A **PROJECT REPORT**

ON

Smart Integrated Automation System for Industrial and Domestic Purpose

Submitted for partial fulfilment of the award of

BACHELOR OF TECHNOLOGY

In

ELECTRONICS & COMMUNICATION ENGINEERING

By

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LUCKNOW

May 2022

CERTIFICATE

It is to certify that **Mudit Pratap Singh**, **Nitesh Upadhyay**, **Prabhat Mittal,** and **Kritika Nath** have carried out the research work presented in this project entitled **"Smart Integrated Automation System for Industrial and Domestic Purpose"** for the award of **Bachelor of Technology** from DR. A. P. J. Abdul Kalam Technical University, Lucknow under my supervision. The project embodies the result of original work and studies carried out by students themselves. The content of the project does not form the basis for the award of any other degree to the candidate or to anybody else.

Date:

Prof. Praveen Chaurasia
(Assistant Professor)

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or another institute of the higher learning, except where due acknowledgment has been made in the text.

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ABSTRACT

Automation device has a wide scope for this Generation as well as in forthcoming generation. In this wide scope, Mobile communication technology is playing a major role in the world of automation but in today's world upgrading the automation system is a major concern. It became more costly when the automation system needs up-gradation. As a solution, we have successfully implemented a smart integrated automation system for both industrial and domestic purposes and by this system, we can easily expand our existing automation system. This article is fully based on a low-cost and reliable automation system for accessing and controlling devices and appliances remotely using an Android-based Smartphone application. we worked with three major goals that are Provide an expendable automation circuit by user end, that can implement for both industrial and domestic automation and last, and this is open source re-programmable.

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CHAPTER 1

SMART INTEGRATED AUTOMATION SYSTEM FOR INDUSTRIAL AND DOMESTIC PURPOSE

1.1 Introduction:

In the current world, Automation system has a wide scope and it is used worldwide and becoming popular day by day but in this new technology many users are facing a problem of upgrading or expending the existing system and this is challenging. Considering the current scenario, if any user wants to expand their existing automation device, they need to install another system device for that must be another Interfacing software. This is very challenging for any user. Automation is used by these techniques, i.e., Manual and Autonomous. In the case of a manual one, automation is controlled by the user. In the case of autonomous, it can be managed by observing the use and signal of the sensor and setting the time accordingly. This project is based on the idea to solve this challenge. Now our team proposed a solution to overcome this issue we plan and design an automation circuit that contains two Node-MCU that are based on the ESP8266 microcontroller. This project is divided into two sections- the first section is containing a relay circuit and a separated Node-MCU for Relay that is designed to give mobility for expanding the relay circuit at the user end which is helpful when users want to expand their existing relay automation board. The second part contains another Node-MCU with a sensor only that will be helpful when the user needs to add new sensors to an existing circuit. Both the Node-MCU clustered which means both the microcontroller are connected over the same server and internet. The reason for using a separated microcontroller is, i.e., the user can upgrade the relay or sensor at the same time or it can be upgraded both at the same time. Our circuit system contains some sensors like an IR sensor, relay, and led display. That is used only for the demonstration and working of sensors with cluster Node-MCU system. In the Domestic automation system, we represent our home appliances are controlled via our phone applications, model is represented by the control of some bulbs via our mobile application. These bulbs are working on AC supply and the user can easily turn ON and OFF appliances via using the mobile. Another is industrial based- in the industry we know that there are many sensors working at a time and our proposed design is capable to run with multi-sensors at a time without affecting Relay and Relay's Node-MCU.

1.2 LITERATURE REVIEW

History of Automation Systems is not so old back many years to find out some material about Automation System. When IoT was introduced, The world of Automated Machinery rapidly increased. IoT (Internet of Things), is A physical object that connects to the Internet. It can be a fitness tracker, a thermostat, a lock or appliance, or even a light bulb.

Kevin Ashton is an innovator and consumer sensor expert who coined the phrase “the Internet of Things” to describe the network connecting objects in the physical world to the Internet.

The term Internet of Things was invented in 1999, initially to promote RFID technology. But later on, it became a widely used term for connecting things via the internet. There are several similar concepts but the Internet of Things is by far the most popular term to describe this phenomenon.

Machines have been providing direct communications since the telegraph (the first landline) was developed in the 1830s and 1840s. Described as “wireless telegraphy,” the first radio voice transmission took place on June 3, 1900, providing a necessary component for developing the Internet of Things. The development of computers began in the 1950s.

The first concept of the Internet of Things was not officially named till 1999, but one of the first examples of an IoT is from the early 1980s and was a Coca-Cola machine, located at the Carnegie Mellon University.

Way back in 1898, Nikola Tesla created the first remote control to operate a toy boat. Tesla worked out a way to use radio waves to send instructions to his boat from a handheld device.

In the late 1990s and early 2000s as internet technology developed fast and smart homes suddenly became a more affordable option. Domestic technology or 'domotics' was a highly discussed topic as domestic appliances were being combined with computers. The Millennium House was a British show home opened in 1998 to demonstrate how running a home could be automated with computer-controlled heating, lights, doors, and gardens. The investigation in this study includes the classification of research and research fields in line with the research content. Further, survey results are presented and the outlook for further study is summarized.

1.3 Types of Automation System:

1.3.1 Bluetooth-based home automation system using cell phones[1]:

In Bluetooth-based home automation systems the home appliances are connected to the Arduino BT board at input-output ports using a relay. The program of the Arduino BT board is based on the high-level interactive C language of microcontrollers; the connection is made via Bluetooth. Password protection is provided so only authorized users are allowed to access the appliances. The Bluetooth connection is established between the Arduino BT board and phone for wireless communication. In this system, the python script is used and it can be installed on any of the Symbian OS environments, it is portable. One circuit is designed and implemented for receiving feedback from the phone, which indicates the status of the device.

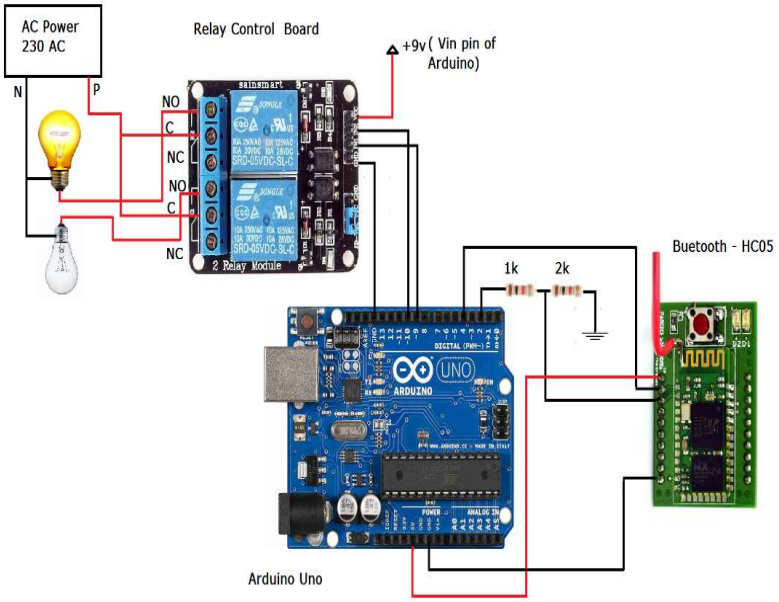

Figure 1: Bluetooth-based home automation system using a cell phone.

1.3.2 Zigbee-based home automation system using cell phones[2]:

To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is recorded and stored by network coordinators. For this the Wi-Fi network is used, which uses the 4- switch port standard wireless ADSL modem router. The network SSID and security Wi-Fi parameters are preconfigured.

The message for security purposes is first processed by the virtual home algorithm and when it is declared safe it is re-encrypted and forwarded to the real network device of the home. Over the Zigbee network, the Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.

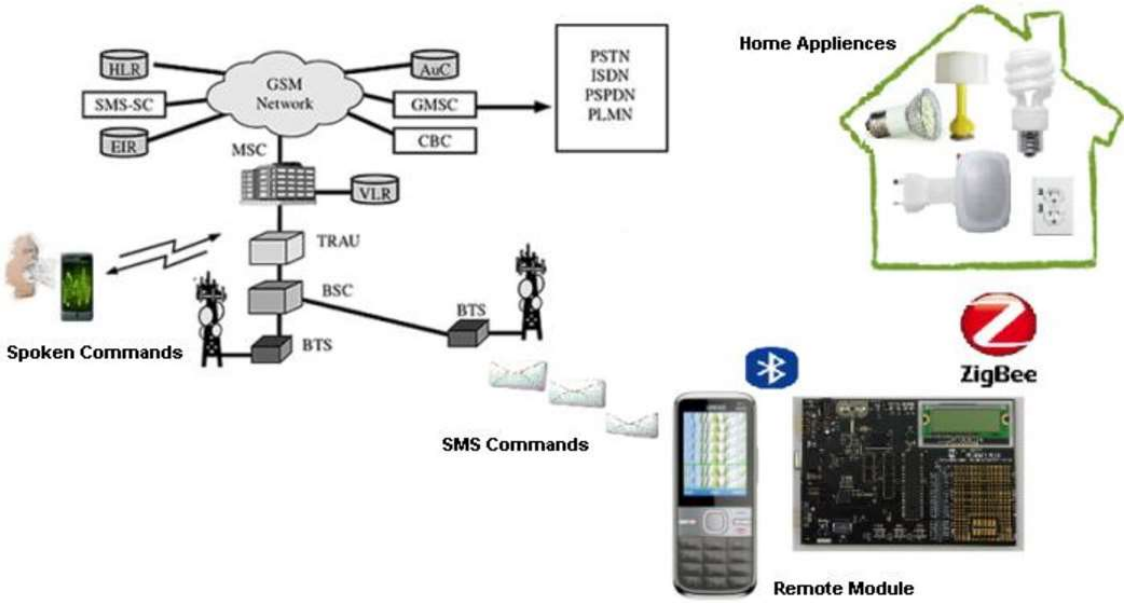

Figure 2: Zigbee-based home automation system using cell phones

1.3.3 GSM-based home automation system using cell phones[3]:

Because of the mobile phone and GSM technology, GSM-based home automation is a lure to research. SMS-based home automation, GPRS-based home automation, and dual-tone multi-frequency (DTMF) based home automation are these options we considered mainly for communication in GSM. The figure shows the logical diagram of the work of A. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system uses a transducer that converts machine function into electrical signals which go into a microcontroller. The sensors of the system convert the physical qualities like sound, temperature, and humidity into some other quantity like voltage. The microcontroller analyses all signals and converts them into commands to be understood by the GSM module. Select appropriate communication methods among SMS, GPRS, and DTFC based on the command which received the GSM module.

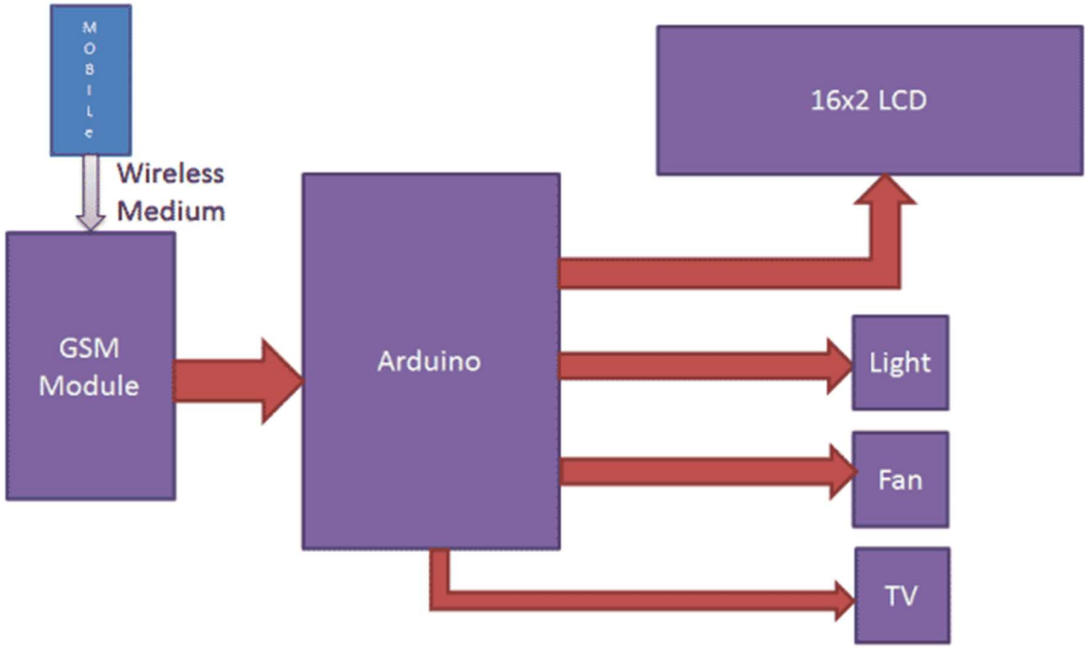

Figure 3: GSM-based home automation system using cell phones.

1.3.4 Wi-Fi-based home automation system using cell phones[4]:

Wi-Fi-based home automation systems mainly consist of three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by the server, and hardware Interface modules to communicate with each other. The same technology is used to log in to the server web-based application. The server is connected to the internet, so remote users can access the server web-based application through the internet using a compatible web browser. The software of the latest home automation system is split into server application software and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, then applies an action to actuators and pre-programmed in the server. Another job is to report and record the history in the server DB. The server application software package for the proposed home automation system is a web-based application built using asp.net. The server application software can be accessed from an internal network or from the internet if the server has real IP on the internet using any internet navigator that supports asp.net technology. Server application software is culpable for, maintaining the whole home automation system, setup, and configuration. The server uses a database to keep a log of home automation system components, we choose to use XML files to save the system logs.

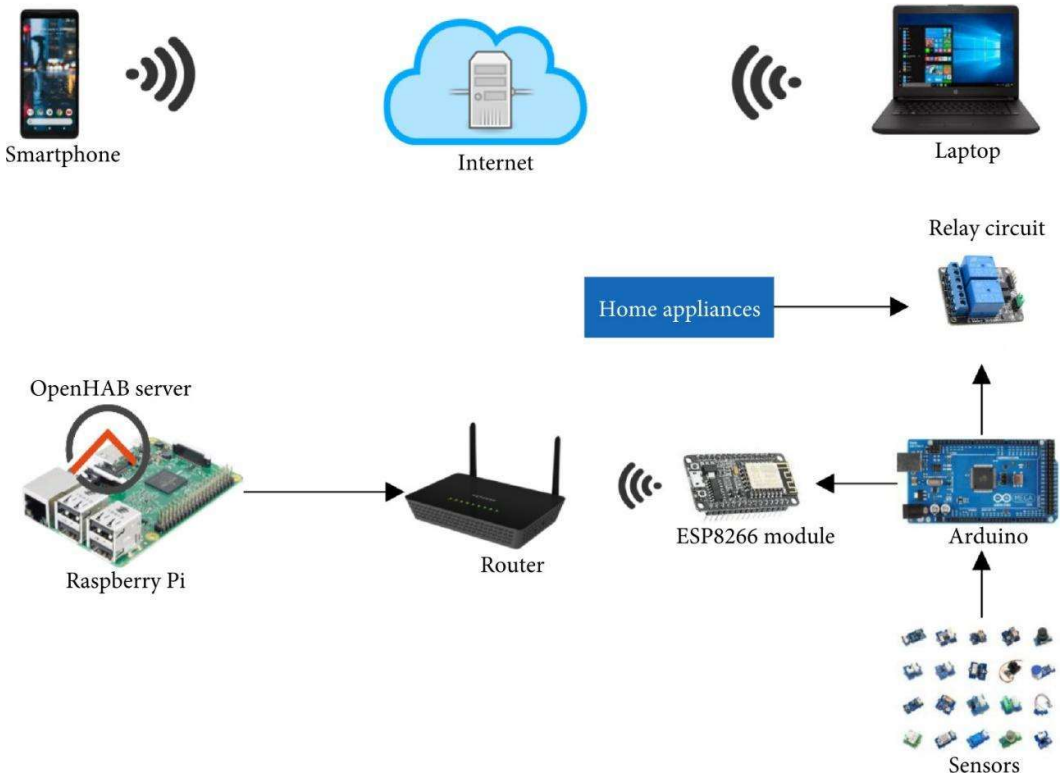

Figure 4: Wi-Fi-based home automation system using cell phones

1.3.5 Home automation using RF module[5]:

The important goal of the Home Automation System is to build a home automation system using an RF-controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current l switches to centralized control systems, containing RF-controlled switches. Today Traditional wall switches situated in various parts of the home make it laborious for the end-user to go near them to control and operate. Even further it turns into more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. To accomplish this, an RF remote is combined with the microcontroller on the transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

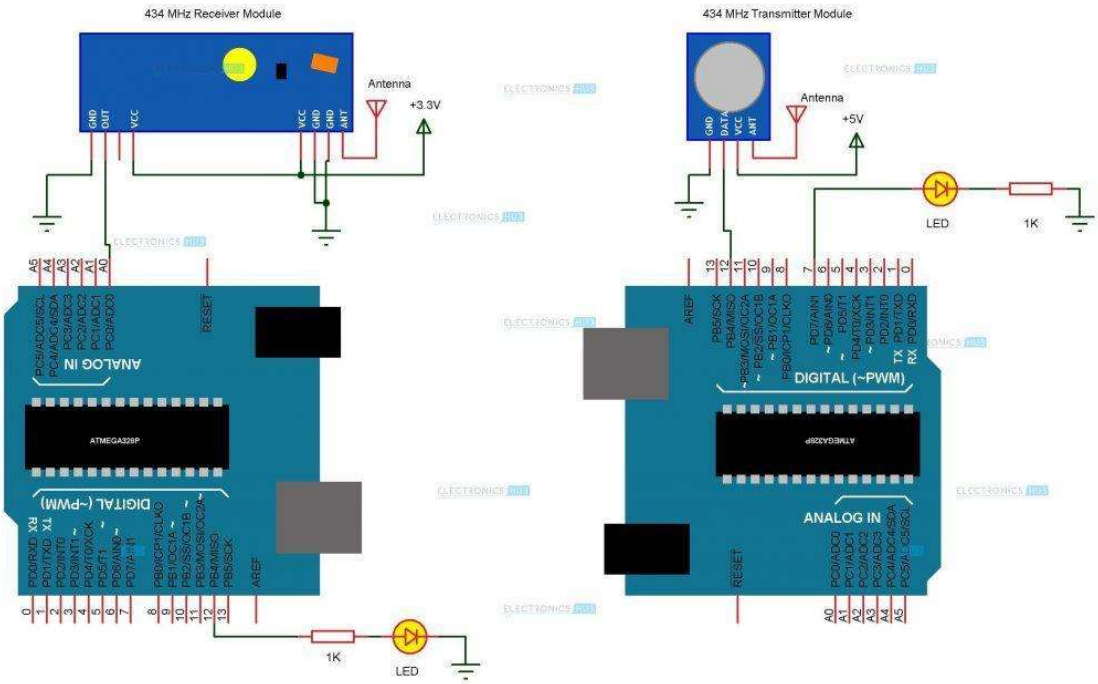

Figure 5: Home automation using RF module

1.3.6 Home automation using Android ADK[6]:

The devices of the home are associated with the ADK and the Connection is established between the Android device and ADK. The devices of the house are linked to the input/output ports of the board (EMBEDDED SYSTEM) and their current situation will have passed to the ADK. The microcontroller board (Arduino ADK) is based on the ATmega2560. It has a USB host connection to associate with Android-based phones, and that is based on the MAX3421e IC. The two important features of Android Open Accessory Protocol 2.0(AOAP) are as follows: It has an audio output that is from the Android device to the component and its support for the component serves as one or more Human Interface Devices (HID) to the Android device. This paper depends upon Android and Arduino platforms which both are FOSS (Free Open-Source Software). Including motion sensors for safety systems will detect an unauthorized action and it will automatically notify the user through cell phone or the security system.

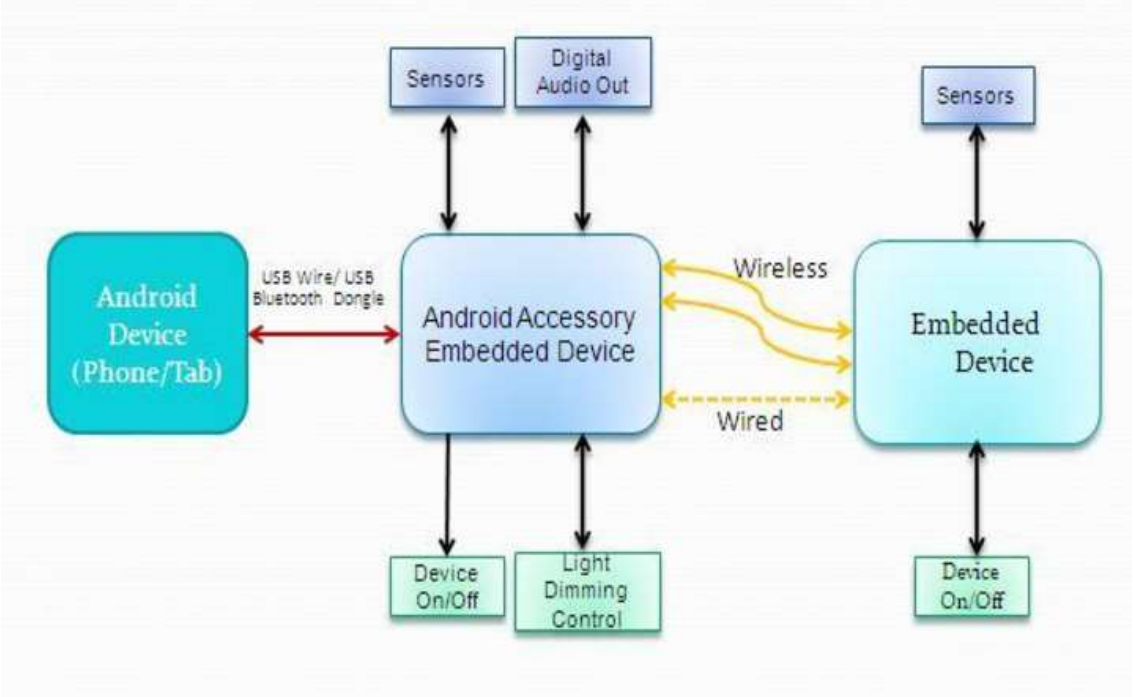

Figure 6: Home automation using Android ADK

1.3.7 Cloud-Based home automation system[7]:

Home Automation using a cloud-based system focuses on the design and implementation of a home gateway to collect data about data from home appliances and then send to the cloud-based data server to get the store on Hadoop Distributed File System, it is processed using MapReduce and use to implement a monitoring-tasks to Remote user Presently home Automation System is persistently developing its resilience by assimilating the current characteristics which gratify the rising interest of the people. This paper presents the design and development of home automation systems that use cloud computing as a service. The current system consists of three important units: the first part is the cloud-server, which handles and controls the data and information of clients and users and the status of devices The hardware interface module is the second part which implements the relevant connection to the actuators and sensing devices which give the physical service. The last part is Home Server, which constructs the hardware device and gives the user interface. This paper focuses on building the web services using the cloud which is needed for security and storage and availability of the data. The current system is cost-efficient, reliable, and comfortable which also gives a secured home automation system for the entire family. The system is made up of various client modules for various platforms.

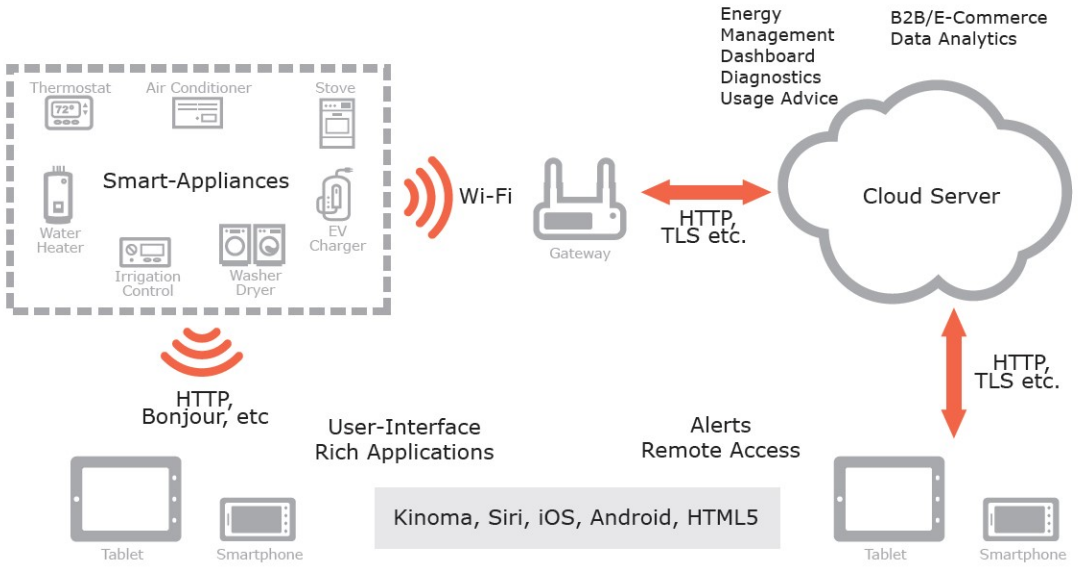

Figure 7: Cloud-Based home automation system

1.3.8 Raspberry pi automation with wireless sensors using smartphones[8]:

Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of the E-mail. Raspberry Pi guarantees to be an efficient platform for the implementation of powerful, and economic smart home automation. Home automation using Raspberry pi is better than any other home automation method in several ways. For example, in DTMF (dual-tone multi-frequency) using home automation, the call tariff is a big demerit, which is not the problem in their proposed method. In-Home Automation using a web server, the design of the webserver and the memory space required are dismissed by this method because it just uses the already established webserver service given by G-mail. LEDs were used to identify the switching action. This system is efficient and flexible and interactive.

Sending Commands to the Raspberry Pi[9]**:**

The script running on the server-side of our laptop or on a web server receives the input commands from the user and appropriately sends them to the client (Raspberry Pi). In This, we will be using those input commands to turn a light ON/OFF. When we give the command to turn ON a light by the server-side script, the data and information gets relayed to the Raspberry Pi and its GPIO pin will turn ON a relay. The system can send current updates to the server to detect whether the light is ON/OFF.

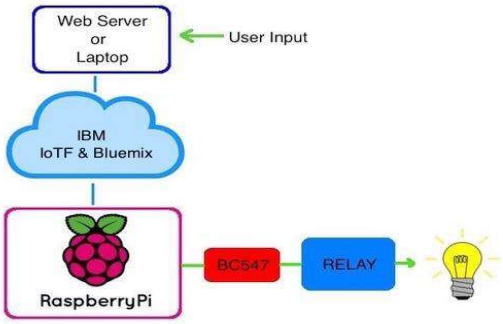

Figure 8: Sending Commands to the Raspberry Pi

Receiving Data from the Raspberry Pi[10]**:**

Using the PIR motion sensor we can send the data signal to the Raspberry Pi, we just run a script that can read the sensor by a GPIO pin and transmit the data to overall system through the IoT-F platform. This can then be looked at by the IoT console.

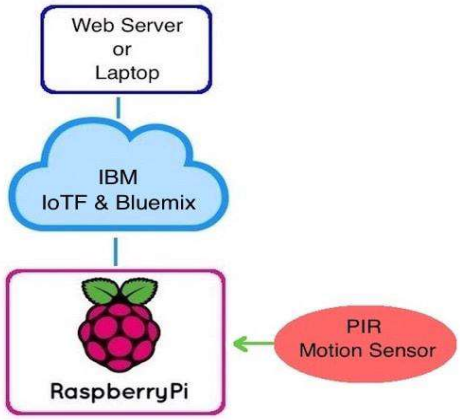

Figure 9: Receiving Data from the Raspberry Pi

1.3.9 Wireless Home Automation system using IoT[11]:

This system uses mobiles or computers to control basic home control and function automatically through the internet from anywhere around the world globally, an automated home is sometimes called a smart home. It is meant to save electric power and human energy. The proposed system is a distributed home automation system, consisting of servers i.e. Wi-Fi modules, and sensors. The server controls and monitors the various sensors, and can be easily configured to handle more hardware interface modules (sensors).

The Arduino board, with a built-in Wi-Fi module acts as a web server. Automation System can be accessed from the web browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with an appropriate web browser through server real IP (internet IP). Wi-Fi technology is selected to be the network infrastructure that connects the server and the sensors. Wi-Fi is chosen to improve system security (by using a secure Wi-Fi connection) and to increase system mobility and scalability.

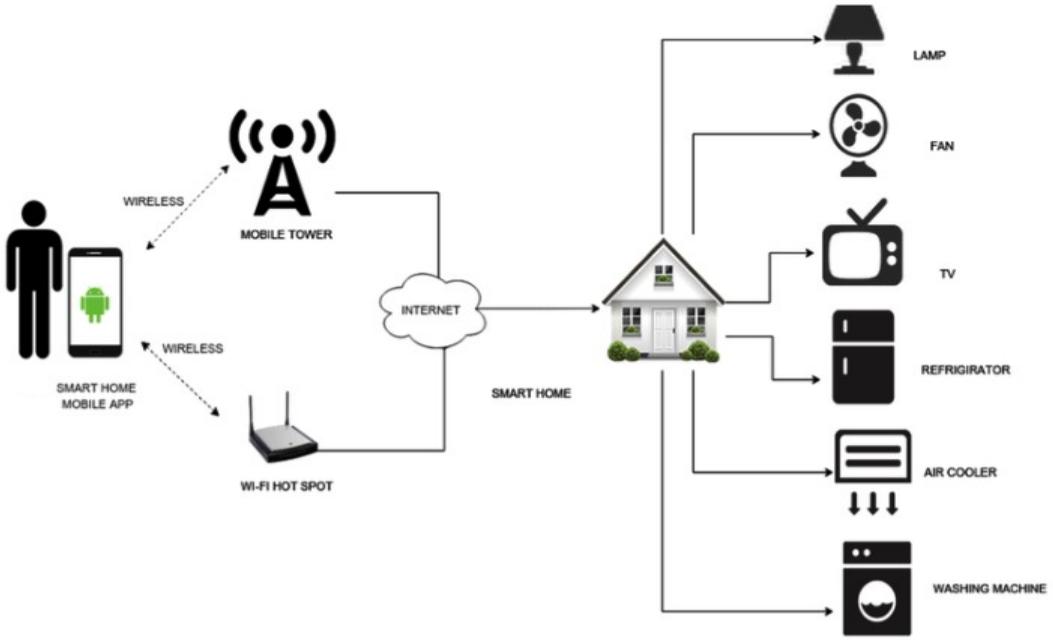

Figure 10: Wireless Home Automation system using IoT

CHAPTER 2

2.1 Brief Description:

Home automation, Smart Institute, Home control, and digital home are just different names for comfort, convenience, security, and power saving. These systems are of increasing importance these days. Even though such systems are very expensive in general, they can also be very economical if one designs and constructs them for very specific needs. There are many ways to control a smart home system, including wireless communication over the internet. This project will help in creating a new generation of smart automation systems in which users can control the home appliances such as refrigerators, Air conditioners, Fans, and Bulbs Industrial Appliances and Institutional things also can control. whenever they want and from wherever they are with the aid of the Internet. This can be extended by a mobile app which is an open-source platform like Android. The apps can be used to create a user interface using which one will be able to control all kinds of appliances via their Smartphone. There are 3 major modules that are required to build this system, that is Client-Server, Radio Frequency Transceiver, and Microcontroller. This system can be accessed by the internet by using a Personal Computer or Smartphone. This project consists of two parts: Hardware and Software. Hardware refers to the development of the device itself including circuit construction, printed circuit board etching, and soldering process. The software part refers to designing algorithms, coding, and compilation. It also includes the development of the user interface.

In the current world automation system has a wide scope and automation system is used world wild and becoming popular day by day but in this new technology many users are facing the problem of upgrading or expanding the existing automation system, which is challenging. If we consider the current scenario, if any user wants to expand their existing automation device they need to install another system device for that must be another Interfacing software. This is very challenging for any user. Automation is used by three techniques, i.e. manual and autonomous. In the case of a manual one, automation is controlled by the user, in the case of autonomous, it can be managed by observing the use and signal of the sensor and setting time accordingly. So, we come up with this idea to solve this challenge. Now our team proposed a solution to overcome this issue we plan and design an automation circuit that contains two Node-MCU that are based on the ESP8266 microcontroller.

This project is divided into two sections- the first section is containing a relay circuit and a separated Node-MCU for Relay that is designed to give mobility for expanding relay circuit at the user end which is helpful when users want to expand their existing relay automation board. The second part contains another Node-MCU with a sensor only that will be helpful when the user needs to add new sensors to an existing circuit. Both the Node-MCU clustered which means both the microcontroller are connected over the same server and internet. The reason for using a separated microcontroller is that the User can upgrade the relay or sensor at the same time or it can be upgraded both at the same time. Our circuit system contains some sensors like an IR sensor, relay, and led display. That is used only for the demonstration and working of sensors with cluster Node-MCU system. In the Domestic automation system, we represent our home appliances are controlled via our phone applications, model is represented by the control of some bulbs via our mobile application, these bulbs are working on AC supply and the user can easily turn ON and OFF appliances via using the mobile. Another is industrial based- in the industry we know that there are many sensors working at a time and our proposed design is capable to run with multi-sensors at a time without affecting Relay and Relay's Node-MCU.

2.2 Component Description:

2.2.1 Node-MCU:

Node-MCU is an electronic device which is programmed by the user according to their requirements. Node-MCU is an ESP8266-based microcontroller. Node-MCU boards are able to read input – light on sensors, a finger on a button, or a Twitter message- and turn it into an output – activating a motor, turning on a led, publishing something online. Node MCU has an integrated Wi-Fi module that makes it compatible to perform tasks over the internet.

In this project, we use two Node-MCU micro-controller, both microcontrollers are connected over the same server. One of the Node-MCU is used for relay module control which is able to control AC components and the second Node-MCU is used for sensors only.

devices connected with its pin. Specifications of Arduino which is required in this project are as follows-

- Microcontroller-Atmega328p (8-bit AVR family microcontroller)
- Operating Voltage-5V
- Input Voltage -7V to 12V
- Analog pins-6
- Digital I/O pin-14
- Flash memory 32 kB (0.5 kB for the bootloader) SRAM - 2KB

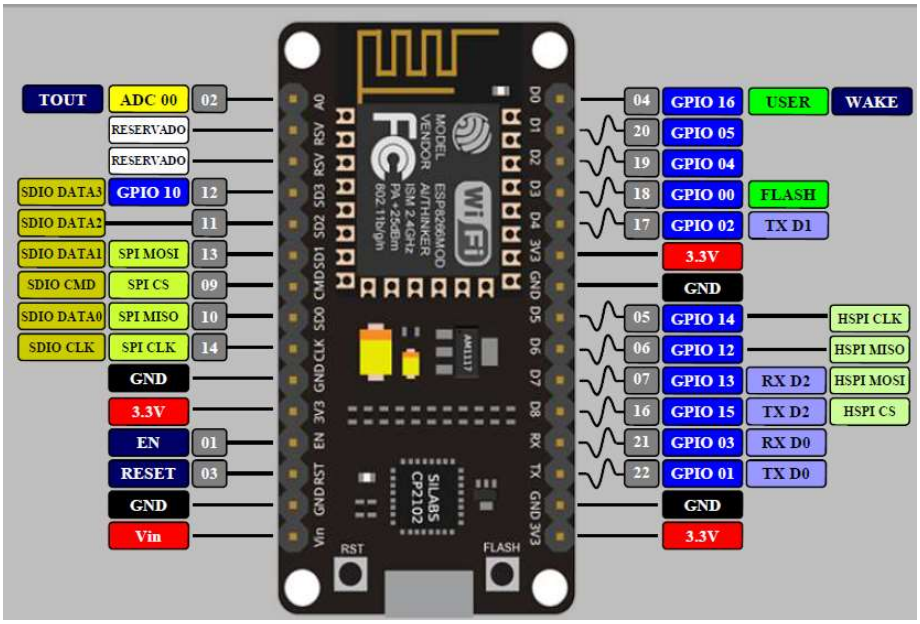

Figure 11: Pin Diagram of Node-MCU

2.2.2 Relay Board:

It is a kind of electro-mechanical component that functions as a switch that is commonly used in the automatic control circuit and to control a high-current using a low-current signal. The input voltage of the relay signal ranges from 0 to 5V. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts normally open (NO) and normally closed (NC). Working is done through a coil to magnetize the switch contacts & drag them jointly once activated. A spring drives them separately once the coil is not strengthened.

By using this system there are mainly two benefits, the first one is, that the required current for activating the relay is less as compared to the current used by relay contacts for switching. The other benefit is, that both the contacts & the coil are isolated galvanically, which means there is no electrical connection among them.

Figure 12: Relay Board

Single-Channel Relay Module Specifications:

1. Supply voltage – 3.75V to 6V
2. Quiescent current: 2mA
3. Current when the relay is active: ~70mA
4. Relay maximum contact voltage – 250VAC or 30VDC
5. Relay maximum current – 10A

Advantages:

1. A remote device can be controlled easily
2. It is triggered with less current but it can also trigger high power machines
3. Easily contacts can be changed
4. At a time, several contacts can be controlled using a single signal
5. Activating part can be isolated
6. It can switch AC or DC

Applications:

1. Used in over voltage/under voltage protection system
2. Mains Switching
3. Speed control of motors through start-delta converters
4. Automatic electrical appliances
5. AC voltage load switching using less voltage DC
6. Home automation projects

2.2.3 IR Sensor:

IR sensor is an infrared sensor that emits in order to sense some aspects of surroundings. It can measure the heat of the object as well as detects motion. It is one of the basic and popular sensor-module in electronic devices for accident detection. This sensor is equivalent to human's visionary senses. The sensor is fixed in front of the vehicle so that the sensor monitors the obstacles. In case of any hindrance or hit the respective sensor will send a message to all the registered numbers informing them about the location and incident using the GPS system through the GSM module. This sensor should be fixed in such a way that it shall sense the obstacles. **An infrared sensor** is used to detect obstacles by transmitting **infrared** signals, this **infrared** signal is reflected from the surface of an object and the signal is received at the **infrared** receiver. The frequency range of infrared lies between the microwave and the visible light spectrum. The working of any Infrared sensor is governed by three laws: Planck's Radiation law and Stephen.

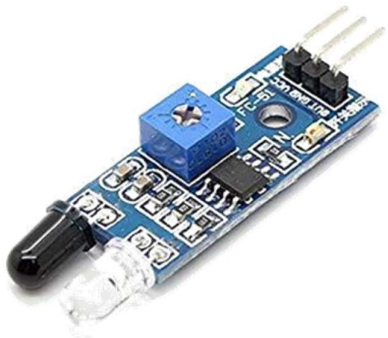

Figure 13: IR Sensor

2.2.4 Voltage regulator:

7805 voltage regulator IC is used in the emergency vehicle to give the 5V-supply to the Arduino Uno and IR sensor from a 12-volt battery. 7805 is a voltage regulator integrated circuit. It is a member of the 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the provide 7805 provides a +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels [15]. Figure 8 shows Voltage regulator IC 7805.

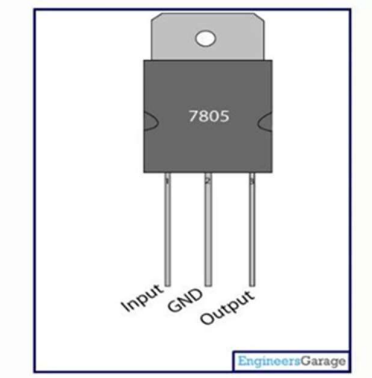

Figure 14: Pin Diagram of Voltage Regulator

Pin No	Function	Name
1	Input voltage (5V-18V)	Input
2	Ground (0V)	Ground
3	Regulated output; 5V (4.8V-5.2V)	Output

Table 1: Pin Description of Voltage Regulator IC 7805

2.2.5 Buzzer:

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

The pin configuration of the buzzer is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '-'symbol or short terminal and it is connected to the GND terminal.

Figure 15: Buzzer

Working Principle:

The working principle of a buzzer depends on the theory that, once the voltage is given across a piezoelectric material, then a pressure difference is produced. A piezo type includes piezo crystals among two conductors.

Once a potential disparity is given across these crystals, then they thrust one conductor & drag the additional conductor through their internal property. So this continuous action will produce a sharp sound signal.

2.2.6 BC547 Transistor:

The BC547 transistor is an NPN Transistor. A transistor is nothing but the transfer of resistance that is used for amplifying the current. A small current of the base terminal of this transistor will control the large current of the emitter and base terminals. The main function of this transistor is to amplify as well as switch purposes. The maximum gain current of this transistor is 800A.

Similar transistors are BC548 & BC549. This transistor works in a fixed DC voltage in the preferred region of its characteristics which is called biasing. Further, the series of this transistor can be divided into three groups based on the current gain BC547A, BC547B & BC547C.

Working States of Transistor:

BC547 Works in two states 1. Forward Bias and 2. Reverse Bias.

In a forward bias mode, the two terminals like emitter & collector are connected to allow the flow of current through it. Whereas in a reverse bias mode, it doesn't allow the flow of current through it because it works as an open switch.

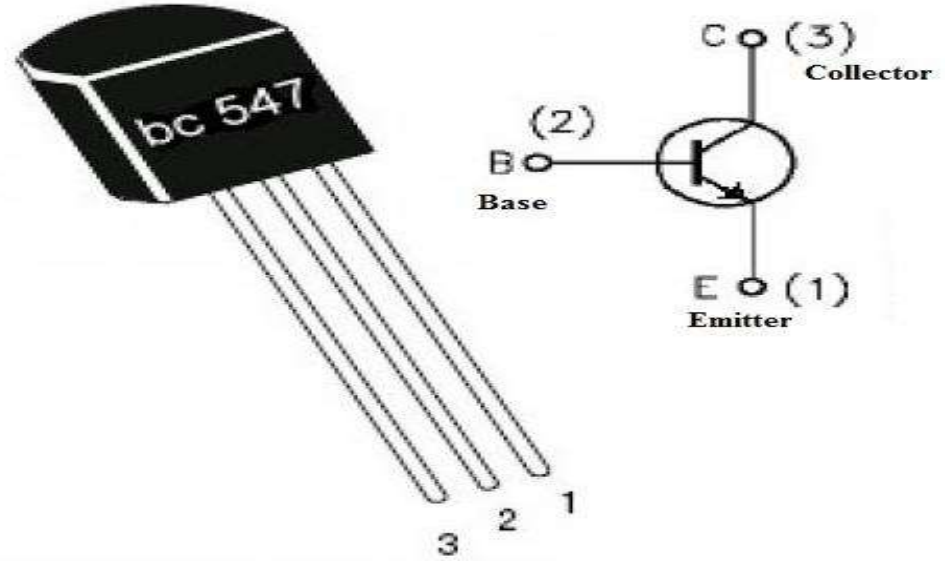

Figure 16: Pin Diagram of Transistor

Features

- The gain of DC current (hFE) = 800 A
- Continuous Ic (collector current) = 100mA
- VBE (emitter-base voltage) = 6V
- IB (base current) = 5mA
- The transition frequency is 300MHz
- Power dissipation is 625mW

2.3 Software Requirement:

2.3.1 Arduino IDE:

The ARDUINO Software (IDE) is an open-source makes it easy to write code and upload it to the ARDUINO board. The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, and Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, which is compiled and linked with a program stub main () into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avr to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Programs written using ARDUINO Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension (.ino). The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displaces errors. The console displaces text output by ARDUINO software (IDE), including complete error messages and other information.

When a sketch is uploaded, the ARDUINO boot loader, a small program that has been loaded onto the microcontroller on your board is used. It allows uploading the code without using any additional hardware. The boot loader is active for a few seconds when the board resets; it starts whichever sketch was most recently uploaded to the microcontroller. The boot loader will blink the onboard (pin 13) LED when it starts.

2.3.2 Fritzing Software Tool

Fritzing is a software tool that allows users to document these electronic prototype projects and share them with others. Due to its intuitive approach, it can help teach electronics to people without an engineering background.

Fritzing provides a powerful means to projects. The user simply recreates the circuit in software and saves it to a project file. The abstract yet reality-based representation is intuitive to read, can be discussed with colleagues and teachers, or published on a website for re-use and inspection by other users.

In this project, Fritzing S/w tool is used for the virtual circuit implementation. It is very useful in cost-cutting as it is very difficult and costly to implement a circuit physically on a prototype/initial phase.

2.3.3 Blynk App (Open S/w):

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, can store data, visualize it, and do many other cool things.

There are three major components in the platform:

Blynk App- allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server- responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices, and can even be launched on a Raspberry Pi.

Blynk Libraries- for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

CHAPTER 3

CIRCUIT DIAGRAM & IMPLEMENTATION OF PROPOSED SYSTEM

3.1 Circuit diagram:

The circuit diagram of the proposed system is explained under the following two sections:

3.1.1 First Prototype Automation System Based on a single Node-MCU:

In the circuit diagram of this project Node-MCU work as a motherboard of our automation system which is biased on Microcontroller ESP8266. Node MCU operates at 3.3V-5V.

Here we are connected two relay R1, R2 at pin number 11,12 of Node-MCU respected, for output of Relay we are using two LED which operates at 3.3V, two IR sensors are used at pin number 3,4 of Node-MCU respectively and the output display at LED (16x2).

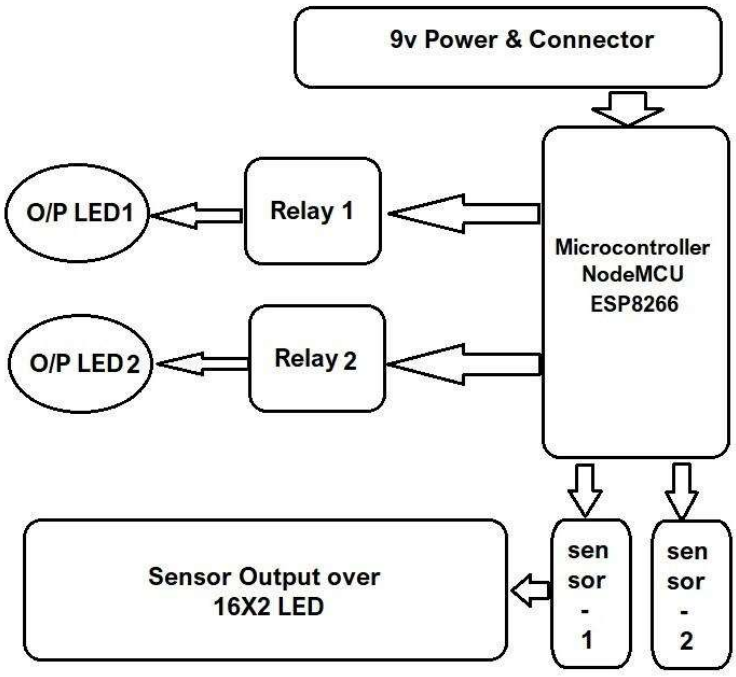

Figure 17: Diagram of single (Node-MCU ESP8266) based automation system

In figure 18 Circuit diagram of the external Relay circuit for our automation system represents that in this circuit board there are two relays R3, R4 which are connected with the connector and power source of the previous one circuit, the output of these two relay show at LED1 and LED2. At this phase, we controlled our circuit board at 9V of battery supply.

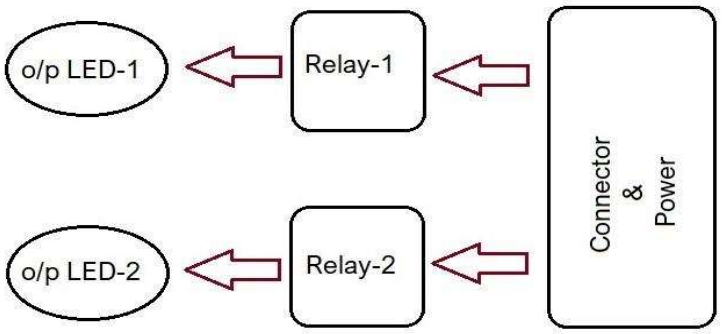

Figure 18: Circuit diagram of external Relay circuit for our automation system.

Figure 19 shows the Prototype design using Fritzing Tool after the implementation of the circuit block diagram we implement our circuit on the Fzitzing tool. Fritzing is a software tool that allows users to document these electronic prototype projects and share them with others. Due to its intuitive approach, it can help teach electronics to people without an engineering background. We implement our wired circuit using this tool kit and after this, the system works properly.

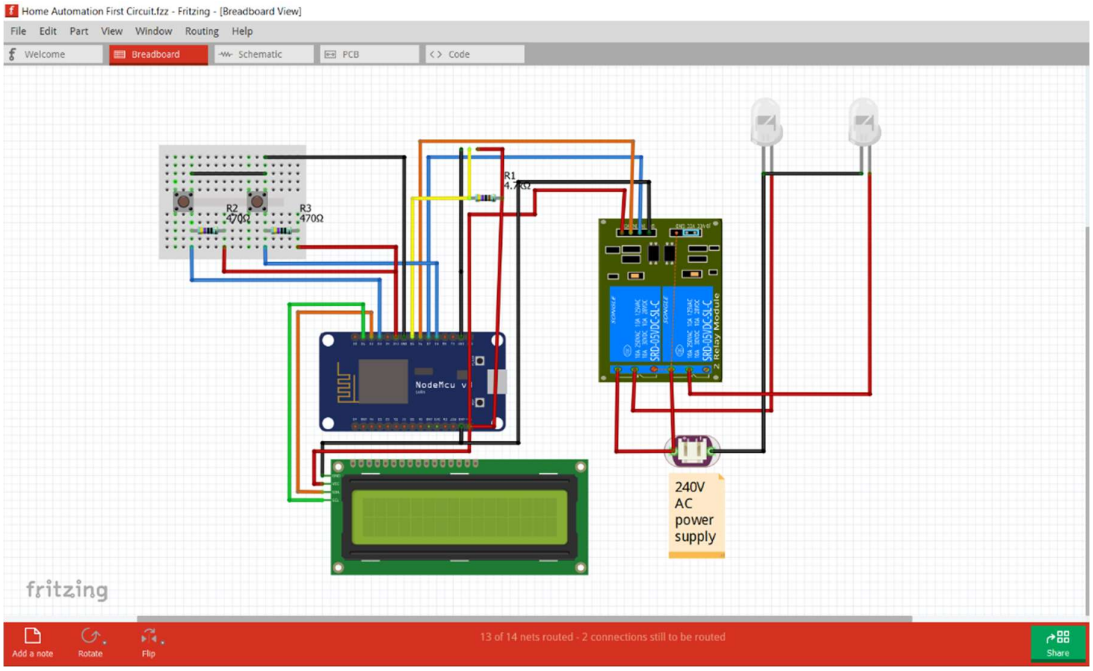

Figure 19: Prototype design of using Fritzing Tool

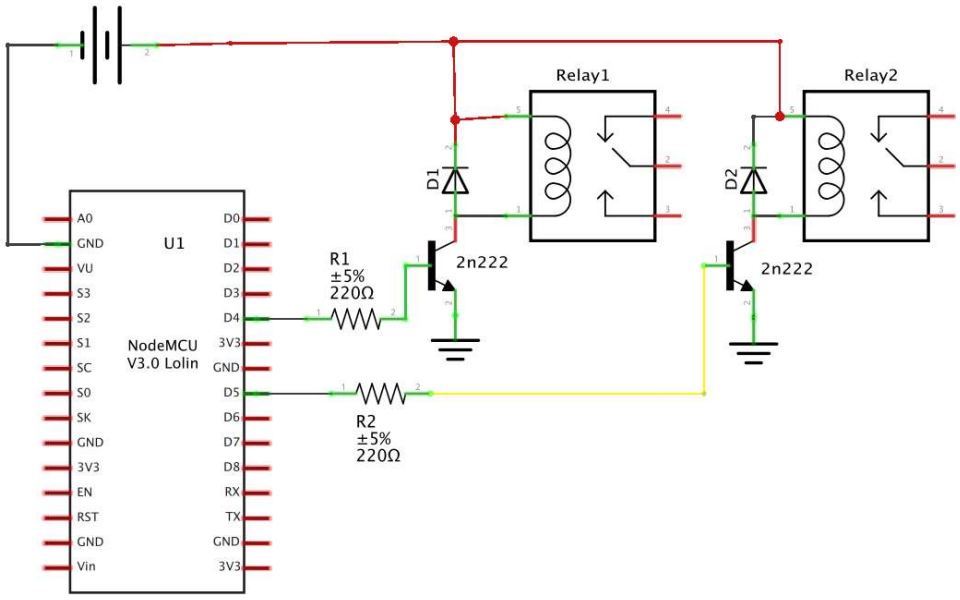

Figure 20: Schematic Diagram of single Node-MCU (ESP8266) based system.

Figure 21 shows that the First Hardware prototype with properly connected via wired.

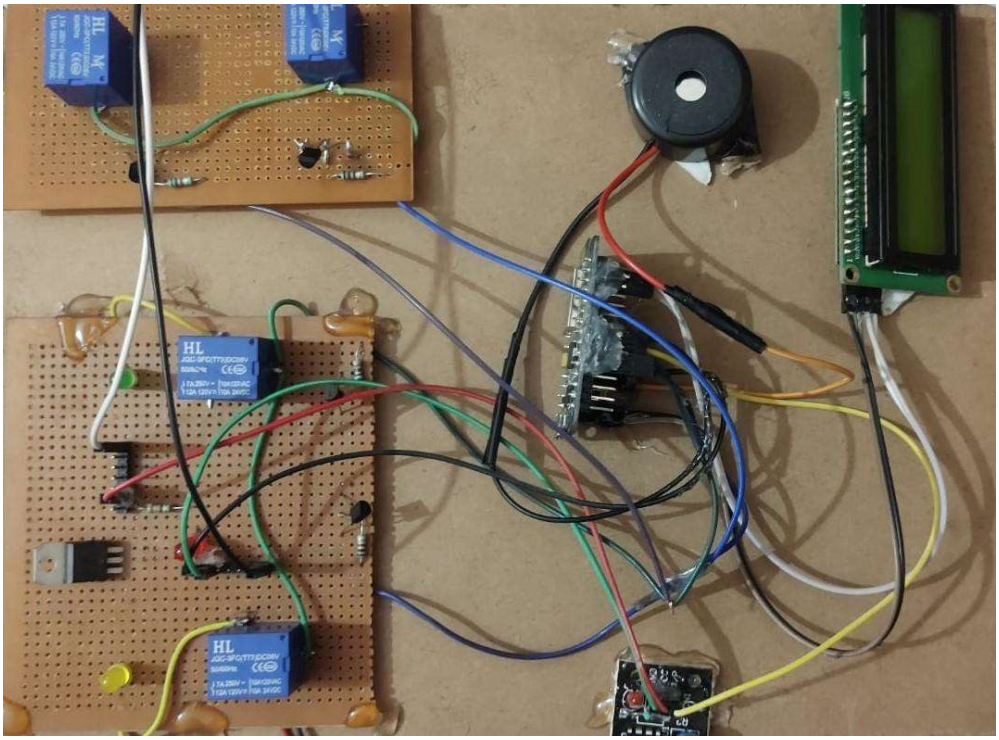

Figure 21: First Hardware prototype.

3.1.2 Final Prototype Automation System Based on dual Node-MCU:

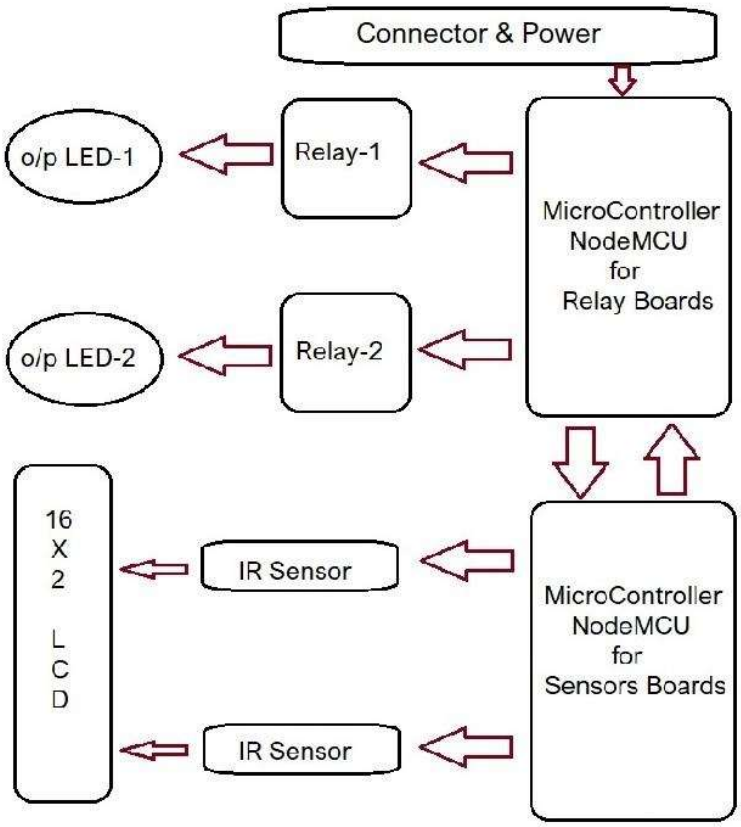

Figure 22: Circuit diagram of dual microcontroller (Node-MCU ESP8266) based automation system.

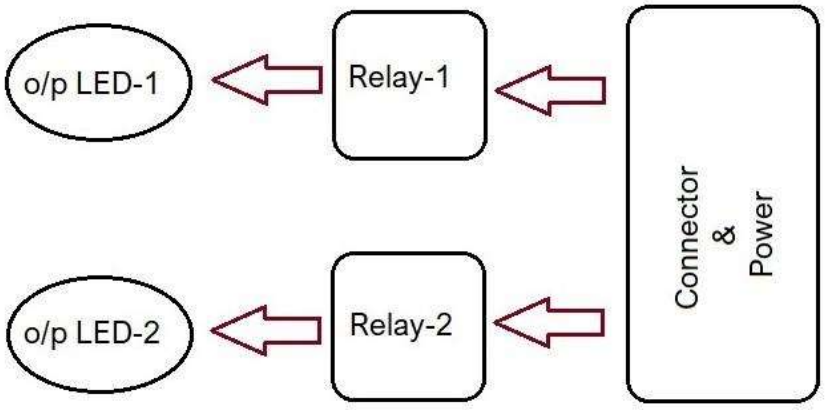

Figure 23: Circuit diagram of external Relay circuit for our automation system.

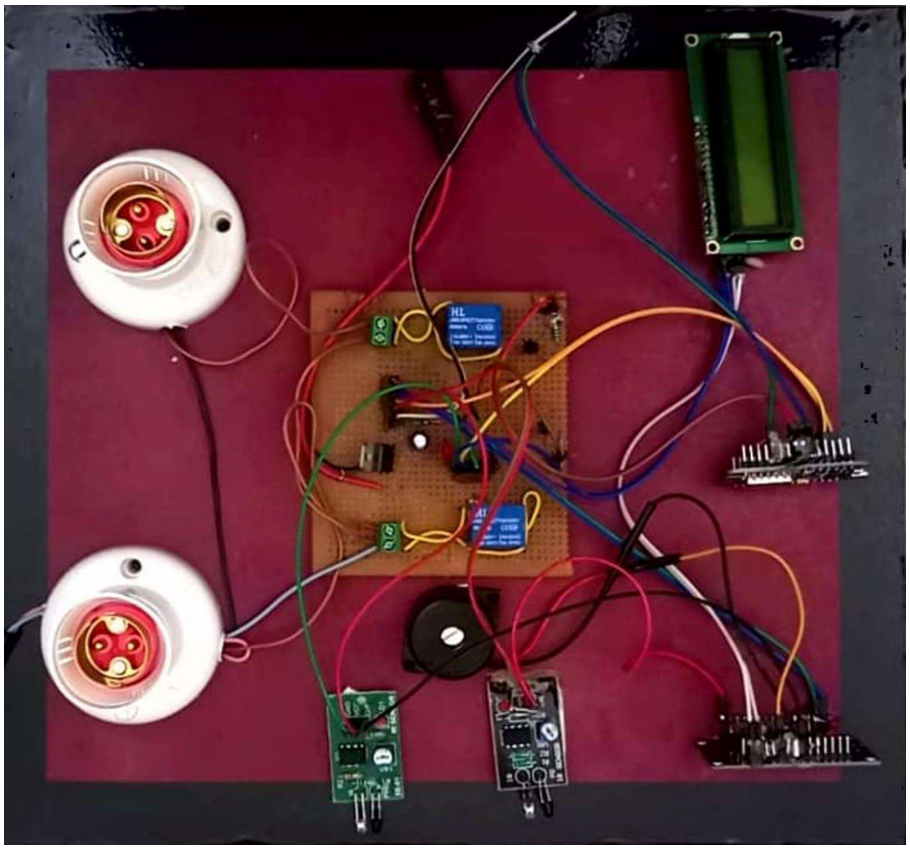

Figure 24: Final project overview.

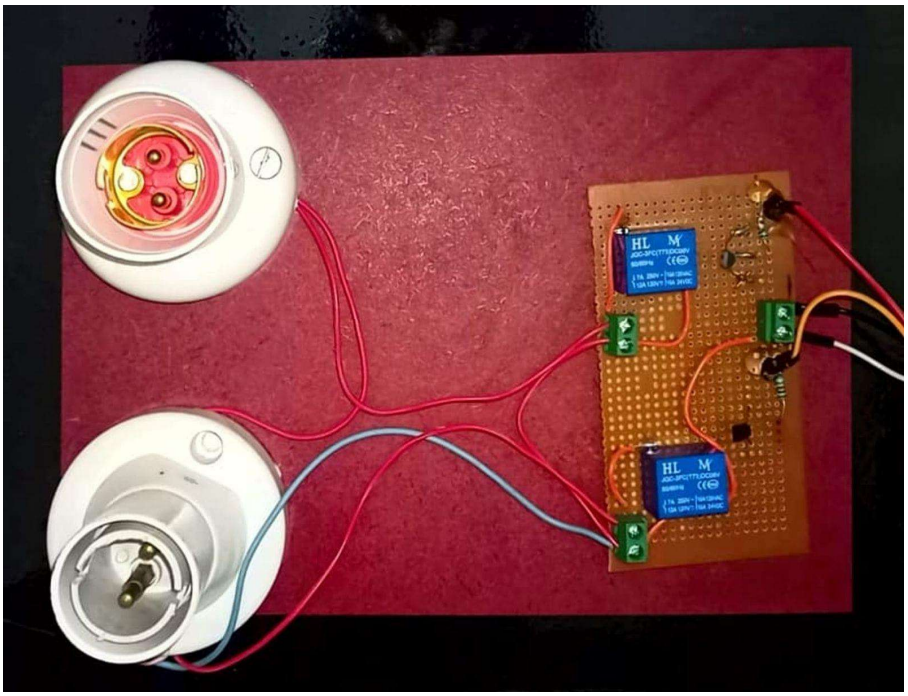

Figure 25: Final external Relay circuit.

CHAPTER 4

RESULT AND CONCLUSION

4.1 Result

After the implementation of the proposed system user can upgrade and expand the automation system. In past, when a user needs to implement a new sensor or when he wants to operate a new AC component. They need to install a whole new setup and it became too costlier and it is a complex process. In our proposed solution-based automation system whenever users want to upgrade, extend or install a new sensor they don't need to change the existing system they can implement it any time in the future. It saves the cost of the automation system and reduces the complexity of new setups.

4.2 Advantages

- This project is helpful for both domestic and industrial automation expeditions.
- This project is user end upgradable and open-source reprogrammable.
- This project is connected with the Blynk IoT server which makes it controllable world widely.
- It has a separated sensor microcontroller that saves the cost of the sensor and reduces the complexity of implementation.

4.3 Limitation

- User should know the programming
- Whenever any other component is added to the project, complete programming is again burned into the memory.
- Whenever the user updates the hardware, latency is in between 3 to 5 seconds according to the component over the server.

4.3 Conclusion:

The automation management system faces a great challenge in the form of continuous growth of technology and lack of knowledge of users about the Internet of things. The conventional method is no longer effective enough for solving complex and challenging up-gradation of the automation systems. Due to the increased amount of automation systems and users, it is very important to take effective steps to reduce the complexity and make it user-end upgradable and open-source reprogrammable. This project replaces the conventional automation system from domestic and industry setup.

This project can operate and control all AC equipment that is present at home and industry (up to 220 volts) using only a relay module because sometimes, a user doesn't want to use any sensor in his custom automation, here our system is able to work without using any sensor, in case user want to use sensors in future, that is possible due to separated sensor microcontroller.

Reference:

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Relay Board Arduino code:

```
// Fill-in information from your Blynk Template here
//#define BLYNK_TEMPLATE_ID           ""
//#define BLYNK_DEVICE_NAME           ""
//#define BLYNK_TEMPLATE_ID "TMPLDjm5hx1q"
//#define BLYNK_DEVICE_NAME "robot"
#define BLYNK_TEMPLATE_ID "TMPLILT44k1Y"
#define BLYNK_DEVICE_NAME "Node-MCU"
#define BLYNK_FIRMWARE_VERSION        "0.1.0"
#define BLYNK_PRINT Serial
//#define BLYNK_DEBUG
#include <Wire.h>  // This library is already built in to the Arduino IDE
#include <LiquidCrystal_I2C.h> //This library you can add via Include Library > Manage Library >
LiquidCrystal_I2C lcd(0x27, 16, 2);
#define ir A0
#define buzzer 0
int counter=0;
int person=0;
#define APP_DEBUG

// Uncomment your board, or configure a custom board in Settings.h
//#define USE_SPARKFUN_BLYNK_BOARD
//#define USE_NODE_MCU_BOARD
//#define USE_WITTY_CLOUD_BOARD
```

```
#include "BlynkEdgent.h"
#define m11 14
#define m12 12
#define m21 13
#define m22 A0
#define pump 15
int pinValue=0;
int pinValue1=0;
int pinValue2=0;
int pinValue3=0;
int pinValue4=0;
int pinValue5=0;
BLYNK_WRITE(V1)
{
 pinValue1 = param.asInt(); // assigning incoming value from pin V1 to a variable
}
BLYNK_WRITE(V2)
{
 pinValue2 = param.asInt(); // assigning incoming value from pin V1 to a variable
 // process received value
}
BLYNK_WRITE(V3)
{
 pinValue3 = param.asInt(); // assigning incoming value from pin V1 to a variable
 // process received value
}
BLYNK_WRITE(V4)
```

```
{
 pinValue4 = param.asInt(); // assigning incoming value from pin V1 to a variable
 // process received value
}

BLYNK_WRITE(V5)
{
 pinValue5 = param.asInt(); // assigning incoming value from pin V1 to a variable
 // process received value
}
void setup()
{
  Serial.begin(115200);
  lcd.init();   // initializing the LCD
  lcd.backlight(); // Enable or Turn On the backlight
  lcd.print(" Hello Makers "); // Start Printing
  pinMode(ir,INPUT);
  pinMode(buzzer,OUTPUT);
  digitalWrite(buzzer,LOW);
  delay(100);
 pinMode(m11, OUTPUT);
  pinMode(m12, OUTPUT);
  pinMode(m21, OUTPUT);
  pinMode(m22, OUTPUT);
  pinMode(pump, OUTPUT);
  BlynkEdgent.begin();
}
```

```
void loop()
{
  BlynkEdgent.run();
 if(pinValue1==1)
 {
  digitalWrite(m11,HIGH);
  Serial.println("forward");
 }
 else
 {
  digitalWrite(m11,LOW);
  Serial.println("forward");
 }
 if(pinValue2==1)
 {
  digitalWrite(m12,HIGH);
  Serial.println("backward");
 }
 else
 {
  digitalWrite(m12,LOW);
  Serial.println("backward");
 }
if(pinValue3==1)
 {
  digitalWrite(m21,HIGH);
```

```
 Serial.println("left");
}
else
{
 digitalWrite(m21,LOW);
 Serial.println("left");
}

if(pinValue4==1)
{
 digitalWrite(m22,HIGH);
 Serial.println("right");
}
else
{
 digitalWrite(m22,LOW);
 Serial.println("stop");
}
}
```

Sensor Arduino Part:

```
#include <Wire.h>  // This library is already built in to the Arduino IDE
#include <LiquidCrystal_I2C.h> //This library you can add via Include Library > Manage Library >
LiquidCrystal_I2C lcd(0x27, 16, 2);
#define ir A0
#define ir1 12
```

```
#define buzzer 14
int counter=0;
int counter1=0;
int person=0;
void setup()
{
  Serial.begin(9600);
  lcd.init();   // initializing the LCD
  lcd.backlight(); // Enable or Turn On the backlight
  lcd.print(" Hello Makers "); // Start Printing
  pinMode(ir,INPUT);
  pinMode(ir1,INPUT);
  pinMode(buzzer,OUTPUT);
  digitalWrite(buzzer,LOW);
}

void loop()
{
  // Nothing Absolutely Nothing!
  counter=analogRead(ir);
  counter1=digitalRead(ir1);
  Serial.println(counter);
  if(counter>512)
  {
   digitalWrite(buzzer,HIGH);
   person=person+1;
   delay(1000);
```

```
  digitalWrite(buzzer,LOW);
  lcd.clear();
 }
  else if(counter1==HIGH)
 {
  digitalWrite(buzzer,HIGH);
  person=person-1;
  if(person==1){person=0;}
  delay(1000);
  digitalWrite(buzzer,LOW);
  lcd.clear();
 }
  lcd.setCursor(0,0);
  lcd.print("counter");
  lcd.setCursor(0,1);
  lcd.print(person);
  if(person>9)
  {
   digitalWrite(buzzer,LOW);
  }
  else
  {
   digitalWrite(buzzer,HIGH);
  }
}
```

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Plagiarism Checker X Originality Report

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SMART INTEGRATED AUTOMATION SYSTEM FOR INDUSTRIAL AND DOMESTIC PURPOSE 1.1 Introduction: In today's world the Automation system has a wide range of applications and is used all over the world and is popular every day but with this new technology many users face the problem of developing or using an existing system and this is a challenge.

Considering the current situation, if any user wants to expand his existing default device, you need to install another system device which should be another Interfacing software. This is very challenging for any user. Automation is used by these methods, namely, Manual and Autonomous. In the case of a manual, the automation is controlled by the user.

In the case of autonomy, it can be managed by looking at the use and signal sensor and setting the time accordingly. This project is based on a vision to solve this challenge. Our team has now come up with a solution to overcome this problem by designing and designing a flexible circuit consisting of two Node-MCU based on the ESP8266 microcontroller.

The project is divided into two phases - the first phase consists of a relay circuit and a relay Node-MCU Relay designed to provide mobility to extend the transmission circuit to a useful endpoint where users want to expand their existing transmission. switching boards. The second part contains another Node-MCU only sensor that will be useful when the user needs to add new sensors to the existing circuit.

Both Node-MCU are integrated which means both microcontroller are connected to the same server as the Internet. The reason for using a separate microcontroller, that is, the

user can upgrade the relay or sensor at the same time or it can be upgraded both at the same time. Our circuit system consists of sensors such as the IR sensor, relay, and lead indicator.

That is only used for the demonstration and function of the sensors with the cluster Node-MCU system. In the Domestic automation system, we represent our home electrical appliances controlled by our mobile operating systems, the model is represented by the control of other bulbs through our mobile operating system. These bulbs work on AC supply and the user can OPEN NOT easily turn off electrical appliances via mobile phone.

Another industry-based industry we know is that there are many sensors running in time and our proposed design is able to work with multiple sensors at a time without affecting the Relay and Relay's Node-MCU. 1.2 LITERATURE REVIEW The history of Automation Systems is not so old back in many years to find out something about Automation System.

With the introduction of IoT, the World of Automated Machines expanded rapidly. IoT (Internet of Things), a portable Internet connection. It could be a fitness tracker, a thermostat, a lock or an appliance, or a light bulb. Kevin Ashton is the inventor and neuroscientist of the consumer who coined the term "Internet of Things" to describe the things that connect the network in the physical world to the internet. The term Internet of Things was established in 1999, originally to develop RFID technology.

But over time, it has become the most widely used term in the Internet. There are several similar concepts but the Internet of Things is the most popular term to describe this situation. Equipment has been providing direct communication since the telegraph (first house phone) was introduced in the 1830s and 1840s.

Described as "wireless telegraphy," the first broadcast of the radio broadcast took place on June 3, 1900, providing a necessary part of the development of the Internet of Things. Computer development began in the 1950's. The first concept of the Internet of Things was not officially invented until 1999, but one of the first examples of IoT in the early 1980's was the Coca-Cola machine, located at Carnegie Mellon University. Back in 1898, Nikola Tesla created the first remote control to use a toy boat.

Tesla has developed a way to use radio waves to send instructions to his boat using a handheld device. In the late 1990s and early 2000s as internet technology rapidly evolved and smart homes became an affordable option. Home technology or 'domotics' was the subject of much discussion as household appliances were integrated into

computers.

The Millennium House was a British exhibition home opened in 1998 to show how home management can be done automatically with computer-controlled heating, lighting, doors and gardens. The research in this study involves the classification of research and research fields according to the research content. In addition, research findings are presented and the concept of further research is summarized. 1.3 Types of Automation System: 1.3.1

Bluetooth-based home automation system using cell phones[1]: In Bluetooth-based home automation systems home appliances are connected to the Arduino BT board in the output ports using a relay. The Arduino BT board system is based on the highly interactive C-language of microcontrollers; the connection is made via Bluetooth. Password protection is provided so only authorized users are allowed access to electronic devices.

A Bluetooth connection is established between the Arduino BT board and the wireless communication phone. In this application, the python script is used and can be installed on any Symbian OS, portable. One circuit is designed and used to get a response to a call, indicating the status of the device. 1.3.2

Zigbee-based home automation system using cell phones[2]: To monitor and control household appliances the system is designed and operated using Zigbee. Device performance is recorded and maintained by network coordinators. For this use a Wi-Fi network, which uses a 4-switch port standard for ADSL wireless modem. SSID network and Wi-Fi security parameters are pre-configured.

The message for security purposes is first processed by a visual home algorithm and when it is said to be safe it is rewritten and transmitted to the real home network device. With the Zigbee network, the Zigbee controller has sent messages to the end. Security and security of all messages received by the visual home algorithm. Reducing system costs and interfering with system sequences Zigbee communications are helpful. 1.3.3

GSM-based home automation system using cell phones[3]: Thanks to mobile phones and GSM technology, GSM-based home automation is a magnetic field of research. SMS-based home automation, GPRS-based home automation, and dual-tone multi-frequency (DTMF) based home automation (DTMF) are the main consideration of GSM communications. The picture shows a logical sketch of A's work.

Alheraish, demonstrates how home sensors and devices interact with the home network

and communicate via GSM and SIM (Subscriber ID module). The system uses a transducer that converts the operation of the machine into electrical signals entering a small controller. System sensors convert physical factors such as noise, temperature, and humidity into another voltage-like value.

The microcontroller analyzes all signals and converts them into commands to be understood by the GSM module. Select appropriate communication channels between SMS, GPRS, and DTFC based on the instructions received by the GSM module. 1.3.4 Wi-Fi-based home automation system using cell phones[4]: Home-based Wi-Fi systems mainly include three modules, a server, a hardware interface module, and a software package. The picture shows the structure of the system model. Wi-Fi technology is used by the server, with Hardware Interface modules to communicate with each other.

The same technology is used to access a web-based application. The server is connected to the Internet, so remote users can access the web server application using a compatible web browser. The latest automated home automation software is divided into server system software and Microcontroller (Arduino) firmware.

Arduino software, developed using the C language, uses IDE with the microcontroller itself. Arduino software is responsible for collecting events on connected sensors, and then applying the action to the actuators and pre-programmed on the server. Another function is to report and record history on the DB server. The home software software package is a web-based program developed using asp.net.

Server system software can be accessed through an internal network or the Internet if the server has a real IP address using any Internet navigator that supports asp.net technology. The server system software is faulty, keeping the entire home system set up, setup, and configuration. The server uses the site to store logs for local system components, preferring to use XML files to store system logs.. 1.3.5

Home automation using RF module[5]: The main goal of the Home App is to build a home automation system using an RF remote control. Now technology is growing faster so homes are also moving smarter. Modern homes deliberately move from the current l switches to the central control systems, which contain RF-controlled switches.

Today traditional wall switches found in various parts of the home make it difficult for the end user to approach them to control and operate. In addition, it is very difficult for older people or those with physical disabilities to do so. Home Automation uses a remote remote solution with simple RF technology. To achieve this, the RF remote control is integrated with a small transmitter on the side of the transmitter that sends

the ON / OFF signals to the receiver to which the devices are connected. By using the remote control switch specified in the transmitter, the goods can be OPENED / OFF worldwide using wireless technology. 1.3.6

Home automation using Android ADK[6]: Home devices are associated with ADK and Connections are established between the Android device and ADK. The house appliances are connected to the board input / output ports (EMBEDDED SYSTEM) and their current status will be extended to ADK. The microcontroller board (Arduino ADK) is based on ATmega2560.

It has a USB host connection to connect to Android-based phones, and that is based on the MAX3421e IC. The two key features of the Android Open Accessory Protocol 2.0 (AOAP) are as follows: It has audio output from Android device to the component and its component support works as one or more Human Interface Devices (HID) Android Device. This paper is based on both Android and Arduino forums which is FOSS (Free Open Source Software).

Including motion sensors for security systems will detect unauthorized action and will automatically notify the user via cell phone or security system. 1.3.7 Cloud-Based home automation system[7]: Home Automation uses a cloud-based system focused on the design and operation of a home gateway to collect data about home electronics and send it to a cloud-based data server for store in the Hadoop Distributed File System, processed.

Map Reduce and use to perform surveillance activities for Remote User Now The Home Automation System is continuously improving its robustness by integrating current features that satisfy the growing human interest. This paper introduces the design and development of dynamic home applications that use cloud computing as a service. The current system consists of three key units: the first part is the cloud-server, which manages and manages customer and user data and status and devices.

The last component of the Home Server, which builds the hardware device and provides user interaction. This paper focuses on building web services using the cloud needed for security and data storage and retrieval. The current system is cost-effective, reliable, and comfortable which also provides a secure home flexibility system for the whole family.

The program is made up of various client modules for various forums. 1.3.8 Raspberry pi automation with wireless sensors using smartphones[8]: The Home Automation System is built with the Raspberry Pi by learning the algorithm and the E-mail title. The Raspberry Pi ensures a successful platform for the implementation of powerful,

economically viable home automation.

Home automation using Raspberry pi is better than any other home automation method in many ways. For example, in DTMF (dual-tone multi-frequency) using home automation, call tax is a major loss, which is not a problem in their proposed route. In-Home Automation uses a web server, a web server design and the required memory space is eliminated by this method because it already uses an already established web server service provided by G-mail. LEDs used to indicate switching action. This system works well and is flexible and interactive.

Sending Commands on Raspberry Pi [9]: Text that runs on the side of our portable computer server or web server receives installation instructions from the user and sends it properly to the client (Raspberry Pi). In this case, we will be using the installation instructions to turn on / off the lamp. If we give the command to turn on the light with the server side script, data and information are transferred to the Raspberry Pi and its GPIO PIN will OPEN the transmission. The system can send current updates to the server to detect if the light is ON / OFF.

Receiving Data from the Raspberry Pi[10]: Using the PIR motion sensor we can send a data signal to the Raspberry Pi, simply run a script that can read the sensor with a GPIO PIN and transfer data to the entire system via the IoT-F platform. This can also be considered an IoT console. 1.3.9 Wireless Home Automation system using IoT[11]: This program uses cell phones or computers to control basic home controls and automatically works online anywhere in the world, an automated home is sometimes called a smart home. It aims to save energy and human energy.

The proposed system is a distributed home system, which includes servers namely Wi-Fi modules, and sensors. The server controls and monitors various sensors, and can be easily configured to manage multiple hardware modules (sensors). Arduino board, with built-in Wi-Fi module works as a web server.

Automation System can be accessed from the web browser of any local PC using an IP server, or remotely from any PC or portable device connected to the Internet with the appropriate web browser via a real IP server (Internet connection). Wi-Fi technology has been selected as the network infrastructure that connects the server with the sensors.

Wi-Fi is preferred to improve system security (using a secure Wi-Fi connection) and increase system mobility and durability. 2.1 Brief Description: Home automation, Intelligent Centre, Home Management, and digital home are just different names for luxury, luxury, safety, and energy saving. These programs are very important these days.

Although such systems are generally expensive, they can also be very economical if one is designing and designing specific needs. There are many ways to manage a smart home system, which includes wireless internet connection. This project will help create a new generation of intelligent automation systems where users can control household appliances such as refrigerators, Air conditioners, Fans, and Industrial Equipment for bulbs and facility equipment can also control. whenever they want and wherever they are with the help of the internet.

This can be expanded with the mobile app which is an open source platform like Android. Apps can be used to create a user-friendly interface using one that will be able to control all types of electronic devices with their Smartphone. There are 3 main modules needed to build this system, Client-Server, Radio Frequency Transceiver, and Microcontroller.

This application can be accessed online through a personal computer or smartphone. This project has two components: Hardware and Software. Computer hardware refers to the development of the device itself which includes circuit construction, installation of a printed circuit board, and the assembly process. Part of the software means designing algorithms, coding, and compiling. It also includes improvements in visual performance.

In the current world the automation system has a wide range and the automation system is used all over the world and is gaining popularity every day but with this new technology many users are facing the challenge of upgrading or expanding the existing automation system, which is a challenge. Considering the current situation, if any user wants to expand his existing default device he needs to install another system device for that should be another Interfacing software. This is very challenging for any user. Automation is used in three techniques, namely manual and autonomous.

In the case of manual, automation is controlled by the user, in an independent mode, it can be controlled by monitoring the usage and signal sensor and setting the time accordingly. Therefore, we come up with this idea to solve this challenge. Our team has now come up with a solution to overcome this problem by designing and designing a flexible circuit consisting of two Node-MCU based on the ESP8266 microcontroller.

The project is divided into two phases - the first phase consists of a transmission circuit and a separate Node-MCU Relay designed to provide mobility to extend the transmission circuit to the end which is useful when users want to increase their existing automation. board. The second part contains another Node-MCU only sensor that will be useful when the user needs to add new sensors to the existing circuit.

Both Node-MCU are integrated which means both microcontroller are connected to the same server as the Internet. The reason for using a separate microcontroller is that the User can upgrade the relay or sensor at the same time or it can be upgraded both at the same time. Our circuit system consists of sensors such as the IR sensor, relay, and lead indicator.

That is only used for the demonstration and function of the sensors with the cluster Node-MCU system. In the Domestic automation system, we represent our home electrical appliances controlled by our mobile applications, the model is represented by the control of other bulbs through our mobile app, these bulbs operate on AC supply and the user can easily turn on and off electrical appliances. using a mobile phone.

Another industry-based industry we know is that there are many sensors running in time and our proposed design is able to work with multiple sensors at a time without affecting the Relay and Relay's Node-MCU. 2.2 Description of Section: 2.2.1 Node-MCU: Node-MCU is an electronic tool designed by the user according to their needs. The Node-MCU is a microcontroller based on ESP8266.

Node-MCU boards can read input - light sensor, finger button, or Twitter message - and convert it into output - turn on the engine, turn on the led, publish something online. The Node MCU has an integrated Wi-Fi module that integrates online activities. For this project, we are using a small Node-MCU controller, both small controls connected to the same server.

One of the Node-MCUs is used to control the transmission module that controls AC components while the second Node-MCU is used for sensors only. devices connected to its PIN. The Arduino details required for this project are as follows- ? Microcontroller-Atmega328p (8-bit family AVR controller) ? Active Voltage-5V ? Input Voltage -7V to 12V ? 6 analog anchors ? Digital I / O pin-14 ? Flash 32 kB memory (0.5 kB boot slide) SRAM - 2KB 2.2.2

Transfer Board: It is a type of electro-mechanical component that acts as a common switch in the automatic control cycle and current control using a low current signal. The input voltage of the transmission signal ranges from 0 to 5V. The relay coil is powered by DC so that the contact switches are turned on or off. A single 5V transmission module usually consists of a coil, as well as two frequently open (NO) and often closed (NC) connections.

Work is done with a coil to magnetize the contacts and drag them together once they

are activated. The spring moves them separately when the coil is not tightened. By using this system there are two main advantages, the first being, the current required for running the relay is small compared to the current used by the transfer contacts. Another advantage is that both the contacts and the coil are galvanically isolated, which means that there is no electrical connection between you.

One channel channel module specifications: 1. Supply voltage - 3.75V to 6V 2. Quescent current: 2mA 3. Current if the relay is working: ~ 70mA 4. Transmission high voltage - 250VAC or 30VDC 5. High Relay current - 10A Benefits: 1. Remote device can be easily controlled 2. It is processed now slightly but can also activate powerful machines 3. Your contacts can easily be changed 4.

At a time, fewer contacts can be controlled using a single signal 5. The active part can be divided 6. It can switch AC or DC Applications: 1. Used in high voltage / low voltage protection system 2. Important Changes 3. Control motor speeds using start-delta converters 4. Automatic electrical equipment 5. To change the AC voltage using a small DC 6. Home automation projects 2.2.3

IR Sensor: IR sensor is an infrared sensor that emits to sense certain parts of the environment. It can measure the temperature of an object and detect movement. It is one of the most basic and popular sensor modules in the electronic detection system. This sensor is similar to the human visual senses. The sensor is adjusted in front of the car so that the sensor can monitor obstacles.

In the event of an obstacle or hit the appropriate sensor will send a message to all registered numbers notifying the location and incident using the GPS system via the GSM module. This sensor must be adjusted in such a way that it can detect obstacles. The infrared sensor is used to detect obstacles by transmitting infrared signals, this infrared signal appears on the object and the signal is received from the infrared receiver. The range of infrared frequency is between the microwave and the visible spectrum of light.

The operation of any Infrared sensor is governed by three laws: the law of Planck's Radiation and Stephen. 2.2.4 Electrical control: The 7805 voltage regulator IC is used in an emergency vehicle to provide 5V-supply to the Arduino Uno and IR sensor from a 12-volt battery. The 7805 is an integrated voltage control circuit. It is a member of a 78xx series of ICs that control the power of a constant line power.

The power source in the circuit may be flexible and will not provide stable output. The voltage regulator IC maintains the output voltage at a constant value. The xx to 78xx

shows that the 7805 offers +5V controlled power. Capacitor values ??can be connected to the input and output pins depending on the appropriate power levels. 2.2.5

Buzzer: An audio display device such as a beeper or buzzer can be electromechanical or piezoelectric or machine type. The main function of this is to convert the signal from sound to sound. Typically, it is powered by DC voltage and is used in timers, on alarm devices, printers, alarms, computers, etc.

Based on various designs, it can produce various sounds such as alarm, music, instrument and siren. The buzzer PIN configuration is shown below. It includes two pins namely positive and negative. The positive term for this is represented by a '+' sign or long term. This terminal is powered by 6Volts and the negative terminal is marked '-' with a symbol or short term and is connected to the GND terminal.

Terms of service: The principle of operation of the buzzer is based on the idea that, once the voltage is supplied to the whole piezoelectric object, then a pressure difference is generated. The piezo type consists of piezo crystals between two conductors. Once the potential difference has been given to all of these crystals, then they move one conductor and drag the additional conductor to their interior.

So this continuous action will produce a sharp sound signal. 2.2.6 BC547 Transistor: The BC547 transistor is an NPN Transistor. A transistor is nothing but a resistance transmission that is used to increase current strength. The small terminal current of this transistor will control the maximum current emitter power and base terminals.

The main function of this transistor is magnification and switching purposes. The maximum current value of this transistor is 800A. Similar transistors are BC548 & BC549. This transistor operates at a constant DC voltage at the preferred location of its characteristics called bias. In addition, the series of these transistors can be divided into three groups based on current gain BC547A, BC547B & BC547C.

Transistor Working Areas: BC547 Works in two regions 1. Forward Bias and 2. Reverse Bias. In forward bias mode, two terminals such as emitter & collector are connected to allow power to flow through them. Although in the distorted mode, it does not allow the current to flow through it because it acts as an open switch.

Features ? Profit DC current (hFE) = 800 A ? Continuous Ic (current collector) = 100mA ? VBE (emitter-base voltage) = 6V ? IB (current base) = 5mA ? The frequency change is 300MHz ? Power consumption is 625mW 2.3 Software Requirements: 2.3.1 Arduino IDE: ARDUINO Software (IDE) is an open source tool that makes it easy to write code and

upload it to ARDUINO board.

Arduino Integrated Development Environment (IDE) is a cross-platform application (Windows, macOS, and Linux) written in Java programming language. It is used to write and upload programs to compatible Arduino boards, but also, with the help of 3rd cores, other vendor development boards. IDE source code is issued under the GNU General Public License, version 2. Arduino IDE supports C and C ++ languages ??using special code-building rules.

Arduino IDE provides software library from the Wiring project, which provides many common input and output processes. User-coded code requires only two basic functions, the first drawing and the main program loop, which is integrated and linked to the main program stub () into a profitable control program using the GNU toolchain, which is also integrated with IDE distribution.

Arduino IDE uses the avr of the program to convert usable code into a text file in a hexadecimal text that is downloaded to the Arduino board via an uploader program on the firmware of the board. Programs written using ARDUINO Software (IDE) are called diagrams. These images are written in a text editor and saved with a file extension (.ino). Editor has cutting / pasting and search / editing features.

The message area provides feedback while saving and exporting and also removing errors. The console removes the output of the ARDUINO (IDE) software, which includes complete error messages and other information. When the drawing is uploaded, ARDUINO boot loader, small program l 3.1

Circuit diagram: The circuit diagram of the proposed system is explained under the following two sections: 3.1.1 First Prototype Automation System Based on a single Node-MCU: In the circuit diagram of this project the Node-MCU acts as the mother board for our default system based on Microcontroller ESP8266. Node MCU operates in 3.3V-5V.

Here we are connected by two R1 relays, R2 to pin number 11,12 of the reputable Node-MCU, through the Relay exit using two 3.3V LEDs, two IR sensors are used on pin number 3,4 of the Node- MCU respectively and the output display on the LED (16x2). In Figure 18 Circuit diagram of the external relay circuit of our automation system represents that on this circuit board there are two relays R3, R4 connected to the connector and the power source of one previous circuit, the output of these two relay systems LED1 and LED2.

At this point, we controlled our circuit board in 9V battery supply. Figure 19 shows the Prototype design using the Fritzing Tool after the implementation of the circuit block diagram using our region in the Fzitzing tool. Fritzing is a software tool that allows users to write these electronic prototype projects and share them with others.

Thanks to its precise method, it can help teach electrical appliances to people who do not have an engineering background. We run our wired circuit using this toolkit and after that, the system works fine. 4.1 Result After the implementation of the proposed system the user can upgrade and expand the automation system.

In the past, when the user needed to use a new sensor or when he wanted to use a new AC component. They need to install a new set and it is very expensive and it is a complicated process. In our proposed solution-based automation system whenever users want to upgrade, expand or install a new sensor they do not need to change the existing system they can use it anytime in the future. It saves the cost of the automation system and reduces the complexity of the new setup. 4.2

Benefits ? This project is useful for both automated domestic and industrial travel. ? This project can be upgraded at the end of the user and redesigned the open source. ? This project is connected to the Blynk IoT server which makes it accessible worldwide.

? It has a separate sensor microcontroller that saves sensor costs and reduces the hassle of use. 4.3 Limit ? User should know the program ? Whenever another component is added to a project, the entire layout is burned and in memory. ? Whenever a user updates computer hardware, the delay is between 3 and 5 seconds depending on the part on the server. 4.3

Conclusion: The automated management system faces a major challenge in the form of continuous technological growth and a lack of user knowledge about the internet of things. The conventional approach is no longer effective enough to address the development of changing and challenging systems. Due to the increase in the number of automated programs and users, it is very important to take effective steps to reduce complexity and make the user conclusion improved and reorganized open source. This project replaces the standard automation system from home and industry settings.

This project can operate and control all existing AC and home appliances (up to 220 volts) using only the transmission module because sometimes, the user does not want to use any sensor in his custom automation, here our system can operate without using any sensor , in case the user wants to use sensors in the future, that may be due to a separate sensor microcontroller.

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Smart Integrated Automation System for Industrial and Domestic Purpose

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ABSTRACT: Automation device has a wide scope for this Generation as well as in the forthcoming generation. In this wide scope, Mobile communication technology is playing a major role in the world of automation but In today's world upgrading the automation system is a major concern. It became more costly when the automation system needs up-gradation. As a solution, we have successfully implemented a smart integrated automation system for both industrial and domestic purposes, by this system we can easily expand our existing automation system. This article is fully based on a low-cost and reliable automation system for accessing and controlling devices and appliances remotely using a NodeMCU-based Smartphone application. We worked with three major goals that are Provide an expendable automation circuit by user end, that can implement for both industrial and domestic automation and last, and this is open source re-programmable.

KEYWORDS: Automation System, NodeMCU, IR sensor.

I. INTRODUCTION

In the current world automation system has a wide scope and automation system is used world wild and becoming popular day by day but in this new technology many users are facing the problem of upgrading or expanding the existing automation system, which is challenging. If we consider the current scenario, if any user wants to expand their existing automation device they need to install another system device for that must be another Interfacing software. This is very challenging for any user. Automation is used by two techniques, i.e. manual and autonomous. In the case of a manual one, automation is controlled by the user, in the case of autonomous, it can be managed by observing the use and signal of the sensor and set time accordingly. So we come up with this idea to solve this challenge. Now our team proposed a solution to overcome this issue we plan and design an automation circuit that contains two NodeMCU that are based on the ESP8266 microcontroller. This project is divided into two sections- the first section is containing a relay circuit and a separated NodeMCU for Relay that is designed to give mobility for expanding the relay circuit at the user end which ishelpful when user want to expand their existing relay automation board. The second part contains another NodeMCU with a sensor only that will be helpful when the user needs to add new sensors to an existing circuit. Both the NodeMCU clustered which means both the microcontroller are connected over the same server and internet. The reason for using a separated microcontroller is, i.e. User can upgrade the relay or sensor separately or it can be upgraded both at the same time. Our circuit system contains some sensors like an IR sensor, relay, and led display. That is used only for the demonstration and shows the working of sensors with the cluster NodeMCU system. In the Domestic automation system, we represent our home appliances are controlled via our phone applications, model is represented by the control of some bulbs via our mobile application, These bulbs are working on AC supply and the user can easily turn ON and OFF appliances via using the mobile. Another is industrial-based, in the industry we know that there are many sensors working at a time and our proposed design is capable to run with multi-sensors at a time without affecting Relay and Relay's NodeMCU.

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II. BLOCK DIAGRAM

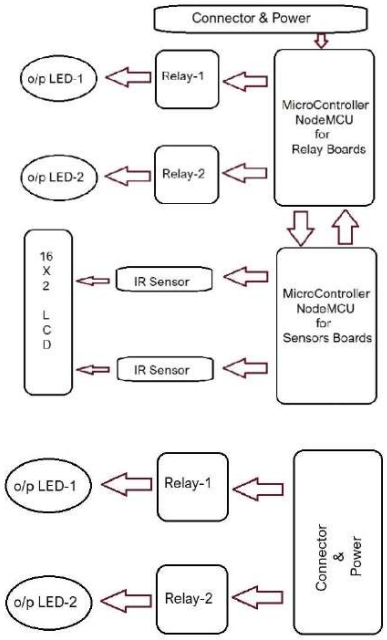

Fig 1: Block Diagram

III. COMPONENTS

3.1. NodeMCU

NodeMCU is an electronic device which is programmable at the user end according to their requirements. NodeMCU is an ESP8266-based microcontroller. NodeMCU boards are able to read input – light on sensors, a finger on a button, or a Twitter message- and turn it into an output – activating a motor, turning on a led, publishing something online. Node MCU has an integrated Wi-Fi module that makes it compatible to perform tasks over the internet. In this project, we use two NodeMCU microcontrollers, both microcontrollers are connected over the same server. One of the NodeMCU is used for relay module control which is able to control AC components and the second NodeMCU is used for sensors only. Specifications of Node MCU which is required in this project are as follows-

- Microcontroller-ESP-8266(32-bit) microcontroller
- Operating Voltage- 3.3v
- Input Voltage – 4.5v-10-v
- Analog pins-1
- Digital I/O pin-11
- Flash memory- 4 MB (0.5 kB for bootloader)
- SRAM - 64KB
- Frequency (clock speed) -80MHz

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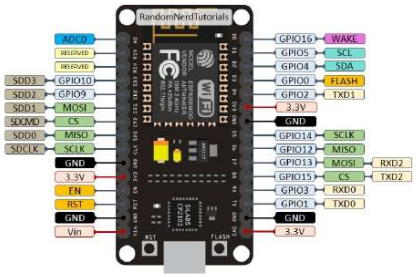

Fig 2: NodeMCU

3.2. Relay Sensor

Relay is a kind of electro-mechanical component that functions as a switch that is commonly used in the automatic control circuits and to control a high-current using a low-current signal. The input voltage of the relay signal ranges from 0 to 5V. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts, normally open (NO) and normally closed (NC). Working is done through a coil to magnetize the switch contacts & drag them jointly once activated. A spring drives them separately once the coil is not strengthened. By using this system there are mainly two benefits, the first one is, that the required current for activating the relay is less as compared to the current used by relay contacts for switching. The other benefit is, that both the contacts & the coil are isolated galvanically, which means there is no electrical connection among them.

Fig 2: Single-Channel Relay Module Specifications

Specification:

- Supply voltage – 3.75V to 6V
- Quiescent current: 2mA
- Current when the relay is active: ~70mA
- Relay maximum contact voltage – 250VAC or 30VDC
- Relay maximum current – 10A

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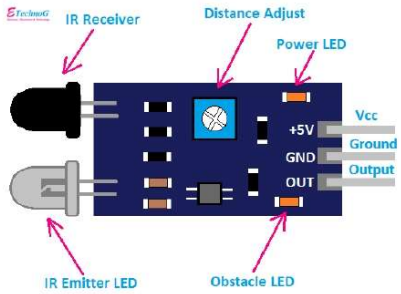
Advantages**:**

- A remote device can be controlled easily
- It is triggered with less current but it can also trigger high power machines
- Easily contacts can be changed
- At a time, several contacts can be controlled using a single signal
- Activating part can be isolated
- It can switch AC or DC

3.3 IR Sensor

IR sensor is an infrared sensor that emits in order to sense some aspects of surroundings. It can measure the heat of the object as well as detects motion. It is one of the basic and popular sensor modules in electronic devices for counting purposes and detection in automation. This sensor is equivalent to human's visionary senses. This sensor should be fixed in such a way that it shall sense the obstacles. **An infrared sensor**is used to detect obstacles by transmitting **infrared** signals, this **infrared** signal is reflected from the surface of an object and the signal is received at the **infrared** receiver. The frequency range ofinfrared lies between the microwave and the visible light spectrum.



3.4 16x2 LCD Module

The term LCD stands for Liquid Crystal Display. It uses a plane panel technology, used in screens of computer monitors & TVs, smartphones, etc. It is an electronic device that is used to display data and the message is known as LCD 16×2. it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. 16 X2 displays mostly depend on multi-segment LEDs. There are different types of displays available in the market with different combinations such as 8×2, 8×1, 16×1, and 10×2, however, the LCD 16×2 is broadly used in devices, DIY circuits, electronic projects due to less cost, programmable friendly & simple to access. The basic working principle of LCD is passing the light from layer to layer through modules. These modules will vibrate & line up their position on 90o that permitting the polarized sheet to allow the light to pass through it. These molecules are accountable for viewing the data on every pixel. Every pixel utilizes the method of absorbing light to illustrate the digit. To display the value, the position of molecules must be changed to the angle of light.

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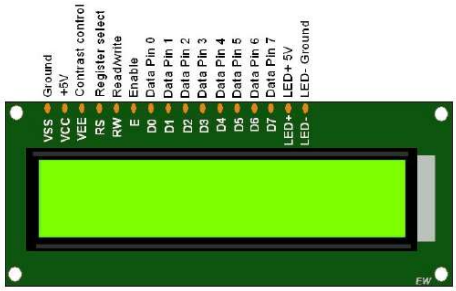

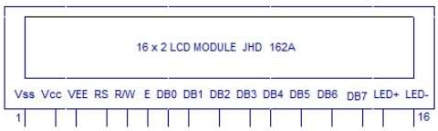

IV. METHODOLOGY

In this project, NodeMCU is used as the motherboard of the whole system. The first part of the system, which is basically the main system with a NodeMCU, is connected with 2 relay modules and also connected with another NodeMCU. The second NodeMCU is used for sensor control. The relay module enabled control of the AC component and this NodeMCU has the custom port to extend the relay module to 2 to 4(up to 14 relay modules). NodeMCU is programmed using Embedded C in such a way that, the user can reprogram just by adding some block of code which is also provided. In normal conditions, the user can control two AC components. In the second part of the system, the circuit board has the relay module and sensor ports in which users can install any kind of sensor like IR sensors, PIR sensors, temperature sensors, etc. For demonstration purposes, we use an IR sensor that is connected to the input port of NodeMCU and show output over the 16x2 LCD. The demonstration IR sensor counts the number of incoming and outgoing boxes. The second part of the system is an extended circuit board, which the user can use when he needs more relay module ports or sensor ports without changing the microcontroller.

V. RESULT

After the implementation of the proposed system user can upgrade and expand the automation system. In past, when users need to implement a new sensor or when they want to operate new AC components they need to install a whole new setup and it became too costlier and it is a complex process. In our proposed solution-based automation system whenever users want to upgrade, extend or install a new sensor they don't need to change the existing system they can implement it any time in the future. It saves the cost of the automation system and reduces the complexity of new setups.

VI. ADVANTAGES

I. This project is helpful for both domestic and industrial automation expeditions.
II. This project is user end upgradable and open-source reprogrammable.
III. This project is connected with a Blynk IoT server that makes it a controllable world widely.
IV. It is a separated sensor microcontroller that saves the cost of the sensor and reduces the complexity of implementation.

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VII. CONCLUSION

The automation management system faces a great challenge in the form of continuous growth of technology and a lack of knowledge of users about the Internet of things. The conventional method is no longer effective enough for solving complex and challenging up-gradation of the automation systems. Due to the increased amount of automation systems and users, it is very important to take effective steps to reduce the complexity and make it user-end upgradable and open-source reprogrammable. This project replaces the conventional automation system from domestic and industry setup.

This project is able to operate and control all AC equipment that is present at home and in the industry (up to 220 volts) using only a relay module because sometimes users don't want to use any sensor in their custom automation, here our system is able to work without using any sensor, in case user want to use sensors in future, that is possible due to separated sensor microcontroller.

VIII. ACKNOWLEDGMENT

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