way we interact with the world around us, and home automation is one of its most promising applications. This project aims to design an IoT-based home automation system that allows users to monitor and control various home appliances and devices remotely.

The system consists of three main components: a network of sensors and actuators, a central hub, and a user interface. The sensors and actuators are installed throughout the house and are connected to the central hub via awireless network. The hub acts as a gateway between the sensors and actuators and the user interface, which can be a mobile app or a web-based dashboard.

The user interface allows users to monitor the status of various home appliances and devices in real-time. For example, users can see if a particular light is on or off, if the air conditioner is running, or if the front door is locked. Users can also control these appliances and devices remotely, turning lights on or off, adjusting the temperature, or unlocking the front door.

The system is designed to be flexible and expandable, allowing users to add new sensors and devices as needed.

This IoT-based home automation system provides users with a convenient and efficient way to monitor and control their home appliances and devices, enhancing the comfort and security of their homes.

OBJECTIVE

The objective of this project is to design an IoT-based home automation system that allows users to monitor and control various home appliances and devices remotely. The specific objectives include:

Developing a network of sensors and actuators to monitor and control various home appliances and devices.

Creating a central hub to act as a gateway between the sensors and actuators and the user interface.

Developing a user interface, which can be a mobile app or a web-based dashboard, to allow users to monitor and control their home appliances and devices remotely.

Designing the system to be flexible and expandable, allowing users to add new sensors and devices as needed.

Ensuring the system is secure and reliable, with measures in place to protect user data and prevent unauthorized access.

Conducting testing and evaluation to ensure the system meets the required specifications and functions effectively.

Overall, the aim is to develop a home automation system that provides users with a convenient and efficient way to monitor and control their home appliances and devices, enhancing the comfort and security of their homes.

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LIST OF ABBREVIATIONS

RTOS	REAL TIME OPERATING SYSTEM
IDE	INTEGRATED DEVELOPMENT ENVIRONMENT
GSM	GLOBAL SYSTEM FOR MOBILE COMMUNICATION
SMS	SHORT MESSAGE SERVICE
HAS	HOME AUTOMATION SYSTEM
WI FI	WIRELESS FIDELITY
WSN	WIRELESS SENSOR NETWORK
GUI	GRAPHICAL USER INTERFACE
PCB	PRINTED CIRCUIT BOARD
ADC	ANALOG – TO – DIGITAL CONVERTER
LCD	LIQUID CRYSTAL DISPLAY
IOT	INTERNET OF THINGS

CHAPTER 1

INTRODUCTION

The objective of research is Home automation using IOT within integration of based energy system. Integration of sensing & actuation systems, connected to Internet, is likely to optimize energy consumption as a whole. It is expected that IoT devices will be integrated into all types of power consuming devices (switches, power outlets, bulbs, televisions, etc.) & be able to communicate within utility supply company in order to effectively balance power generation & energy usage.

Energy System that is properly installed & adequately sized would be not really require much in way of management. I designed & wrote It simulation to demonstrate basic operation of a solar energy electric power system. only for 3 things need to be considered first is level of charge on battery bank. (AmpHour Meter), Second is Amount of charging power coming in. (Solar Amps Meter), Third is Amount of power being used. (AC Amps Meter) . IoT is especially relevant to Smart Grid since It provides systems to gather & act on power- related information in an automated fashion within goal to improve efficiency, reliability, economics, & sustainability of production & distribution ofelectricity.

There are several planned or ongoing large-scale deployments of IoT, to enable best system of cities & systems. For example, Songdo, South Korea, first of its kind fully clean & wired smart city, is near completion. Ambient intelligence & autonomous control are not part of original facts of Internet of Things. In future Internet of Things might be a non-deterministic & open network in which auto-organized or intelligent entities Web services, SOAcomponents, virtual objects also known as avatars will be interoperable & able

to act independently pursuing their objectives & shared ones depending on context, circumstances or environments.

1.1 EMBEDDED COMPUTER SYSTEMS

An Embedded System is one that has computer hardware with software embedded in it as one of its important components.

An embedded computer is frequently a computer that is implemented fora particular purpose. In contrast, an average PC computer usually serves a number of purposes: checking email, surfing the internet, listening to music, word processing, etc... However, embedded systems usually only have a single task, or a very small number of related tasks that they are programmed to perform.

An embedded computer system is an electronic system, which includes a microcomputer .It is configured to perform a specific dedicated application .Software is programmed into ROM .This software is not accessible to the user of the device , and software solves only a limited range of problems .Here the microcomputer is embedded or hidden inside the system.

Each embedded micro-computer system, accepts inputs, performs calculations, and generates outputs and runs in "real time."

For Example a typical automobile now days contains an average of ten microcontrollers. In fact, modern houses may contain as many as 150 microcontrollers and on average a consumer now interacts with microcontrollers up to 300 times a day. General areas that employ embedded microcomputers encompass every field of engineering namely: Communications, automotive, military, medical, consumer, machine control etc...

1.1.1 CHARACTERISTICS OF EMBEDDED SYSTEMS

- Speed (bytes/sec)
- Power (watts)

- Size (cm3) and weight (g)
- Accuracy (% error)
- Adaptability

So,an embedded system must perform the operations at a high speed so that it can be readily used for real time applications and its power consumption must be very low and the size of the system should be as for as possible small and the readings must be accurate with minimum error .The system must be easily adaptable for different situations.

1.1.2 SOFTWARE ISSUES

The important software issues related to the embedded system are mentioned below.

- Software maintenance is extremely important.
- Verification of proper operation,
- Updates for the software in periodic intervals is very important.
- Fixing the bugs in the software improves its efficiency and also a very important factor.
- Adding features, New features must be added to the software when ever they are available
- Extending to new applications, the software must be upgraded such that its applicability increases for new application areas.
- Change user configurations .This is an important factor to improve the popularity of the software.

1.1.3 COMPONENTS OF EMBEDDED SYSTEM

- It has HardwareProcessor, Timers, Interrupt controller, I/O Devices, Memories, Ports, etc.
- It has Real Time Operating System (RTOS)

RTOS defines the way the system work. Which supervise the application software. It sets the rules during the execution of the application program. A small scale embedded system may not need an RTOS

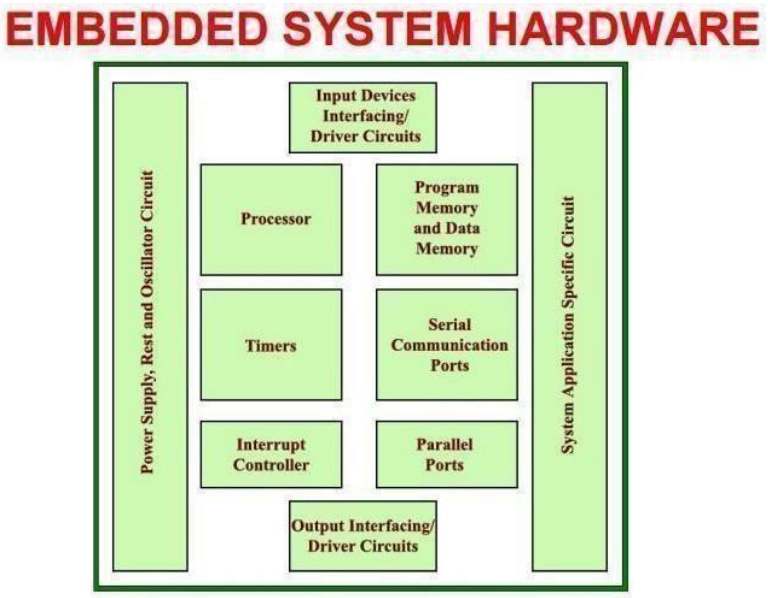


Figure 1.1.3.1 Embedded System Hardware

1.1.4 CLASSIFICATION OF EMBEDDED SYSTEMS

Embedded systems are classified into three:

- Small Scale Embedded Systems
- Medium Scale Embedded Systems
- Sophisticated Embedded Systems

1.1.5 Small Scale Embedded Systems

Small scale embedded systems are designed with a single 8 or 16-bit microcontroller which may even be operated with a battery. For developing embedded software for these types of systems, an editor, assembler, (IDE) integrated development environment, and cross assembler are the main programming tools.

1.1.6 Medium Scale Embedded Systems:

Medium scale embedded systems are designed with a single or few 16 or 32 bit microcontrollers, DSPs or RISCs. These systems have both hardware and software complexities. When developing embedded software for these types of systems, the following programming tools are available. They are C, C++, Visual C++, Java, and RTOS, source code engineering tool, debugger, simulatorand integrated development environment.

1.1.7 Sophisticated Embedded Systems

Sophisticated embedded systems have huge hardware and software complexities and may need PLAs, IPs, ASIPs, scalable processors orconfigurable processors. They are used for cutting-edge applications that need hardware and software co-design & components which have to combine in the final system.

1.1.8 APPLICATIONS

Embedded Systems in Automobiles

- Motor Control System
- Cruise Control System
- Engine or Body Safety
- Robotics in Assembly Line
- Car Entertainment
- Car multimedia
- Mobile and E-Com Access

1.1.9 Embedded systems in Telecommunications

- Mobile computing
- Networking
- Wireless Communications

1.1.10 Embedded Systems in Smart

- Cards Banking
- Telephone Security Systems

1.1.11 Embedded Systems in Missiles and Satellites

- Defense
- Aerospace
- Communication

1.1.12 Embedded Systems in Computer Networking & Peripherals

- Networking Systems
- Image Processing
- Printers
- Networks Cards
- Monitors and Displays

1.1.13 Embedded Systems in Digital Consumer Electronics

- DVDs
- Set top Boxes
- High Definition TVs
- Digital Cameras

The conventional friction brake system is composed of the following basic components: the “master cylinder” which is located under the hood is directly connected to the brake pedal, and converts the drivers’ foot pressure intohydraulic pressure. Steel “brake hoses” connect the master cylinder to the “slavecylinders” located at each wheel. Brake fluid, specially designed to work in extreme temperature conditions, fills the system. “Shoes” or “pads” arepushed bythe slave cylinders to contact the “drums” or “rotors,” thus causing drag, which slows the car. Two major kinds of friction brakes are disc brakes

and drum brakes. Disc brakes use a clamping action to produce friction between the “rotor” and the “pads” mounted in the “caliper” attached to the suspension members. Disc brakes work using the same basic principle as the brakes on a bicycle: as the caliper pinches the wheel with pads on both sides, it slows the vehicle. Drum brakes consist of a heavy flat-topped cylinder, which is sandwiched between the wheel rim and the wheel hub.

The inside surface of the drum is acted upon by the linings of the brake shoes. When the brakes are applied, the brake shoes are forced into contact with the inside surface of the brake drum to slow the rotation of the wheels (Limpert1992). Air brakes use standard hydraulic brake system components su ch as braking lines, wheel cylinders and a slave cylinder similar to a master cylinderto transmit the air-pressure-produced braking energy to the wheel brakes. Air brakes are used frequently when greater braking capacity is required. All the above mentioned convectional brakes have two chief problems one is the wear and tear and other is unnecessary excessive temperature in the service is attained.Excessive heating of brakes can result in fade .it causes temporary changes in thefriction as they get hotter. Normally efficiency is regained when they cool again Brake pads and linings also wear away faster at higher temperatures.

CHAPTER 2

LITERATURE SURVEY

This paper describes the design and development of a system for household appliance control using cell phone through global system for mobile communication (GSM) technology. The cellular communications is a potential solution for such remote controlling activities. SMS (short message service) technology can be used to control household appliances from distance. Remotely, the system allows the home owner to monitor and control the home appliances viamobile phone set by sending commands in the form of SMS messages and receiving the appliances status as well. The proposed system makes use of wireless control hence can be effectively used in systems were unwired connections are desired. The system uses the user's mobile handset for control and therefore the system is moreadaptable and cost-effective and also providing ubiquitous access for appliance control.[1]

This paper is about the application of data acquisition systems in industrial requirements for real time execution of events with industrial process control and automation. Multiple embedded nodes are measuring various industri alparameters to monitor and control industrial process. Data acquired from each nodeis processed, displayed and sent to master processor (CPLD XC9572) that compiledata received from different nodes and send this information to remote location using GSM technology and simultaneously display the variations in quantity undermeasurement to local and remote systemconfigured with Lab VIEW platform. In addition, the master processor process this information and generates controls signals based on predefined cases or can receive the controlling action from remote controller to control the industrial application like CNC machines, Electric drives etc. The paper adds the value towards the low cost, less manufacturing time, ease of implementation with reliable measuring, controlling and data logging demands of industry.[2]

This paper presents the development of GSM-based control home

appliances for smart home system. The main aim of the prototype development is to reduce electricity wastage. GSM module was used for receiving short message service (SMS) from user's mobile phone that automatically enable the controller to take any further action such as to switch ON and OFF the home appliances such as light, air-conditioner etc. The system was integrated with microcontroller and GSM network interface using assembly language. MPLAB software was utilized to accomplish the integration. The system is activated when user sends the SMS to controller at home. Upon receiving the SMS command, the microcontroller unit then automatically controls the electrical home appliances by switching ON or OFF the device according to the user order. In other word, it read message from the mobile phone and response to control the devices according to the received message. The prototype has been successfully developed and it could provide an effective mechanism in utilizing the energy source efficiently.[3]

This article describes a project in which an electrical circuit is designed by which an user can turn on/off any electrical appliances i.e. fans, lights and can lock/unlock windows, doors etc. of his/her house or officethrough sending SMS using a custom built android application to a specific phone number connected to the microcontroller. In this system an androidapplication is used to send instruction through SMS. At the receiving end, a GSM module receives the SMS and sends the particular hexadecimal codes to a microcontroller. Then the microcontroller reads the code and sends the signals to relays for performing actions according to the specified logic. For designing the system Proteus, a virtual system modelling and circuit simulationapplication, was used as simulation software. The code for micro controller was written in mikroC PRO and burnt with PICkit 2 softwares. This system ensures smart safeguarding as well as efficient use of energy for its user's office and living place.[4]

The more the technology advances into the future, the more it makes the life of people depending on it easier and one of such technologies is Automation. The term Automation can be coupled with- no effort, ease of performing a task and

less human involvement. Internet of Things is such other term which envisions every object around us as an integral part of the Internet.In this paper, we suggest a highly intractable and environmentally sustainable form of Home Automation System using Internet of Things a means to control the appliances at home via a device with access to the Internet. The key components of this system are a pocket sized microprocessor- Raspberry Pi and a microcontroller- Arduino Uno and an Android application to visualize the dataprovided by the Raspberry Pi and also to send, receive and process the requests. The Raspberry Pi acts as the brain of this system, processing the requests, responding to the requests made by the Android application, communicating with the Arduino and also acts as a server to store the data given by the sensors. All the sensors and actuators are connected to the Arduino which is connectedto the Pi using a USB cable.[5]

Availability 01' high speed mobile networks like 3G and Long Term Evolution (LTE) coupled with cheaper and accessible smart phones, mobile industry has seen a tremendous growth in terms of providing various services and applications at the finger tips of the citizens. Internet of Things (lot) is one of the promising technologies which can be used for connecting, controlling andmanaging intelligent objects which are connected to Internet through an IP address. Applications ranging from smart governance, smart education, and smart agriculture, and smart health care, smart hornesetc can use lot tor effective deliveryof services without manual intervention in a more effective manner. This paper discusses about lot and how it can be used for realizing smart Horne automation using a micro-controller based Arduino board and Android mobile app. In this paper, two prototypes namely Horne automation using Bluetooth in an indoor environment and Horne automation using Ethernet in an outdoor environment are presented.[6]

In this era of digitization and automation, the life of human beings is getting simpler as almost everything is automatic, replacing the old manual systems.

Nowadays humans have made internet an integral part of their everyday life without which they are helpless. Internet of things (iot) provides a platform that allows devices to connect, sensed and controlled remotely across a network infrastructure. In this paper we focus on home automation using smart phone and computer. The iot devices controls and monitors the electronic electrical and the mechanical systems used in various types of buildings. The devices connected to the cloud server are controlled by a single admin which facilitate a number of usersto which a number of sensor and control nodes are connected. The admin can access and control all the nodes connected to each user but a single user can control only the nodes to which the user itself is connected. This whole system using Internet ofThings (iot) will allow mobile devices and computers to remotely control all the functions and features of home appliances from anywhere around the world using the internet connection.The system designed is economical and can be expanded asit allows connectionand controlling of a number of different devices.[7]

With the rapid increase in usage and reliance on the vivid features of smart devices, the need for interconnecting them is genuine. Many existing systemshave ventured into the sphere of Home Automation but have apparentlyfailed to provide cost-effective solutions for the same. This paper illustrates a methodologyto provide a low cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi).This crystallizes the concept of internetworking of smart devices. A Wi-Fibased Wireless Sensor Network(WSN) is designed for the purpose of monitoring and controlling environmental, safety and electrical parameters of a smart interconnected home. The user can exercise seamless control over the devices in a smart home via the Android application based Graphical User Interface (GUI) on asmartphone. The overall cost of large scale implementation of this system is aboutINR 6000 or USD 10.[8]

Internet of Things offers user interoperability and connectivity between devices, systems, services, networks and in particularly control systems.

IoT involves enhancing network to proficiently collect and analyze the data from various sensors and actuators then sends the data to the mobile phone or a personal computer over a wireless connection. Building IoT has progressed essenti ally in the last couple of years since it has created a new era in the world of information and communication technologies. Security is becoming an important issue nowadays as the possibilities of intrusion are increasing day by day. Safety from intrusion, theft, fire and leakage of flammable gas are the most important requirements of home security system for the people. The aim of this work is to provide security and surveillance to home through internet. In this work, the proposed system is designed using ARM-11 architecture and LinuxOS based Raspberry Pi-3 board, USB camera and DC motor. The DC motor is interfaced with Raspberry Pi-3 boardvia driving circuit (L293D) to control the door while the camera is connected to theUSB port of Raspberry Pi-3 board. A webpage is provided to the end user with username and password in order to allow the entry of only authorized users.[9]

This paper presents the overall design of Home Automation System (HAS)with low cost and wireless remote control. This system is designed to assist and providesupport in order to fulfill the needs of elderly and disabled in home. Also, the smart homeconcept in the system improves the standard living at home. The main control system implements wireless Bluetooth technology to provide remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status issynchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devicesin house with relatively low cost design, user-friendly interface and ease of installation.[10]

CHAPTER 3

SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

In existing system zigbee based home automation has implemented. It used only for short rang range of applications there is a loss of power. If there iswastage of energy in the form of running devices in the industry, it results in huge loss of power and thereby contributing to the economical fall. When the machine goes abnormal condition, it indicated to the user via buzzer. Mainly, the automatic detection of cautious environment in the industry is quite less in the existing system.

Some of the disadvantages of existing systems are Power wastages are more, Man power is needed, Tendency for accidents to occur. The main disadvantage in the existing system is the man power accidental conditions through which various load losses are evolved. The regular switching characteristics of the loads are further mishandled due to human error.

DISADVANTAGE

- Loss of power
- Covers Short distance

3.2 PROPOSED SYSTEM

The proposed system for IoT-based home automation monitoring and controlling for various loads consists of the following components:

Sensors and Actuators: A network of sensors and actuators will be installed throughout the house to monitor and control various home appliances and devices. The sensors will collect data on the status of appliances such as lights,

fans, air conditioners, and doors, while the actuators will allow users to control these appliances remotely.

Central Hub: The central hub will act as a gateway between the sensors and actuators and the user interface. It will receive data from the sensors and send commands to the actuators, allowing users to control their home appliances and devices remotely.

User Interface: The user interface will be a mobile app or a web-based dashboard that allows users to monitor and control their home appliances and devices remotely. It will display real-time data on the status of various appliances, and users can control these appliances remotely.

Cloud Platform: The system will be hosted on a cloud platform, providing users with easy access to their data and ensuring the system is secure and reliable. The cloud platform will also allow users to access the system from anywhere, atany time.

Machine Learning: Machine learning algorithms will be used to learn user preferences and optimize the system's performance.

Security Measures: The system will be designed to be secure and reliable, with measures in place to protect user data and prevent unauthorized access. For example, the system can use encryption to protect user data, and users can authenticate themselves using a password or biometric authentication.

The proposed system will provide users with a convenient and efficient way to monitor and control their home appliances and devices, enhancing the comfort and security of their homes.

3.3 BLOCK DIAGRAM

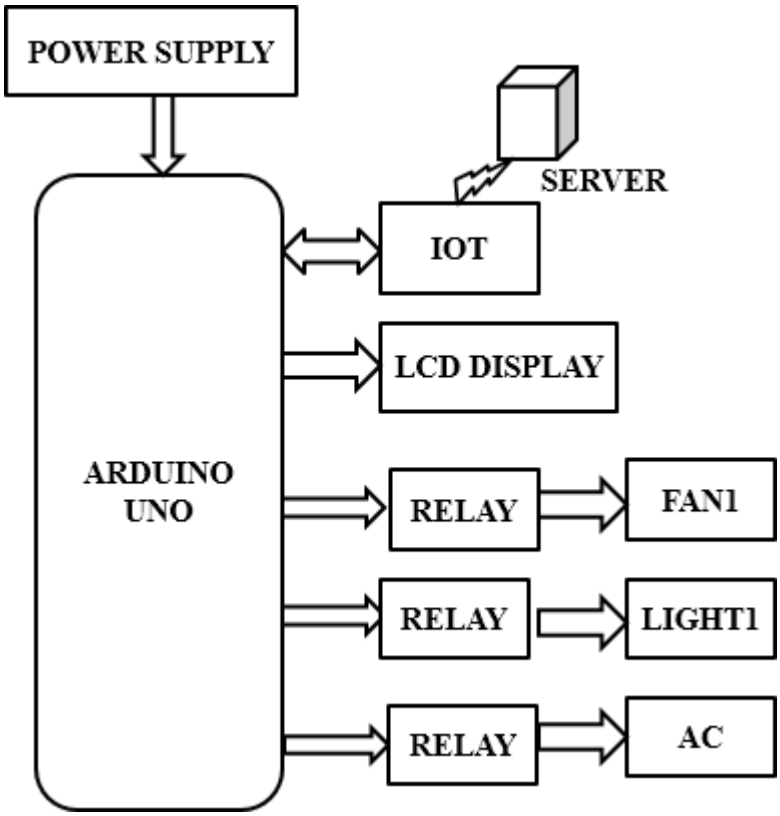


Figure 3.3.1 Block Diagram

EXPLANATION

In this system, owner directly monitoring through their mobile phone using IOT (Internet of Things) and automatically control fan and light. If any person is there in home, fan and light will be automatically ON. If no person is there in home, fan and light will be off.The Arduino controller will control the load depending on the input given by the user. The ac home load such as fan and light will be controlled with the help of IOT website. The command for the system is given by IOT website. All the parameters will be displayed through LCD Display.

3.4 CIRCUIT DIAGRAM

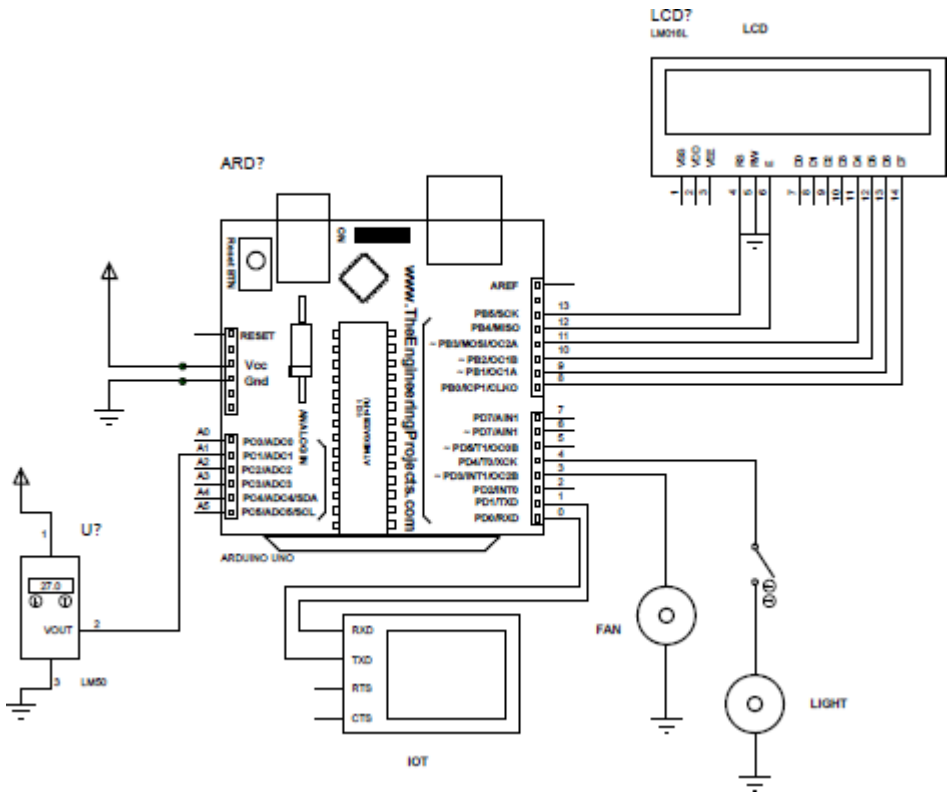


Figure 3.4.1 Circuit Diagram

ADVANTAGES

- Low cost
- User friendly
- Easy to install and use
- Fast response
- Uses renewable energy.

APPLICATION

- It can be used for many applications such as,
  - Home
  - Office and Conference Hall

CHAPTER-4

SOFTWARE REQUIREMENTS

4.1 ARDUINO IDE

Arduino IDE (Integrated Development Environment) is a software platform used for writing, compiling, and uploading code to Arduino boards. It is an open-source platform that supports a wide range of microcontrollers, making it a popular choice for hobbyists, makers, and engineers.

Arduino IDE provides a simple and intuitive interface for programming Arduino boards. It includes a text editor for writing code, a message console for debugging, and a toolbar with commonly used functions. The IDE also provides a library of pre-written code and examples to help users get started quickly.

One of the key features of Arduino IDE is its ability to compile and upload code to Arduino boards using a USB cable. This allows users to easily test and debug their code on a physical device. Additionally, Arduino IDE supports a variety of communication protocols, such as I2C, SPI, and serial, allowing users to interface with a wide range of sensors and devices.

In summary, Arduino IDE is a powerful tool for programming Arduino boards. Its user-friendly interface, library of pre-written code, and support for various communication protocols make it a popular choice for hobbyists and professionals alike.

In the IoT-based home automation system, Arduino IDE can be used to write and upload the code to the Arduino board, which acts as a central hub for the system. The Arduino board is responsible for collecting data from sensors and controlling the various home appliances and devices through actuators.Arduino IDE provides a simple and user-friendly interface for writing code for Arduino boards. It supports a wide range of sensors and actuators, which makes

it suitable for the IoT-based home automation system. The IDE includes libraries that allow developers to interface with various sensors and actuators easily.

The code written in Arduino IDE can be uploaded to the Arduino board through a USB cable, allowing users to test and debug their code on a physical device. The IDE also includes a serial monitor that displays data from the Arduino boa rd, which is useful for debugging and troubleshooting.

Arduino IDE plays a crucial role in the IoT-based home automation system, allowing developers to write and upload the code to the Arduino board, which acts as a central hub for the system. The simple interface and support for various sensors and actuators make it an ideal choice for the home automation system.

4.2 PROTEUS

Proteus is a software tool used for simulation and design of electronic circuits. It is widely used by electronics engineers, hobbyists, and students for circuit design and testing before actual hardware implementation.

Proteus consists of two main components: ISIS and ARES. ISIS is a schematic capture tool that allows users to create and simulate electronic circuits. ARES is a PCB design tool that enables users to create a layout of the circuit board and design the printed circuit board (PCB).

Proteus also includes a wide range of components such as resistors, capacitors, inductors, diodes, transistors, and microcontrollers that can be used in circuit design. Additionally, Proteus supports various microcontroller families such as PIC, AVR, ARM, and 8051, making it a popular choice for microcontroller-based project.

One of the key features of Proteus is its ability to simulate circuits in real-time. This allows users to test and debug their circuits before actual hardware implementation, saving time and reducing the risk of errors

Proteus also supports co-simulation with other software tools such as MATLAB, allowing users to simulate and analyze complex systems that involve both electronics and control systems.

In summary, Proteus is a powerful software tool for circuit design and simulation. Its user-friendly interface, extensive library of components, and real-time simulation capabilities make it an essential tool for electronics engineers, hobbyists, and students.

Proteus can be used for the design and simulation of the IoT-based home automation monitoring and controlling system for various loads. It can be used to create and test electronic circuits that will be used to interface with sensors and actuators, control home appliances and devices, and collect data from sensors.

Proteus allows users to simulate the behavior of electronic circuits in real-time and test the functionality of the IoT-based home automation system before implementing it in the real world. By using Proteus, developers can identify and fix any issues or bugs in the system before actual hardware implementation, saving time and reducing costs.

Additionally, Proteus supports a wide range of microcontroller families such as PIC, AVR, ARM, and 8051, making it suitable for designing and testing the code for the Arduino board, which acts as a central hub for the IoT-based home automation system.

In summary, Proteus plays a crucial role in the IoT-based home automation monitoring and controlling system, allowing developers to design and simulate the electronic circuits that will be used to control and monitor various home appliances and devices. It helps in identifying and fixing issues and bugs in the system, reducing costs and ensuring the functionality of the system before actual hardware implementation.

The working process of Proteus in the IoT-based home automation monitoring and controlling system involves the following steps:

Circuit Design: The first step is to design the circuit that will interface with sensors and actuators, control home appliances and devices, and collect data from sensors. Proteus provides a user-friendly interface to design and simulate electronic circuits using its extensive library of components.

Microcontroller Programming: After designing the circuit, the microcontroller code needs to be programmed. Proteus supports a wide range of microcontroller families such as PIC, AVR, ARM, and 8051. The code can be written in the Arduino IDE and then simulated in Proteus to check its functionality.

Simulation: Proteus allows the simulation of the electronic circuit and microcontroller code in real-time. The simulation helps to identify any issues or bugs in the system before actual hardware implementation.

Testing: Once the simulation is complete, the IoT-based home automation monitoring and controlling system can be tested. This involves connecting the circuit to the actual hardware components and testing its functionality.

Debugging: If any issues or bugs are identified during testing, the circuit and code need to be debugged. Proteus provides a range of debugging tools to help locate and fix any issues.

Final Implementation: Once the circuit and code have been tested and debugged, the final step is to implement the IoT-based home automation monitoring and controlling system in the real world.

In summary, Proteus plays a crucial role in the design and testing of the IoT-based home automation monitoring and controlling system. It allows the simulation of electronic circuits and microcontroller code in real-time, helping developers to identify and fix any issues before actual hardware implementation. Proteus provides a user-friendly interface, extensive library of components, and

debugging tools, making it an essential tool for electronics engineers, hobbyists, and students.

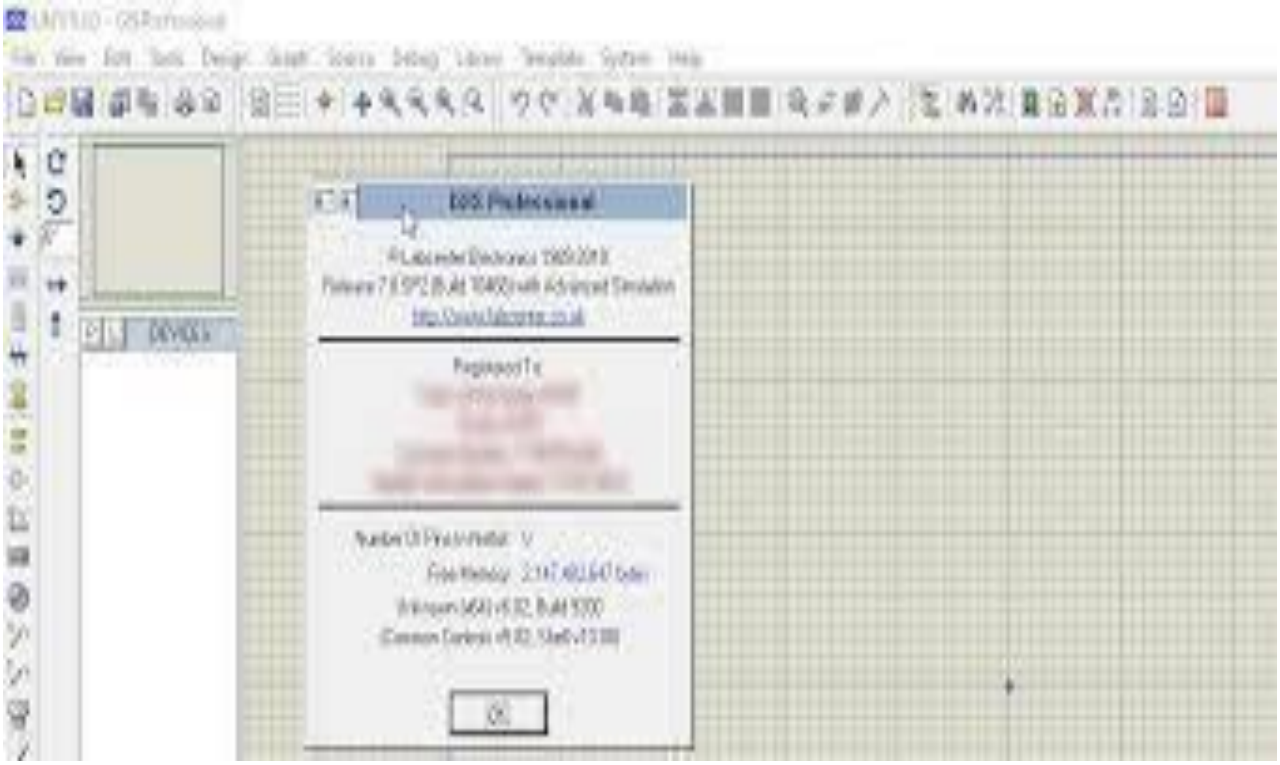


Figure 4.2.1 Proteus

CHAPTER 5

HARDWARE DESCRIPTION

5.1 POWER SUPPLY CIRCUIT:

A power supply is a device that converts input voltage from a power source into the appropriate voltage, current, and frequency needed to power electronic devices. In the context of the IoT-based home automation monitoring and controlling system, a power supply is necessary to provide power to the various components of the system, including the microcontroller, sensors, and actuators.

The power supply for the IoT-based home automation monitoring and controlling system can be either an AC-DC or DC-DC converter. An AC-DC converter converts the input voltage from an AC power source to a regulated DC voltage, while a DC-DC converter converts one DC voltage level to another. The choice of the power supply depends on the specific requirements of the system.

In addition to providing the correct voltage and current, the power supply must also be capable of supplying sufficient power to the system. The power requirements of the IoT-based home automation monitoring and controlling system depend on the number and types of components used, as well as the power consumption of each component.

It is essential to select a power supply that meets the safety standards and regulations of the region where the IoT-based home automation monitoring and controlling system will be used. It is also important to ensure that the power supply is reliable and can withstand any power surges or fluctuations.

In summary, a power supply is necessary for the IoT-based home automation monitoring and controlling system to provide power to the various components of the system. The choice of the power supply depends on the specific requirements of the system, and it must meet safety standards and regulation

In the context of the IoT-based home automation monitoring and controlling system, the power supply serves the purpose of providing power to the various components of the system. The system includes microcontrollers, sensors, actuators, and other electronic devices that require power to operate.

The power supply must provide the correct voltage and current needed to power each component of the system. This voltage and current requirement may vary depending on the specific component, and the power supply must be capable of providing a stable output with minimal noise or fluctuations.

The power supply also plays a critical role in ensuring the safety and reliability of the IoT-based home automation monitoring and controlling system. It must meet safety standards and regulations and be able to withstand any power surges or fluctuations that may occur.

In summary, the power supply is an essential component of the IoT-based home automation monitoring and controlling system. It serves the purpose of providing power to the various components of the system while ensuring safety and reliability. The power supply must be carefully selected based on the specific requirements of the system and must be able to provide a stable output with minimal noise or fluctuations.

The power supply is an essential component of the IoT-based home automation monitoring and controlling system. The working process of the power supply in this system involves converting the input voltage from the power source into the appropriate voltage, current, and frequency needed to power the various components of the system.

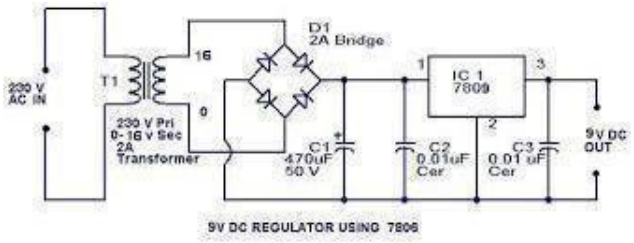
The power supply must provide a stable output with minimal noise or fluctuations to ensure the proper functioning of the components. The power requirements of the system depend on the number and types of components used and their power consumption.

For example, the microcontroller requires a stable voltage supply, typically 5V or 3.3V. The sensors and actuators may have different voltage requirements and current ratings, and the power supply must be capable of providing the required voltage and current levels.

The power supply for the IoT-based home automation monitoring and controlling system can be either an AC-DC or DC-DC converter. An AC-DC converter converts the input voltage from an AC power source to a regulated DC voltage, while a DC-DC converter converts one DC voltage level to another. The choice of the power supply depends on the specific requirements of the system.

In addition to providing the correct voltage and current, the power supply must be reliable and capable of supplying sufficient power to the system. The power supply must also meet safety standards and regulations of the region where the IoT-based home automation monitoring and controlling system will be used.

In summary, the working process of the power supply in the IoT-based home automation monitoring and controlling system involves converting the input voltage into the appropriate voltage, current, and frequency to power the various components of the system. The power supply must provide a stable output with minimal noise or fluctuations, be reliable, and meet safety standards and regulations. The choice of the power supply depends on the specificrequirements of the system, including the number and types of components usedand their power consumption.



9V DC REGULATOR USING 7806

5.2 ARDUINO UNO

Arduino Uno is an open-source microcontroller board based on the ATmega328P microcontroller. It is a widely used board for prototyping and DIY electronics projects due to its ease of use, low cost, and large community support.

The Arduino Uno board consists of a microcontroller, a USB interface for programming and communication, digital input/output pins, analog input pins, and power pins. The board can be powered through a USB cable or an external power supply.

The microcontroller on the Arduino Uno board is programmed using the Arduino Integrated Development Environment (IDE). The IDE provides aneasy-to-use platform for writing, compiling, and uploading code to the board. The programming language used is based on Wiring, a simplified version of C++.

The digital input/output pins on the Arduino Uno board can be used to control LEDs, motors, and other digital components. The analog input pins can be used to read signals from sensors and other analog components. The power pins provide a regulated voltage of 5V and an unregulated voltage between 7V and 12V.

The Arduino Uno board also has a variety of shields that can be attached to expand its capabilities. Shields are boards that plug into the Arduino Uno board and provide additional functionality, such as WiFi connectivity, motor control, or data logging.

In summary, the Arduino Uno board is an open-source microcontroller board that is widely used for prototyping and DIY electronics projects. It consists of a microcontroller, USB interface, digital and analog input/output pins, and power pins. It is programmed using the Arduino IDE and can be expanded using shields to provide additional functionality.

The Arduino Uno is a crucial component of the IoT-based home automation monitoring and controlling system. It serves as the main microcontroller that controls and communicates with various sensors, actuators, and other components of the system.

The Arduino Uno provides an easy-to-use platform for writing and uploading code to the system. Its digital input/output pins can be used to control and monitor various components of the system, such as lights, fans, sensors. The analog input pins can be used to read analog signals from sensors, such as light sensors, gas sensors, and humidity sensors.

The Arduino Uno can also be used to communicate with other components of the system, such as the Wi-Fi module, through its serial interface or other communication protocols, such as SPI or I2C.

In summary, the Arduino Uno is used in the IoT-based home automation monitoring and controlling system to provide control and communication between various components of the system. It is programmed to monitor and control different loads, communicate with other components of the system, and collect data fromsensors.

The working process of the IoT-based home automation monitoring and controlling system using Arduino Uno involves the following steps:

Data collection: The Arduino Uno board reads the analog signals from the sensors and converts them into digital signals using its analog-to-digital converter (ADC). The digital signals are then stored in the microcontroller's memory.

Data processing: The microcontroller on the Arduino Uno board processes the data collected from the sensors and makes decisions based on the programmed logic.

Control: The microcontroller sends signals to the actuators, such as relays, motors, or LED lights, to control the various loads in the home. For example, if the microcontroller detects that the lights in a room are turned off, it may turn themon automatically.

Communication: The Arduino Uno board may communicate with other components of the system, such as a Wi-Fi module or a smartphone application, to allow the user to control and monitor the system remotely. The communication may be done using serial communication or other communication protocols, such as SPI or I2C.

Power supply: The Arduino Uno board may be powered by a USB cable or an external power supply. The power supply should provide a stable and regulated voltage to ensure reliable operation of the system.

In summary, the Arduino Uno board is used in the IoT-based home automation monitoring and controlling system to sense, collect, process, and control data from various sensors and loads in the home. It may also communicate with other components of the system and require a reliable power supply.

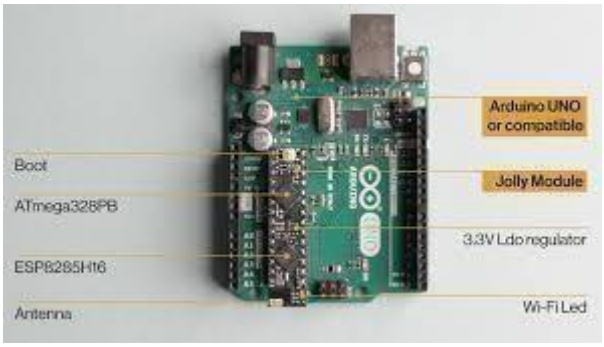


Figure 5.2.1 Arduino UNO Board

5.3 FAN

Figure 5.3.1 Fan

A fan is a device that utilizes the mechanical energy of a rotating impeller to produce both movement of the air and an increase in its total pressure. The great majority of fans used in mining are driven by electric motors, although internal combustion engines may be employed, particularly as a standby on surface fans. Compressed air or water turbines may be used to drive small fans in abnormally gassy or hot conditions, or where an electrical power supply is unavailable. In mine fans were classified in terms of their location, main fans handling all of the air passing through the system, booster fans assisting the through-flow of air in discrete areas of the mine and auxiliary fans to overcome the resistance of ducts in blind headings. Fans may also be classified into two major types with reference to their mechanical design.

A centrifugal fan resembles a paddle wheel. Air enters near the centre of the wheel, turns through a right angle and moves radially outward by centrifugal action between the blades of the rotating impeller. Those blades may be straight or curved either backwards or forwards with respect to the direction of rotation. Each of these designs produces a distinctive performance characteristic. Inlet and/or outlet guide vanes may be fitted to vary the performance of a centrifugal fan. An axial fan relies on the same principle as an aircraft propeller, although usually with many more blades for mine applications.

Air passes through the fan along flow paths that are essentially aligned with the axis of rotation of the impeller and without changing their macro-direction.

However, later in the chapter we shall see that significant vortex action may be imparted to the air. The particular characteristics of an axial fan depend largely on the aerodynamic design and number of the impeller blades together with the angle they present to the approaching airstream. Some designsof axial impellers allow the angle of the blades to be adjusted either while stationary or in motion.

This enables a single speed axial fan to be capable of a wide range of duties. Axial fan impellers rotate at a higher blade tip speed than a centrifugal fan of similar performance and, hence, tend to be noisier. They also suffer froma pronounced stall characteristic at high resistance. However, they are more compact, can easily be combined into series and parallel configurations and can produce reversal of the airflow by changing the direction of impeller rotation, although at greatly reduced performance. Both types of fan are used as main fans for mine ventilation systems while the axial type is favoured for underground locations.

5.4 RELAY

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. It was invented by Joseph Henry in 1835. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense,a form of an electrical amplifier.

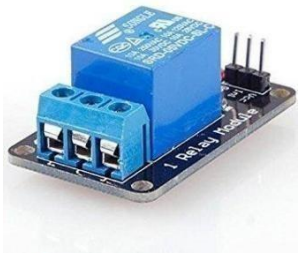


Figure 5.4.1 Relay

BASIC OPERATION:

A simple electromagnetic relay, such as the one taken from a car in the first picture, is an adaptation of an electromagnet. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a moveable iron armature, and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts.

It is held in place by a spring so that when the relay is de-energized there is an air gap in the magnetic circuit. In this condition, one of the two sets of contacts in the relay pictured is closed, and the other set is open. Other relays may have more or fewer sets of contacts depending on their function. The relay in the picture also has a wire connecting the armature to the yoke. This ensures continuity of the circuit between the moving contacts on the armature, and the circuit track on the Printed Circuit Board (PCB) via the yoke, which is soldered to the PCB.

When an electric current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact. If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open.

When the current to the coil is switched off, the armature is returned by a force, approximately half as strong as the magnetic force, to its relaxed position. Usually this force is provided by a spring, but gravity is also used commonly in industrial motor starters. Most relays are manufactured to operate quickly. In a low voltage application, this is to reduce noise. In a high voltage or high current application, this is to reduce arcing.

If the coil is energized with DC, a diode is frequently installed across the coil, to dissipate the energy from the collapsing magnetic field at deactivation, which would otherwise generate a voltage spike dangerous to circuit components. Some automotive relays already include that diode inside the relay case. Alternatively a contact protection network, consisting of a capacitor and resistor in series, may absorb the surge. If the coil is designed to be energized with AC, a small copper ring can be crimped to the end of the solenoid. This "shading ring" creates a small out-of-phase current, which increases the minimum pull on the armature during the AC cycle.

By analogy with the functions of the original electromagnetic device, a solid-state relay is made with a thyristor or other solid-state switching device. To achieve electrical isolation an opto-coupler can be used which is a light- emitting diode (LED) coupled with a photo transistor.

5.5 NODE MCU

NodeMCU is an open-source firmware and development board that is based on the ESP8266 Wi-Fi chip. It is used as a component in IoT-based systems, including home automation monitoring and controlling systems, to provide wireless connectivity and communication with other devices over Wi-Fi.

The NodeMCU board is programmed using the Lua scripting language or Arduino IDE, and it comes with built-in support for Wi-Fi connectivity, which

enables it to connect to a Wi-Fi network and communicate with other devices over the network. It also comes with a range of digital input/output pins that can be used to control and monitor various components of the system, such as sensors and actuators.

In an IoT-based home automation monitoring and controlling system, the NodeMCU board can be used to connect to the internet, collect data from various sensors, and control various loads in the home.

The NodeMCU board can also be used to communicate with other devices in the system, such as a smartphone application or a cloud server, to enable remote monitoring and control of the system. For example, a user can use a smartphone application to turn on the lights in a room, even when they are not at home.

In summary, the NodeMCU board is used in IoT-based home automation monitoring and controlling systems to provide Wi-Fi connectivity, collect data from sensors, control loads, and communicate with other devices in the system.

The NodeMCU board is an important component in an IoT-based home automation monitoring and controlling system because it provides wireless connectivity and communication with other devices over Wi-Fi. Its ability to connect to the internet, collect data from various sensors, and control various loads in the home makes it an ideal platform for developing home automation systems.

Using the NodeMCU board, various loads in the home such as lights, fans, air conditioning units, and other appliances can be controlled remotely through a smartphone application or a cloud server.

In summary, the NodeMCU board is used in IoT-based home automation monitoring and controlling systems to provide wireless connectivity, collect

data from sensors, control loads, and communicate with other devices in the system, ultimately making the home more efficient and convenient.

Figure 5.5.1 NodeMCU

The working process of an IoT-based home automation monitoring and controlling system using NodeMCU involves several steps, as described below:

Sensor Data Collection: The NodeMCU board is programmed to collect data from various sensors such as humidity sensors, motion sensors, and others installed in the home.

Data Processing and Decision Making: The collected sensor data is processed by the NodeMCU board, which then makes decisions based on predefined rules.

Load Control: The NodeMCU board is used to control various loads in the home such as lights, fans, and appliances. The board can send commands to switch on or off a load, or to adjust its intensity or speed.

Communication with Other Devices: The NodeMCU board can communicate with other devices in the system such as a smartphone application or a cloud server to enable remote monitoring and control of the system.

User Feedback: The NodeMCU board can provide feedback to the user through various means such as LEDs or a display screen. For example, it can indicate the status of a load, whether it is switched on or off.

In summary, the working process of an IoT-based home automation monitoring and controlling system using NodeMCU involves collecting data from sensors,

processing and making decisions based on the data, controlling various loads in the home, communicating with other devices in the system, and providing feedback to the user.

5.6 LIQUID CRYSTAL DISPLAY

LCD stands for Liquid Crystal Display. It is a type of flat panel display commonly used in electronic devices such as televisions, smartphones, and computers. In the context of an IoT-based home automation monitoring and controlling system, an LCD can be used as a display screen to provide information to the user.

LCD screens are energy-efficient, compact, and easy to use. They can be interfaced with a microcontroller or a single-board computer such as Arduino or NodeMCU. An LCD screen typically has a set of pins that are connected to the microcontroller, which sends data and commands to display information on the screen.

In an IoT-based home automation monitoring and controlling system, an LCD can be used in combination with other components such as sensors and actuators to create a user-friendly interface that allows the user to monitor and control various aspects of their home.

Figure 5.6.1 Liquid Crystal Display

In an IoT-based home automation monitoring and controlling system, an LCD can be used as a display screen to provide real-time information to the user about the status of various loads and sensors in their home. For example, it can display the current temperature, humidity, or light level in a room, the status ofa load (on or off), or any error messages.

The LCD screen can be interfaced with a microcontroller or a single-board computer such as Arduino or NodeMCU, which can read data from various sensors and control the loads using actuators. The LCD screen can display this data and allow the user to control the loads through a user-friendly interface.

An LCD screen can greatly enhance the user experience of an IoT-based home automation system by providing real-time information and easy control of various loads and sensors.

In an IoT-based home automation monitoring and controlling system, the working process of an LCD screen typically involves the following steps:

The microcontroller or single-board computer, such as Arduino or NodeMCU, reads data from various sensors and controls the loads using actuators.

The microcontroller sends the data to the LCD screen through a set of pins that are connected to both the microcontroller and the LCD screen.

The LCD screen receives the data from the microcontroller and displays it on the screen.

The user can interact with the LCD screen using a button or a touchscreen to adjust the settings or control the loads.

The microcontroller receives the user's input through the LCD screen and processes it accordingly to control the loads or adjust the settings.

Overall, the LCD screen serves as an interface between the user and the IoT-based home automation system, allowing the user to monitor the status of various loads and sensors and control them easily and efficiently.

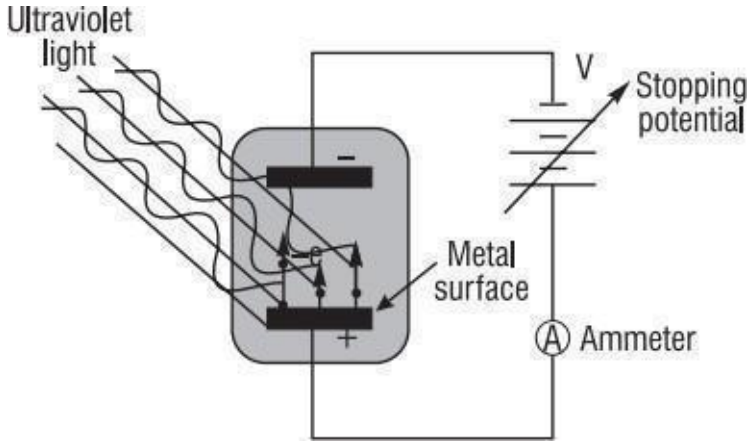
5.7 LIGHT

Electric lights brighten our darkness, and many other uses of light impact our lives daily. The answer, in short, is light is a special kind of electromagnetic energy. The speed of light, although quite fast, is not infinite. The speed of light in a vacuum is expressed as c = 2.99 × 108 m/s. Light travels in a vacuum at a constant speed, and this speed is considered a universal constant. It is important to note that speed changes for light traveling through non-vacuum media such as air (0.03% slower) or glass (30.0% slower). For most purposes, we may represent light in terms of its magnitude and direction. In a vacuum, light will travel in a straight line at fixed speed, carrying energy from one place to another. Two key properties of light interacting with a medium are: 1. It can be deflected upon passing from one medium to another (refraction). 2. It can be bounced off a surface (reflection). The aspects of light interaction with media other than a vacuum will be addressed further in Modules 1.3 and 1.4, which deal with geometrical and physical optics, respectively. The field of detection and measurement of light energy is called radiometry. It uses a standardized system for characterizing radiant energy. Table 1-1 defines the standard terms used in this course.

Dual Nature of Light Scientists build models of physical processes to help them understand and predict behavior. So it is with light energy. It is through seeing the effects of light that the models are developed. Scientists haveobserved that light energy can behave like a wave as it moves through space, or it can behave like a discrete particle with a discrete amount of energy (quantum)that can be absorbed and emitted. As we study and use light, both models are

helpful. Concept of a photon The particle-like nature of light is modeled with photons. A photon has no mass and no charge. It is a carrier of electromagnetic energy and interacts with other discrete particles (e.g., electrons, atoms, and molecules). A beam of light is modeled as a stream of photons, each carrying a well-defined energy $\text{Photon energy } (E) = hc/\lambda$ that is dependent upon the wavelength of the light. The energy of a given photon can be calculated by:

When ultraviolet light shines on some metal surfaces, it causes electrons to be emitted. This effect is shown in Figure 1-2. The photoelectric effect did not produce results that matched the early predictions of wave theory. Two concerns were: 1. More intense radiation (larger-amplitude waves) did not cause emitted electrons to have more energy. 2. The energy of the emitted electron was dependent on the wavelength of the light, not the amplitude of the wave. In the photoelectric effect experiment shown in Figure 1-2, light strikes a metal plate. Electrons are immediately released. The flow of electricity in the external circuit can be measured and the number of electrons generated for a given light signal can be determined.



If light were a continuous wave, it might wash over the metal surface and interact with the electrons to give them the needed energy to escape at lower light levels (intensities), but only after long delays. However, faint light at high frequencies (short wavelengths) caused the immediate release of electrons. Thus, light knocked the electrons out of the metal surface as if the light were made of particles—photons. There is a minimum energy threshold for an electron to escape from the metal. Photons with frequencies below a given threshold eject no electrons, no matter how intense the light. Photons with frequencies above the threshold do eject electrons, no matter how low the intensity. The energy of the released electrons can be calculated from Equation

Characteristics of light waves

To understand light waves, it is important to understand basic wave motion itself. Water waves are sequences of crests (high points) and troughs (low points) that "move" along the surface of the water. When ocean waves roll in toward the beach, the line of crests and troughs is seen as profiles parallel to the beach. An electromagnetic wave is made of an electric field and a magnetic field that alternately get weaker and stronger. The directions of the fields are at right.

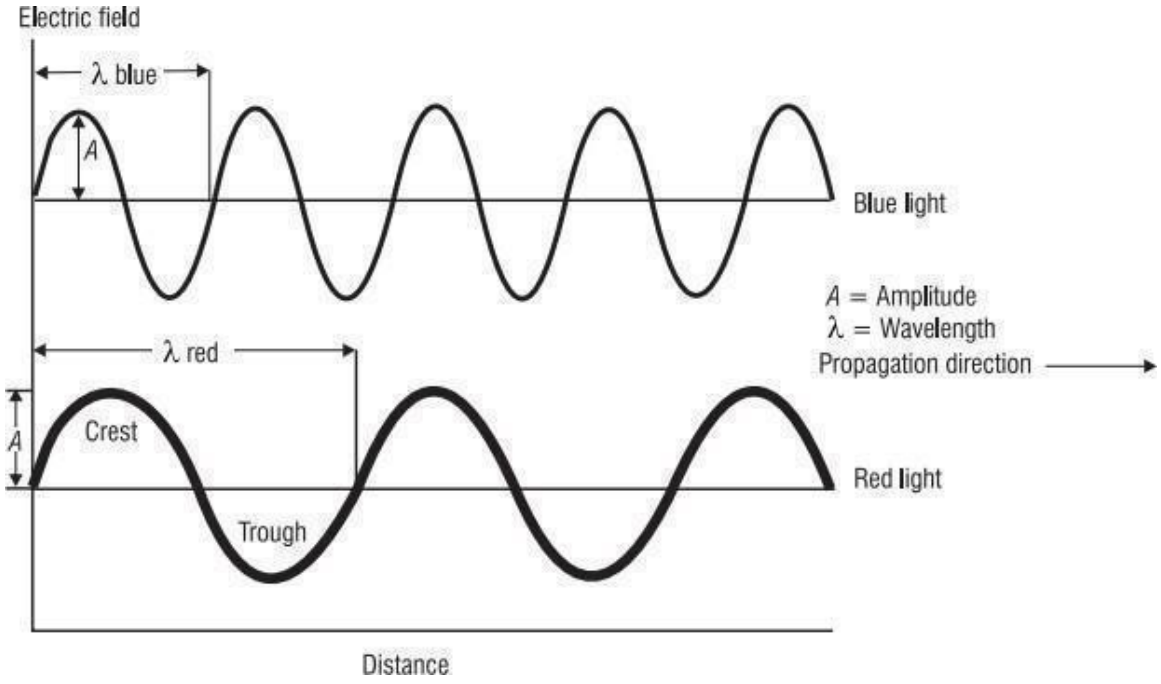


Figure 5.7.1 Light Waves

CHAPTER 6

CONCLUSION

6.1 CONCLUSION

In conclusion, an IoT-based home automation monitoring and controlling system is a highly efficient and convenient way to manage various loads in a household. By using sensors, actuators, microcontrollers, and network connectivity, this system allows for remote monitoring and control of different loads, such as lights, fans, air conditioning units, and more.The use of technologies such as Arduino, NodeMCU, and Proteus enables the developmentof a cost-effective and reliable home automation system that can be customized to meet the specific needs of different households. The LCD screen serves as an intuitive interface that allows users to monitor the status of various loads and sensors and control them easily and efficiently.An IoT-based home automation monitoring and controlling system has the potential to improve energy efficiency, increase convenience, and enhance the overall quality of life for homeowners. As technology continues to evolve, we can expect to see even more advanced home automation systems that offer even greater capabilities and benefits.

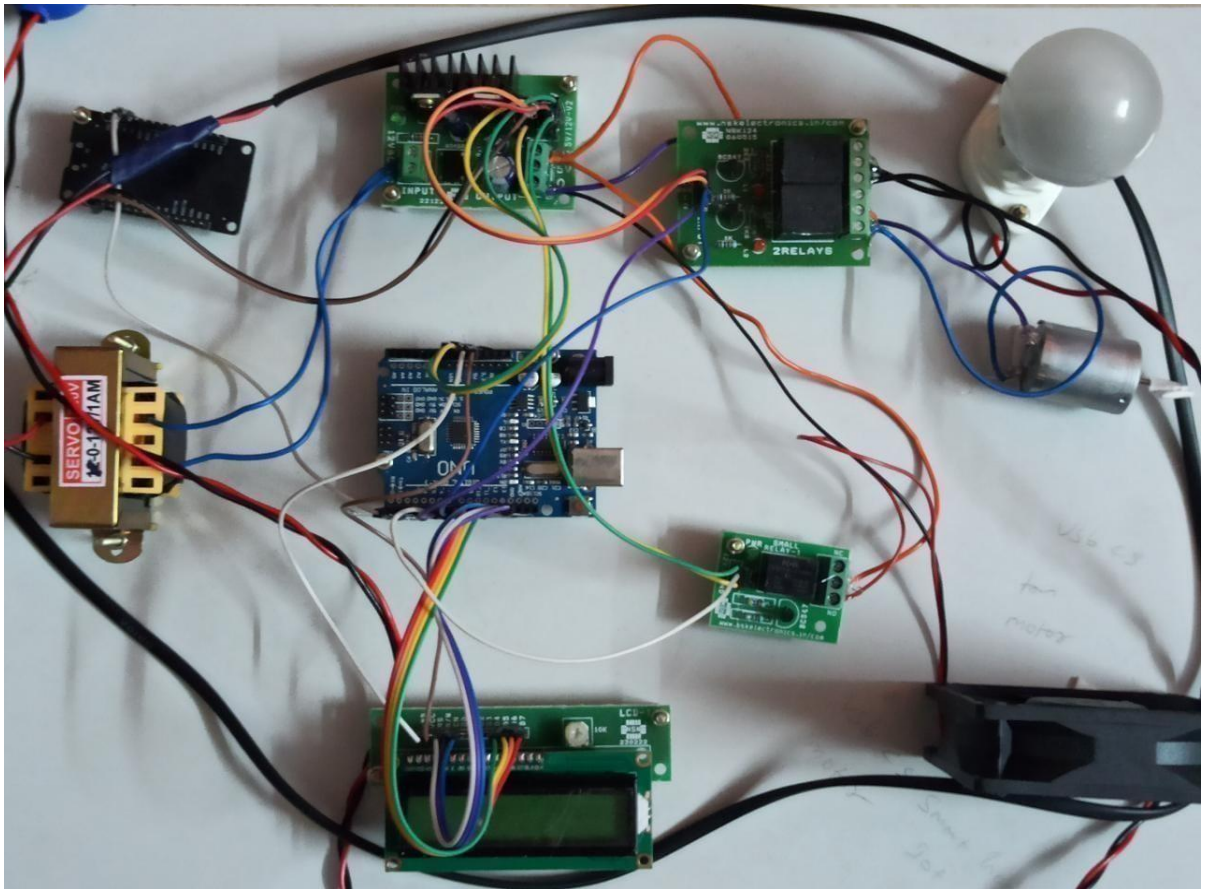


Figure 6.1.1 Hardware Kit

In this paper, the home automation is implemented using IOT. A smarthome integrates various electrical appliances in the home and automates them with no or minimum user intervention. The smart home keeps track of differentenvironment variables present and guides the appliances to work according to theneeds of the user. In this the electrical appliances are controlled based on thecommand form the IOT. From the energy is consumed. We achieved thedevelopment of Smart Home by using the Internet of Things technologies. Fromthe experiment, it was found that we can manage to make low cost, flexible andenergy efficient smart home for the better and greener future.

6.2 FUTURE ENHANCEMENT

There are several ways in which an IoT-based home automation monitoring and controlling system can be enhanced in the future:

Integration with voice assistants: Voice assistants like Amazon Alexa or Google Assistant can be integrated into the system to allow for voice-based control of various loads.

Machine learning-based optimization: The system can be optimized using machine learning algorithms to automatically adjust the settings of various loads based on user preferences, weather conditions, and other factors.

Integration with renewable energy sources: The system can be integrated with renewable energy sources like solar panels or wind turbines to further improve energy efficiency.

Advanced security features: Advanced security features can be added to the system to prevent unauthorized access and ensure data privacy.

Smart scheduling: The system can be programmed to automatically turn on or off loads based on pre-defined schedules, further enhancing energy efficiency.

Remote troubleshooting: The system can be designed to allow for remote troubleshooting and diagnostics, making it easier to identify and resolve issues.

CHAPTER 7

SOURCE CODE

```
#include<LiquidCrystal.h>

LiquidCrystal  lcd(13,12,11,10,9,8);

#define Light 7
#define machine 6
#define Fan 5
void setup()
{
     Serial.begin(9600);
      lcd.begin(16,2);
      pinMode (Light,OUTPUT);
      pinMode (machine,OUTPUT);
      pinMode (Fan,OUTPUT);
      lcd.setCursor(0,0);
      lcd.print("IOT BASED HOME");
      lcd.setCursor(0,1);
      lcd.print("AUTOMATION  SYS");
      delay(2000);
      lcd.clear();
}
void loop()
{
   if(Serial.available()>0)
         {
   char Y = Serial.read();
```

```
      if (Y=='A')

{
      digitalWrite (Light,HIGH); //first motor 1 pin
      lcd.setCursor(0,0);
       lcd.print("Light-ON ");
        }
          else if (Y=='a')
               {
        digitalWrite (Light,LOW); //first motor 1 pin
      lcd.setCursor(0,0);
       lcd.print("Light-OFF");
         }
          else if (Y=='B')
           {
digitalWrite (machine,HIGH); //first motor 1 pin


           lcd.setCursor(0,1);
       lcd.print("Machine-ON  ");
           }
         else if(Y=='b')
           {
       digitalWrite (machine,LOW); //first motor 1 pin
        lcd.setCursor(0,1);
       lcd.print("Machine-OFF");
         }
           else if(Y=='C')
       {

      digitalWrite (Fan,HIGH); //first motor 1 pin
```

```
    lcd.setCursor(10,0);
    lcd.print("Fan-ON");

     }



     else if(Y=='c')
     {
       digitalWrite (Fan,LOW); //first motor 1 pin


        lcd.setCursor(10,0);
    lcd.print("Fan-OFF");
}}}

/*
water agri
email id: teamprojectclass@gmail.com
blynk password: projectiot2023
*/


/* Fill-in information from Blynk Device Info here */
#define BLYNK_TEMPLATE_ID "TMPL32-RAo_rP"
#define BLYNK_TEMPLATE_NAME "Home Automation"
#define  BLYNK_AUTH_TOKEN  "k9a63h01j22qPs063IZF-blsrzvXhuek"

/* Comment this out to disable prints and save space */
#define BLYNK_PRINT Serial


#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "projectiot2023";
char pass[] = "";

//controlling
```

```
BLYNK_WRITE(V0)
{
  // Set incoming value from pin V0 to a variable
  int value = param.asInt();
  if (value == 1)
  {
 // Serial.println("on");
  Serial.print('A'); /// LIght
  delay(100);

  }
  else
  {
  // Serial.println("off");
  Serial.print('a');
  delay(100);

  }
}



BLYNK_WRITE(V1)
{
  // Set incoming value from pin V0 to a variable
  int value1 = param.asInt();
  if (value1 == 1)
  {
 // Serial.println("on");
  Serial.print('B'); //Machine
  delay(100);

  }
  else
  {
  // Serial.println("off");
  Serial.print('b');
  delay(100);

  }
}


BLYNK_WRITE(V2)
```

```
{
  // Set incoming value from pin V0 to a variable
  int value1 = param.asInt();
  if (value1 == 1)
  {
 // Serial.println("on");
  Serial.print('C'); // FAN
  delay(100);

  }
  else
  {
  // Serial.println("off");
  Serial.print('c');
  delay(100);

  }
}

//Change the virtual pins according the rooms

BLYNK_CONNECTED()
{


  Blynk.syncVirtual(V0);
  Blynk.syncVirtual(V1);
  Blynk.syncVirtual(V2);


}


void setup()
{
  // Debug console
  Serial.begin(9600);
  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
  // You can also specify server:
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, IPAddress(192,168,1,100),
8080);
}
```

```
void loop()
{
  Blynk.run();
  if (Serial.available()>0)
  {
  char a=Serial.read();
  //Serial.print(a);
  }
```

CHAPTER 8

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