GSM BASED HOME AUTOMATION AND SMART SECURITY SYSTEM

BY

Hossain Mahmud Bijoy
ID: 182-15-2134
AND

Salim Sadman Showmik
ID: 183-15-2266

This Project submitted in Partial Fulfillment of
the Requirements for the Award of Degree of
Bachelor of Science in Computer Science and Engineering

Supervised by

Fatema Tuj Johora
Sr. Lecturer
Department of CSE
Daffodil International University

Co-Supervised By

Mohammad Jahangir Alam
Sr. Lecturer
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DAHAKA, BANGLADESH

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APPROVAL

This Project titled **"GSM Based Home Automation and Smart Security System"**, submitted by Salim Sadman Showmik ID No: 183-15-2266 and Hossain Mahmud Bijoy ID No: 182-15-2134 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 01 February 2023.

BOARD OF EXAMINERS

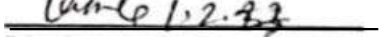
Chairman

Dr. Touhid Bhuiyan
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

Tania Khatun (TK)
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner



Ms. Lamia Rukhsara (LR)
Senior Lecturer
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

External Examiner

Dr. Mohammad Shorif Uddin
Professor
Department of Computer Science and Engineering
Jahangirnagar University

DECLARATION

This is to certify that this project and thesis entitled "**GSM Base Home Automation and Smart Security System**" is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Computer Science and Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering.

Supervisor by:

30.1.23

Fatema Tuj Johora
Sr. Lecturer
Department of CSE
Daffodil International University

Co-Supervisor by:

Mohammad Jahangir Alam
Sr. Lecturer
Department of CSE
Daffodil International University

Signature of the candidates

Hossain Mahmud Bijoy
ID: 182-15-2134
Department of CSE
Daffodil International University

Salim Sadman Showmik
ID: 183-15-2266
Department of CSE
Daffodil International University

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ABSTRACT

A home automation system is an extension of the current activities that are implemented in the home and this home automation system can be easily developed. The primary purpose of this project is to develop a smart and cost-effective home automation machine using IOT that is remotely controlled by means of any Android OS smartphone. This project will install, control home electronic devices like TV, fans, security lock, lights, sensors, etc. So using the internet on a very low budget. With the advancement in automation technology, life is getting easier and simpler in all aspects. Home automation technology is based on **ESP32+SIM800L** devices, motion sensor, fire sensor, mobile app, web app and security lock. Home atomization using **ESP32+SIM800L** which are a GPS model and using Blynk app. Blynk is used as a third-party application. It provides open source users with automation design at a lower cost. This makes the life of the common man very easy.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Home security has changed a lot over the past century and will continue to do so. Security is an important aspect or feature of smart home applications. The new concept of smart home provides residents with a comfortable, convenient and safe environment. Traditional security systems protect homeowners and their property from intruders by providing information in the form of short messages. However, smart home security systems have many other benefits. The main concept behind this work is to receive the sent SMS, process it further if necessary and perform some operations. The smart home can be easily described as a fully automated home that performs set tasks, provides feedback to home users, and responds appropriately to situations. Intelligent home security systems such as control networks and communication systems, emergency calls, and intrusion detection systems require automated and controlled systems both near and far from the control. This paper aims to design a GSM-based home security system that detects intrusion into a monitored area via PIR. [1]

For home security, the intruder alarm has a transmitter paired with a portable his receiver that allows him to be Send SMS. The device will send an SMS in an emergency to alert homeowners. A number provided to the system. The system consists of sensors, a GSM modem, and a microcontroller component to control the device. Home security has changed a lot over the past century and will continue to do so. Security is an important aspect or feature of smart home applications the new concept of smart home provides residents with a comfortable, comfortable and safe environment. [2]

Traditional security systems protect homeowners and their property from intruders by providing information in the form of short messages. However, smart home security systems have many other benefits. The main concept behind this work is to receive the sent SMS, process it further if necessary and perform some operations. A smart home can be easily described as a fully automated home that performs set tasks, provides feedback to home users, and responds appropriately to situations. Intelligent home security systems, such as control networks and communication systems, emergency and intrusion detection systems require automated and controlled systems both near and far from control [3].

This document aims to design a GSM-based home security system for detecting intrusions into monitored areas via PIR. For home security, a burglar alarm has a transmitter paired with a portable receiver that cans text her if there is a break-in or forced entry into the home while the owner is away. To alert the homeowner, the device will send her an SMS to the emergency. A number provided to the system. The system consists of sensors, a GSM modem, and a microcontroller component to control the device.

1.2 Motivation

Home automation is on the rise in recent years. IOT's ever-evolving technology puts everything under control, and smarter and more advanced home automation solutions are here. To improve living standards, devices must be fully automated without user intervention. This makes it easier for end-users to interact with the device as the device learns and responds to user requests without the user having to physically press a button. Wired sensor systems are more difficult to manage and require many wired in different locations. Therefore, the wireless sensor node is gaining importance and becoming a key factor for efficient implementation of home automation. Energy saving is one of the key advantages of home appliance automation. Therefore, users must be informed about the energy consumption of automated devices. In developing countries, where people juggle hectic schedules, efficient energy savings and comfort at affordable prices are of paramount importance. Due to security breaches, many homes need home security these days with his security features of various kinds you can live a safe life at home.

1.3 Objective

- The goal of this project is to develop a home automation system in a better way to provide the customer with full manipulate over all remotely controllable elements in their home.
- It works on ESP32 micro-controller based complete system so we can easily grasp how it works.
- The automation system will be able to be controlled using a mobile application.

1.4 Expected Outcome

- Home automation protects your home by allowing you to see your front door from your smartphone or tablet. So you don't have to worry about leaving your keys at home.
- Home automation keeps your family comfortable.
- Home automation allows you to turn on your air conditioner before you even get home, so you'll be comfortably cool when you get home.
- Home automation saves money and energy by eliminating the need to leave appliances and lights on when not in use or when no one is home.
- Home Automation lets you manage your home from anywhere.
- You can keep track of your belongings even when you're away from home on vacation.
- Home automation means less to worry about.
- The greatest advantage of automated systems is peace of mind and peace of mind.

1.5 Report Layout

Everything about this project is written here in chapter 1. Why I chose this project, how this project will be completed, motivation, objective, expected result etc. briefly discussed.

In Chapter 2 Discuss the background of the project Related work for this project is briefly discussed here. Also discuss the benchmarking studies, scope of the problem, and challenges for this project.

In Chapter 3,We discuss the specification requirement here. Here we also briefly discuss business process modeling, requirements gathering and analysis, Block diagram and circuit diagram, logical data model, and design requirements.

In Chapter 4 here briefly discuss about front-end design, back-end design, interaction design and UX, implementation requirements.

In chapter 5 here we discuss about Database implementation, Front-end design implementation, Interaction implementation, Testing implementation, Test results and brief report.

In Chapter 6 here we discuss the topic Impact on Society, Impact on the Environment, Ethical Aspects.

In Chapter 7 we discuss the discussion and conclusions, the scope of further development**.**

CHAPTER 2
BACKGROUND

2.1 Introduction

We live in the internet age; life has become smarter and more convenient for us these days. The net has introduced unattainable and first-rate opportunities for humans that join us with the idea of creating an automated clever gadget. The concept of an automated smart gadget has emerged from the rapid growth of the net and can reduce risk in any gadget without human involvement. International research continues on efficient power consumption of electrical systems or devices to reduce wastage through human intervention. The performance of such an energy management system can lead us to the applicable goal of an automation machine that can be used continuously with safety without human intervention.

For this globally promising concept within the electrical area, we had our thoughts to work on what could be useful in this field. Internet of Things (IOT) machines has a large field of research or painting. Home automation gadgets are one of the most talked about, promising and globally researched IOT sectors. This home automation device has already made a big impact on the subject of our age, which is now looking to reduce the usual energy waste. Home power management systems (HEMS) are now the primary objective of reducing energy loss, dangerous system outages and loss of human life. Many research papers from IEEE and a few works and pages posted on line have a huge and fundamental idea percentage about these items, how we can buy our power and reduce machine potential. These principles and their research make our research approach almost overwhelmingly speculative. For this reason, the tasks and objectives for this research paper have been focused on. [4]

These articles and magazine ideas are information on IOT, its packages and well-sized areas of research, home automation, smart home, home equipment, home power control machines, smart meters, planning with smart appliances, differences between harnessed electricity and solar electricity, energy in our US. Acceptance. All these concepts are powerful to achieve the conclusion and choice of energy saving control function for this painting.

In the contemporary situation of our country, electricity may be in great need. Similarly, the proper use of human available energy is not mentioned. People often forget to show lighting and household appliances outside the door of the house. Still, home automation apps let you manipulate. [5]

Describes a version of home automation using Bluetooth via PC. Unfortunately this device does not support cellular technology. An easy way to use your smartphone remotely. People are running around trying to complete everything on our list. We shouldn't endure the stress of opening doors or turning off appliances. This means you can gain valuable time and be more productive on a daily basis. [6]

Amul Yadav has developed software in a conventional XML layout that can be ported to other mobile tools without difficulty to concentrate on a single platform. Each of these structures has its own specific characteristics and some lack development compared to others. [7]

Our layout device has a prototype software layer. The software is capable of synthesizing voice data by reconstructing Google Voice. Composite data is analyzed and processed in a uniform manner. Underneath the general show, our arrangement system offers features to operate domestic home appliances using voice commands. Our goal is to be specific in that it has applications in the amount of personal equipment management software programs.

2.2 Related Work

Within the related work, there are several posts cited in recent cell vs. machine, machine vs. mobile, or device vs. gadget talks. These include: Deployment of a prototype including a cellular tea medical system with interfaces to sensors on the affected person's body Use of GSM simulations [8]; Mobile device development using Wi-Fi LAN [9]; Force size devices monitor ambient air volume with GPS, GPRS modems and better RISC devices [10]; Design of remote control of sensors and actuators using GSM module [11]; and Self-designed human stimulation system using microcontroller integrated software [12]. At the same time, the machine developed in [13] automates the intensity analyzer and transfers the wasted energy to the electronic challan machine in the reception area. The gadget works by integrating a GSM module which connects to a digital electricity meter kWh. Send energy usage SMS messages to authorized offices using GSM network. The legal department retrieves and processes the received SMS messages, analyzes the meter, calculates the payment amount and sends the refund to the customer through SMS. The figure given by [14] is an enhancement of a built-in water biller with SMS function. This gadget is designed to simplify the management of your monthly billing system without human intervention. The system receives the SMS from the counter in a semantic database. Results records are processed to provide up-to-date billing. The machine will again send an SMS

notification to the person about the total amount invoiced. Machines are starting to use Visual Base and databases, which are great for prototyping, and the tool works great for sending SMS to users for notifications. Vehicle Speed Detection Using SMS [15] was a black box design for alarm vehicles that clearly monitors bus overspeeding via SMS.

2.3 Comparatives Analysis

- **Reduced installation costs:** First and foremost, installation costs are significantly reduced considering the fact that no cabling is critical. Stressed out answers require wiring, the material in which wiring is expensive without a specialist.
- **System scalability and easy extension:** Establishing a wireless network is mainly advantageous when, due to new or changing requirements, expansion of the network is essential. Compared to stressed installations, where cabling extension is tedious. This makes wireless installation a key investment.
- **Aesthetical benefits:** Apart from protecting a larger area, this feature enables the exact aesthetic requirements to be fulfilled. Examples are consultant buildings with all-glass structures and historic homes where design or conservation objectives no longer permit the installation of cables.
- **Integration of mobile devices:** With wireless networks, connecting cellular gadgets, including PDAs and smartphones, to automation systems becomes viable anywhere and anytime, as a connection does not necessarily require a specific physical vicinity of a tool (as long as the tool reaches the network).
- For all these purposes, Wi-Fi generation is not only an attractive choice in maintenance and renovation, but also for new installations.

2.4 Scope of the Problem

A common characteristic of successful innovation is its ability to make lifestyles less complicated. We have a major power breakdown in you. Additionally, due to our hectic schedules we regularly neglect to exchange our home appliances, resulting in excessive energy payments. Home automation is all about dealing with your own home and life in general. You can operate lights and various home appliances remotely by turning them off when they are no longer in use. It can reduce your energy payments. Nowadays, the main problem for security, there are tragedies with theft, due to the past of special nights when users are not at home, thieves have become intelligent and to join the use of the present era, and almost they have sensors in mind that they fear. Someone else phones you at home.

2.5 Challenges

The main attenuation in this project is internet connection. The range of home automation is constantly evolving as new technologies are developed. Home automation systems can be used to control a wide variety of devices and systems in your home, including lighting, security, climate control, and entertainment. However, with so many devices and systems to control, home automation can be difficult to set up and maintain. Each device or system must be compatible with other devices in order to work seamlessly together. Additionally, you may need your own specific software or apps to control each device or system. For these reasons, home automation works best when carefully planned and implemented. By working with a professional home automation company, we can ensure that the system is installed correctly and compatible with all devices.

CHAPTER 3
REQUIREMENT SPECIFICATION

3.1 Business process modeling

This figure shows the business process modeling of this IoT home automation. Here, the user wants to improve the smart home security system in his home. If a user wants to add a smart security system and home control app. Next, he spoke to several companies to discuss how much it would cost to build an intelligent security system. These companies come to his home and set up the systems required by the users in their home business processes.

The model is shown in Figure 3.1.

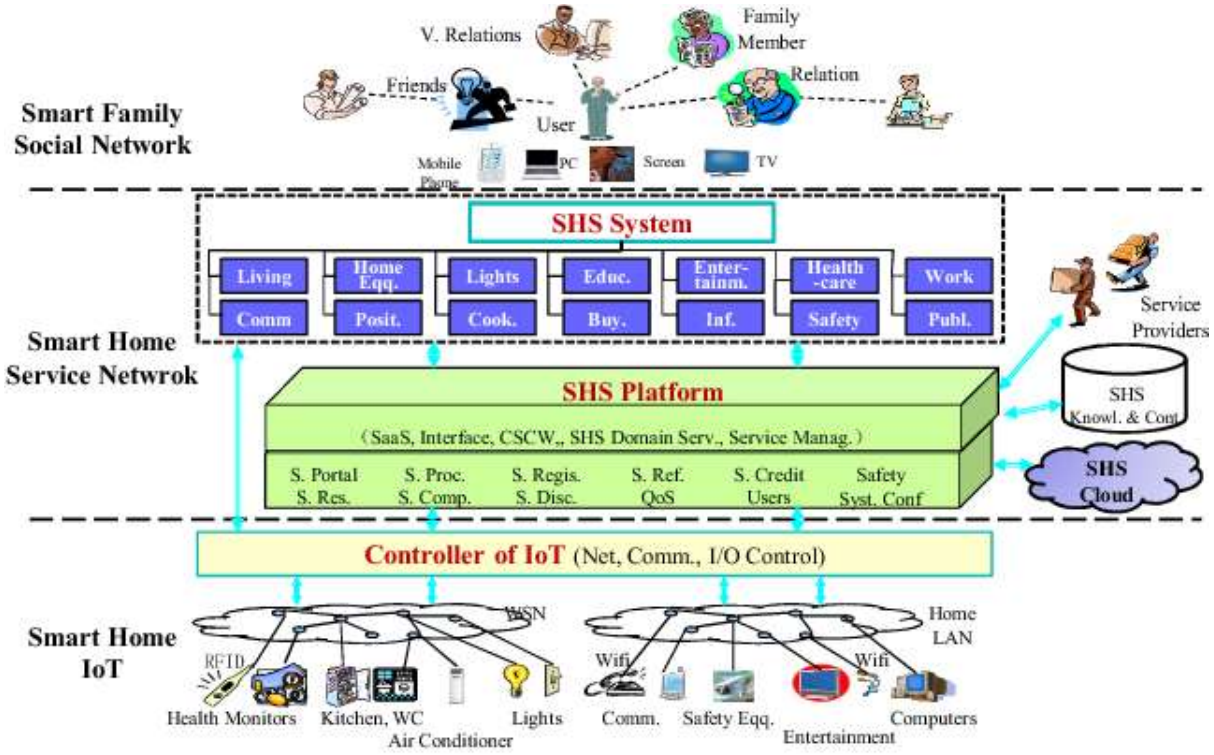

Fig 3.1: Business Process Model.

3.2 Requirement Collection and Analysis

Requirements analysis is an important part of any project. He believes that there are two types of requirements: functional and non-functional. The functional requirements are the working process of GSM Modular ESP32 SIM800L applications and features. The non-functional requirements define the application, behavior and efficiency of the GSM Modular ESP32 SIM800L.

- Functional Requirement:
  - The Android app must have a sign-in and sign-in option for the user.
  - The app must have a sign-in and sign-in option using Gmail address and password.
  - The app must connect to the ESP32 SIM800L GSM module.
- Non-functional Requirement:
  - Android applications require a user interface.
  - User interface should be mobile friendly.
- Cost Analysis

Table 3.1 Project cost analysis.

Serial No.	**Name**	**Quantity**	**Price (BDT)**
1.	ESP32+SIM800L	1	2000
2.	5V Relay	2	60
3.	BC547 Transistor	3	15
4.	DC Fan	1	50
5.	AC Bulb	2	100
6.	Bulb Holder	2	100
7.	IC7805	1	15
8.	DC Power Socket	1	10
9.	9V Adapter	1	150
10.	Bread Board	1	100
11.	PVC Board	1	200
12.	Jumper Wire	1	100
	Total	**17**	**2900**

3.2 Block Diagram and Circuit Diagram

Block Diagram:

This topic describes the techniques that have been applied in home automation. The main topic protected in this chapter is how this project is to simulate.

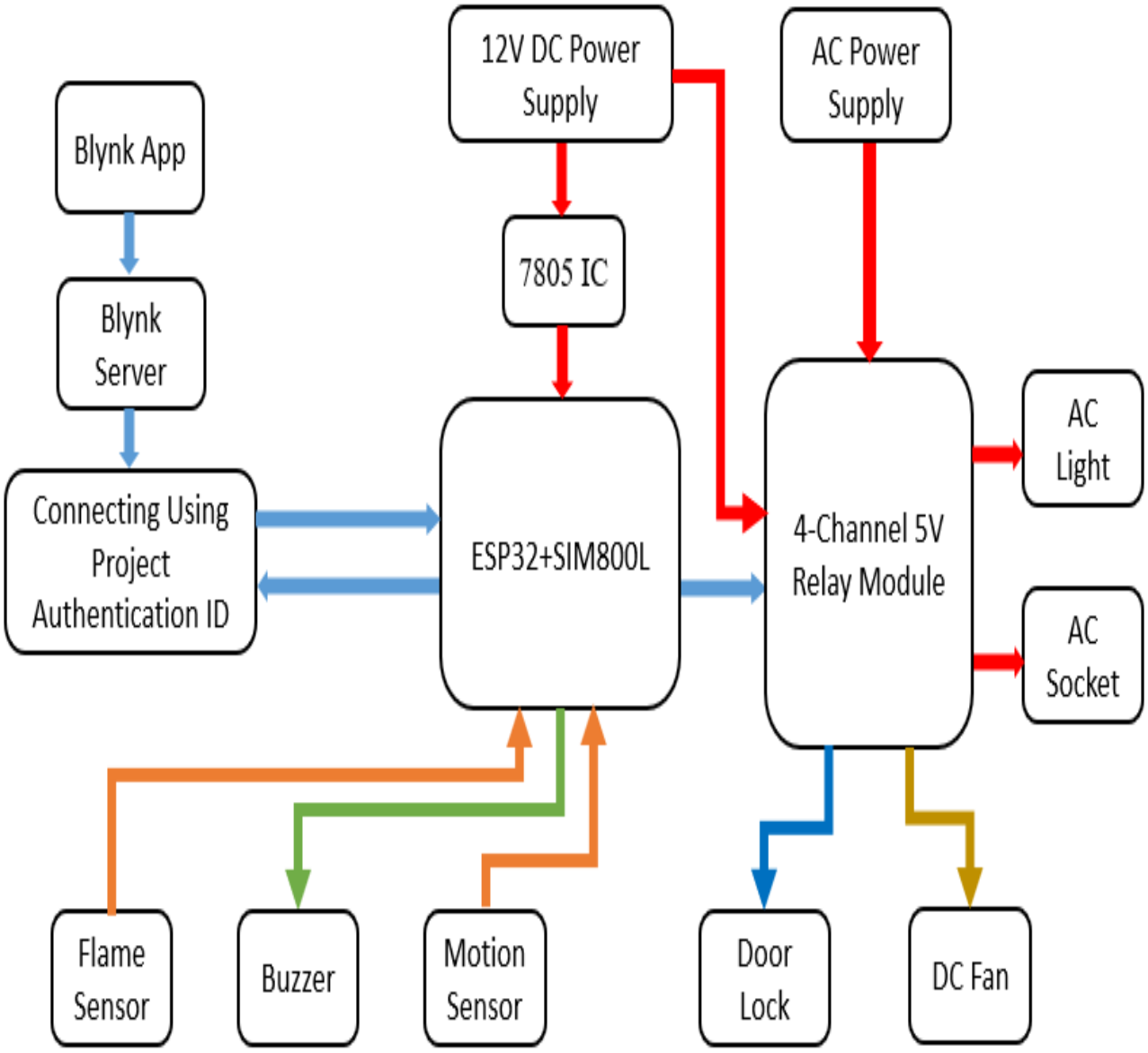

Fig 3.2: Block Diagram.

Circuit Diagram:

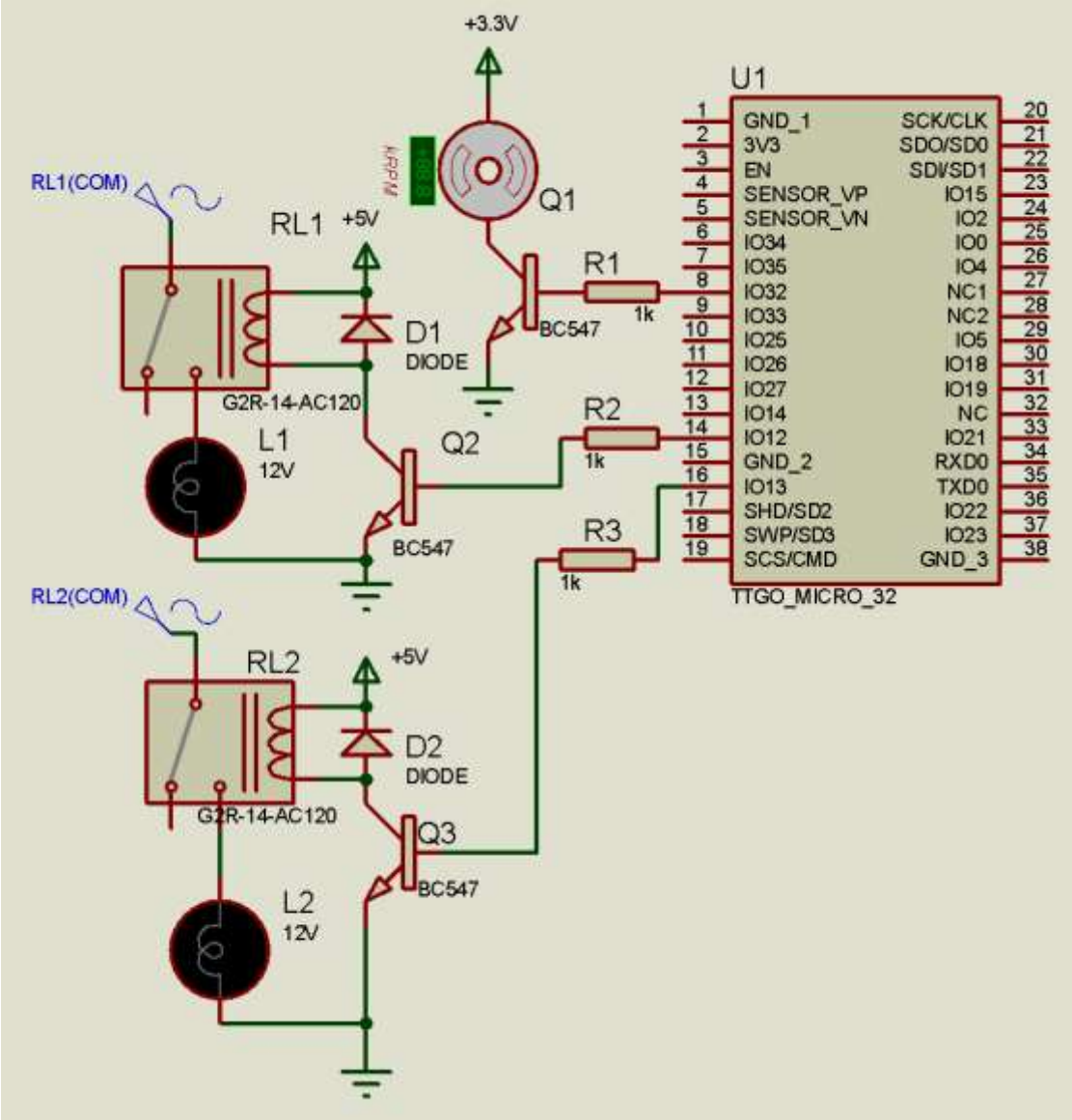

Fig 3.3: Circuit Diagram.

3.4 Logical Data Model

A logical data model is a type of relational table. This is a table with other objects. Here we have some relational tables like User, Microcontroller, Light, Fan, Door etc. There is a table. Some functional schemes like user ID, password, fan, light etc. The complete logic model is shown in Figure 3.3.

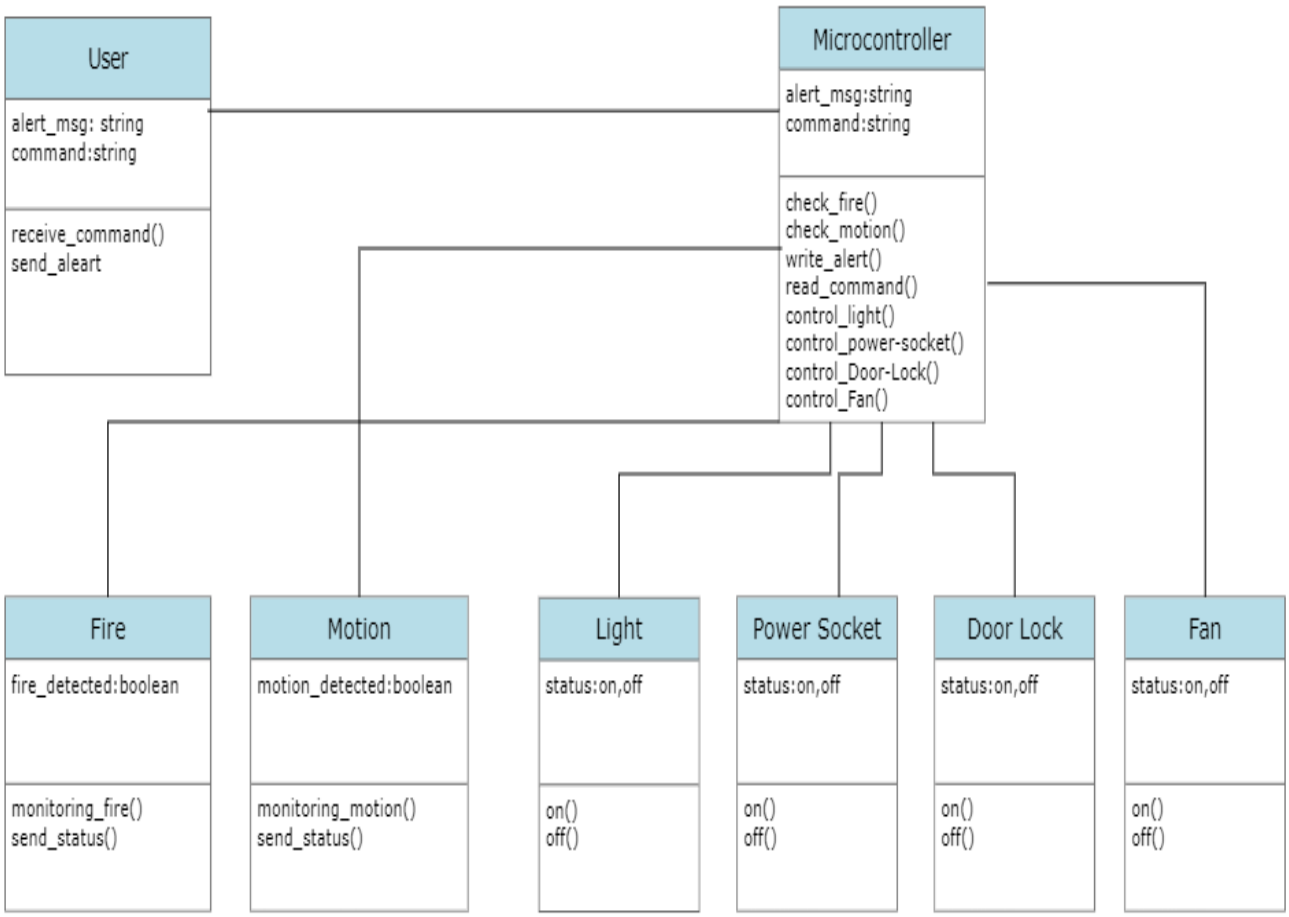

Fig 3.4: Logical Data Model

3.5 Design Requirements

A design requirement is a functional function that constrains the concept of a design feature. This section describes the software and hardware requirements that are the design requirements for this initiative. The basic software program requirements of the project are most essential for implementation. Hardware is also essential for home automation and Application systems. Below is a list of software requirements.

Software:

- Front-End: Arduino IDE
- Operating System: windows 10/windows11.
- Programing Language: C.
- Home Automation is required to use third party apps Blynk apps.

The second most essential part is the hardware necessities. A listing of hardware necessities can be observed beneath.

Hardware:

- ESP32+SIM800L.
- 5V 4 Channel Relay.
- Motion Sensor
- Flame Sensor
- Door Lock
- Buzzer
- IC7805.
- DC Fan.
- AC Light.
- DC Power Socket.
- 12V Adapter.
- Bread Board.
- PVC Board.
- Jumper wire

CHAPTER 4

DESIGN SPECIFICATION

4.1 Font-end Design

We discussed the list of application requirements in a previous discussion.. Now, at this stage we are able to tell almost all the requirements for our Project.

Software Requirement:

Computer Software Arduino IDE and home Automation is required to use third party apps Blynk apps: whereas our project is an android and GSM Automation primarily based application so we pick Arduino and Third party Apps Blynk for constructing the principle structure code. by the usage of Arduino and blynk apps we make a home Automation gadget for from consumer.

Hardware Requirements:

- ESP32+SIM800L.
- 5V 4 Channel Relay.
- Motion Sensor
- Flame Sensor
- Door Lock
- Buzzer
- IC7805.
- DC Fan.
- AC Light.
- DC Power Socket.
- 12V Adapter.
- Bread Board.
- PVC Board.
- Jumper wire

4.1.1 ESP32+SIM800L

TTGO T-Call is a new ESP32 development board that integrates SIM800L GSM/GPRS module. In addition to Wi-Fi and Bluetooth, this ESP32 board allows you to communicate via SMS or phone calls and connect to the Internet using your SIM card data plan.

Fig 4.1: ESP32+SIM800L Module.

4.1.1.a ESP32+SIM800L Pin Out Details

- T-Call ESP32 SIM800L board is in hibernate mode.
- Use your SIM card's data plan to wake up and connect to the Internet.
- Select sensor values to server and return to sleep mode.

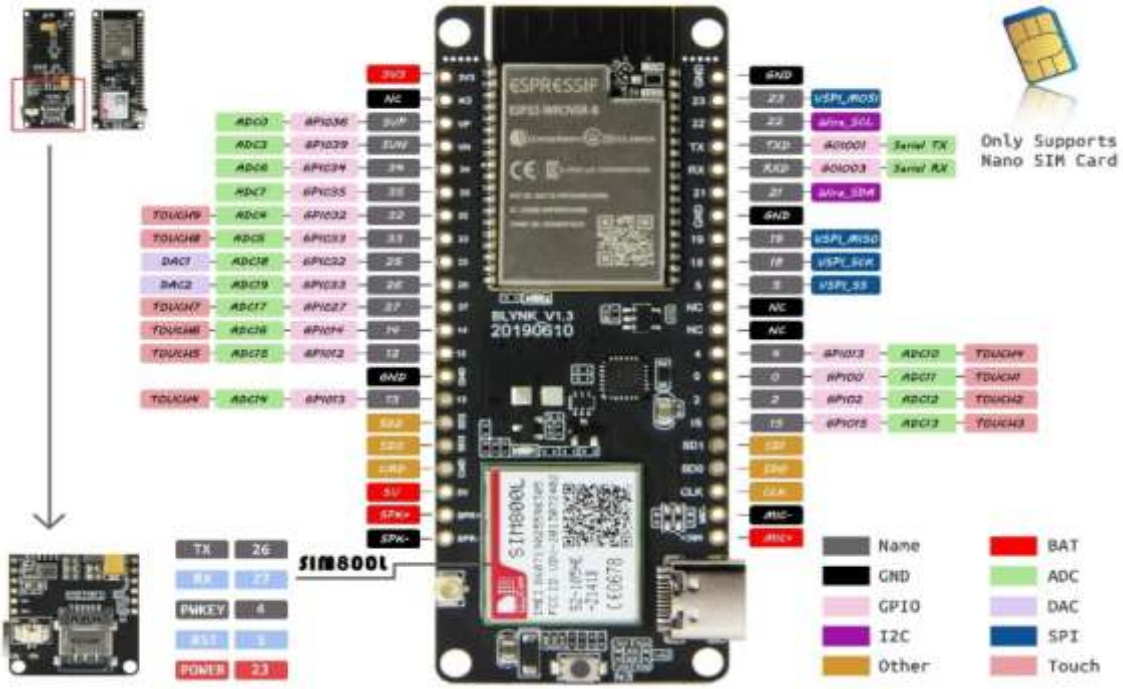

Fig 4.2: ESP32+SIM800L Module Pin out Details.

4.1.2 5V 4 Channel Relay

A 5V relay is an electromechanical switching tool that can operate AC or DC gadgets through a 5V DC relay coil.

Fig 4.3: 5V 4 Channel Relay.

4.1.2.a 5V 4 Channel Relay Pin Out Details

A relay uses an electrical cutting-edge to open or close the transfer contacts. This is usually accomplished with a coil that attracts the contacts of the switch and pulls them together while energized, and a spring pulls them apart when the coil is de-energized.

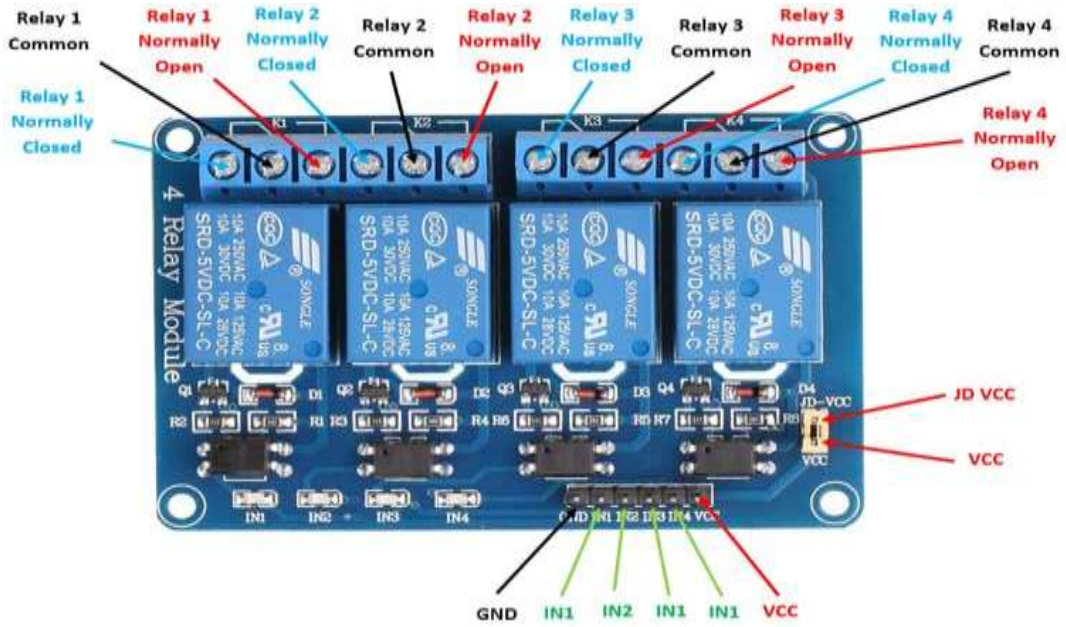

Fig 4.4: 5V Relay Pin Out Details.

This system has two advantages - firstly, modern relays need to switch contacts in order to activate the relay, and secondly, coils and contacts are galvanic best friends isolated, meaning no electrical connection among them. This means that the relay can be used to switch the mains through a remote low voltage digital system that includes a micro-controller.

4.13.2.3 Motion Sensor

A passive infrared (PIR) sensor module is used for motion detection. These are the sensors Miles uses regularly to refer to "PIR", "Pyro electric", "Passive Infrared" and "IR motion". The module consists of an on-board pyro electric powered sensor, conditioning circuit and a dome-shaped Fresnel lens. It is used to detect motion of people, animals or other gadgets. They can generally be used in the structure of burglar alarms and robotically activated light fixtures.

Fig 4.5: Motion Sensor.

4.1.4 Flame Sensor

The sensors most sensitive to ordinary light are called flame sensors. This sensor module is therefore used in flame detectors. Otherwise, the sensor detects flames in the wavelength range 760 nm to 1100 nm from the light source. This sensor can be easily damaged by high temperatures. Therefore, the sensor can be placed away from the flame. The flame can be detected at a distance of 100cm and the detection angle is 600 degrees. The output of this sensor can be analog or digital. These sensors are used as flame detectors in fire brigade robots.

Fig 4.6: Flame Sensor.

4.1.5 Door Lock

Fig 4.7: Door Lock.

4.1.6 Buzzer

Fig 4.8: Buzzer.

4.1.7 IC7805

Voltage regulators are widely used in digital circuits. They provide a constant output voltage for different input voltages. In this case, IC 7805 is a well-known controller IC used in most initiatives. The name 7805 indicates which of the two is meant. "78" means it's a high quality voltage regulator, and "05" means he supplies 5V when manufactured. Therefore, our 7805 provides a +5V current output

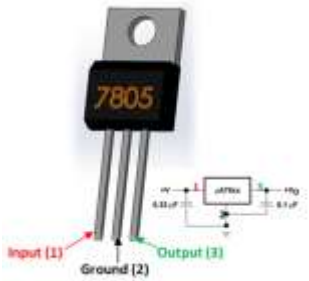

Fig 4.9: IC7805.

The output current can reach 1.5A. However, ICs suffer from severe heat damage, so it is recommended to harvest heat for current consumption projects. For example, if the input voltage is 12V and you consume 1A, (12-5) *1=7W. It will destroy like 7 watts of heat.

4.1.8 DC Fan

Direct current (DC) fans are powered by constant potentials such as: Battery voltage is supplied. Common voltage values for DC fans are 5V, 12V, 24V, and 48V. In contrast, AC fans or AC fans operate with the same positive and negative AC voltage.

Fig 4.10: DC Fan.

4.1.9 AC Bulb

An LED bulb is a semiconductor product that has a built-in circuit that takes a high-voltage AC input current and converts it to a too-low-voltage DC current to drive the LEDs. LED dimming light 0.5Watt.

Fig 4.11: AC Bulb.

4.1.10 DC Power Socket

2 pin the electrode means that the device is blocked and usually contains two pins that transmit electricity. Originally, all electrical appliances were equipped with 2-pole sockets, which meant that the devices were not ground and all power sockets were built for 2-pole sockets. However, with the increase in more and more powerful equipment, the misery of electric shocks has become more severe. This problem was mainly solved by specifying the ground connection as PIN3. The ground conduction system is therefore known as a third-pole system.

Fig 4.12: DC Power Socket.

4.1.11 12V Adapter

It is very good power supply. It converts energy into small, light and efficient. It's thin enough to fit extension cords without blocking other outlets. The output is regulated until you get a continuous 12V current up to 2000mA (2 amps). 5.5mm/2.1mm jack, positive end. This monitor is designed to work anywhere in the world, with 100V-240V AC wall power you will only need an inexpensive component adapter

.

Fig 4.13: 12V Adapter.

4.1.12 Bread Board

A breadboard is a temporary, solder less version with hardware and test schematics. By embedding leads or terminals in openings and creating devices with wires where possible, the largest digital segments can be interconnected with digital circuitry. Beneath the board is a metal strip on the breadboard, with the opening referenced to the bottom of the board at maximum magnification.

Fig 4.14: Bread Board.

4.1.13 PVC Board

PVC panel, known as Chevron Board or Andy Board, is widely used for both interior and exterior applications. Contains chemical installation, PVC, which is used in industry, furniture, construction and advertising.

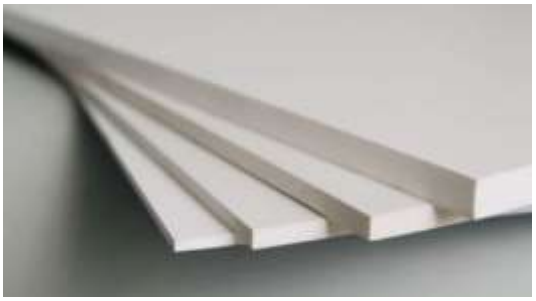

Fig 4.15: PVC Board

Made of lightweight PVC and foam, this PVC foam board is moisture resistant and corrosion. It is completely lighter. They are also resistant to chemicals. The total thickness of the material will be from 6mm to 45mm. It is possible to carve, engrave, paint, print, laminate and grind the surface of the foam plate according to your needs. One of the most highlighting characteristics of this foam board is that it will not decay over time and the color is still in the same new form for long without fading.

4.1.14 Jumper Wire

A jumper wire is a cable with connector pins at each end that can be used to connect two points without soldering. Patch cords are commonly used on breadboards and other prototyping tools so that circuits can be easily modified as needed.

Fig 4.16: Jumper Wire.

4.2 Back-End design

This discussion will cover the backend development of the project. Write a project flowchart. The back-end design is shown in Figure 4.17.

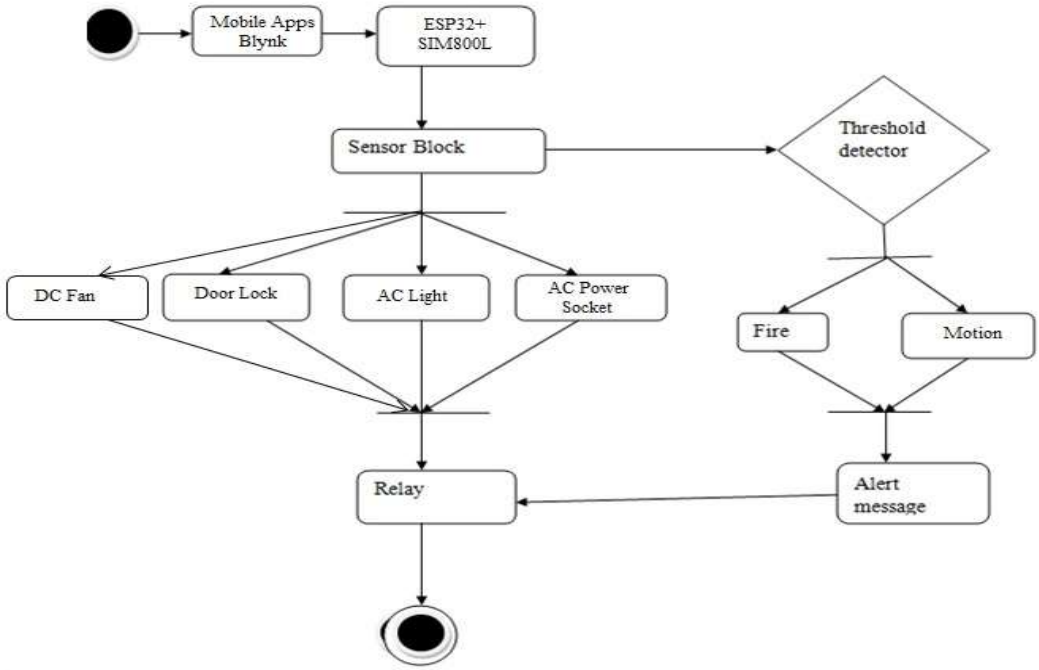

Fig 4.17: Home Automation Flow Chart Diagram.

4.3 Interaction Design and UX

The design of smart home systems is based on what every device wants to automate. Smart homes include automation of lights, light bulbs, fans, refrigerators, water heaters, and home security such as fire detection and occupancy monitoring.

System design becomes easier once user needs are identified. Based on this, calculate the type of protocol to use and the required sensors. A basic requirement for smart home systems is a combination of specific hardware and software. A hardware-to-software interface and communication protocol for sending notifications to users.

We are developing a smart home system that can control lights and fans based on mobile phones. I also want to implement a fire alarm system that can notify me in my absence if there is a fire in my home, so I will create a controller that can be controlled using a mobile phone. You could create a controversial fire alarm system, but the current system doesn't allow you to integrate it into a single Internet architecture.

Therefore, we propose an IoT-based smart home system. Connect lights and fans to this device and start it. You should be able to control both the lights and the fan from your phone. All this requires location awareness. This means you can turn the lights on when you get closer to your home and turn them off when you leave.

Install security system. For example, install a fire alarm system. If there is a fire in your home, answer your cell phone. If your mobile number is on silent when there is a fire in your home, you may not always receive an alarm. Through the IoT system, the same data will be entered into the Gmail and Twitter accounts, so even if the house is on fire, one of his friends or one of his Twitter followers will be able to know that it is on fire. . There is a fire and appropriate action can be taken.

Basically, I'm creating a security system with fire, and a physical world system with controls for lights and bulbs. Security system in case there is an intruder in the house. Also, control them with a mobile interface. It also controls them through location awareness.

UX or user experience is also an integral part of Blynk third-party applications. After reviewing online and physical research, we have received positive feedback from users who have used these types of third-party applications Blynk has previously created. Then run a test by some people. Third party applications with blynk and GSM Modular ESP32 +SIM800L are faster and more convenient.

4.4 Implementation Requirement

In a previous discussion, this project was described in a GSM-based home automation project. Need to use C, embedded software (Aurdiuno IDE) computer language to create IOT GSM home automation architecture. Create code from Aurdino. My complete project works by following this code and encoder. Here we use Third Party Apps Blynk and design Project Connected. Basically home security uses strong. So for a smooth connection he also uses the Blynk app. Internet connection is required to use this Blynk application. A user and her Blynk Cloud Server can connect to the phone, but an internet connection is required as the user creates authentication through her Blynk application. The combination and proper placement of hardware and software equipment makes the application smarter.

CHAPTER 5
IMPLEMENTATION AND TESTING

5.1 Implementation of Database

In this project, we are able to manage home appliances with the help of Blynk app to be very effective in your IoT home automation tasks. Download the application on a smart telephone from the Google Play Store and then create a contract on it. We are able to manipulate a bulb connected to AC mains through Blynk app and relay module via ESP32. Blynk along with Arduino IDE can be very suitable app to build complete projects based on IOT.

5.2 Testing Implementation

After project development, system testing should be performed. The required project must be installed on a device suitable for the test phase.

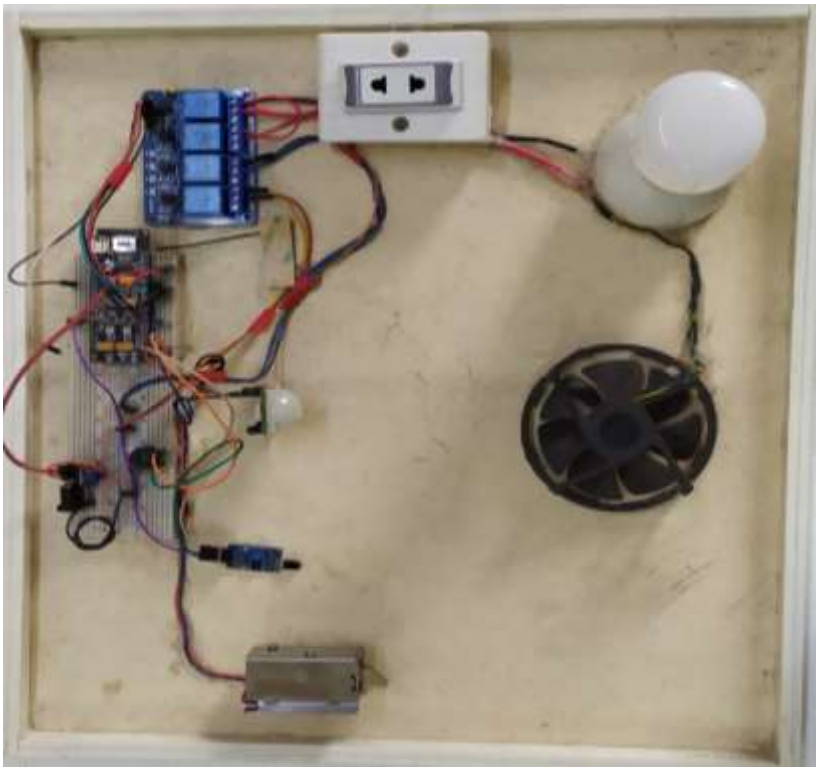

Fig 5.1: Final Project.

Fig 5.2: All Active Load.

Login Testing:

Device testing is the first step in testing your home automation or Project GSM system. Developers can easily find errors and bugs by running unit tests. System processes and expected results must check valid and invalid inputs. Active system unit tests are shown in Table 5.1.

Table 5.1: Device testing for login System

Device	Value	Expected result	Result
Open ESP32+SIM800L Connected with Blynk Apps	Login Blynk Apps and Password Setup Verify Password	Login successfully. Device Connect Full Device	Pass

Fig 5.3: Bulb

Fig 5.4: Door Lock.

.

Fig 5.5: DC Fan

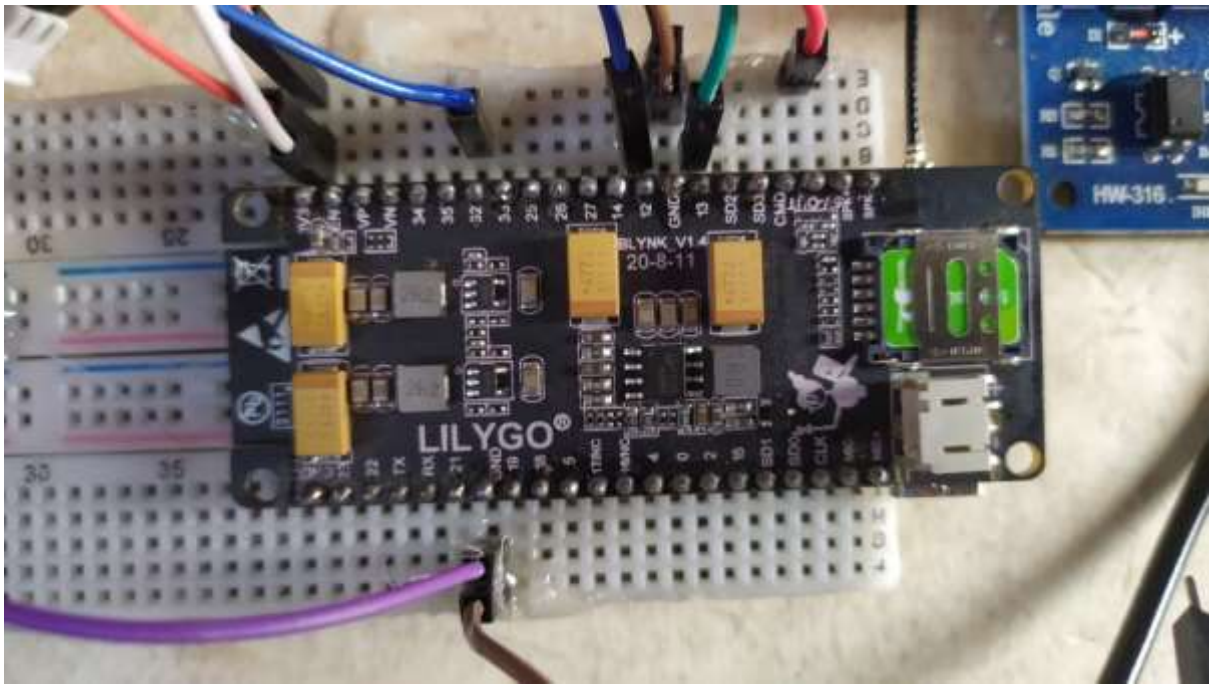

Fig 5.6: Main Circuit.

Fig 5.7: PIR Sensor

.

Fig 5.8: Fire Alarm.

Fig 5.9: AC Power Socket.

Fig 5.10: Mobile App (OFF Mode).

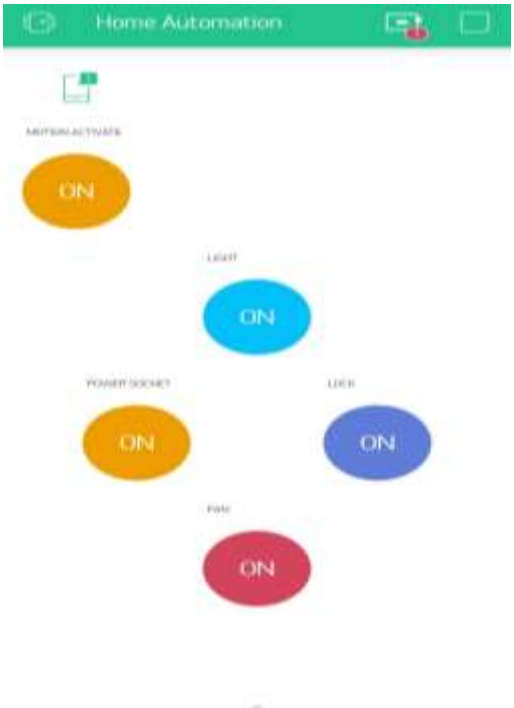

Fig 5.11: Mobile App (ON Mode).

Device Testing:

After the device testing is complete, Device testing begins to test the development. A system application tests each sub-function in a functional test. A Device test is run for the entire run task with the expected result. Device tests are shown in Table 5.2

Table 5.2: Device testing for different user role.

Device	Attribute value	Expected result	Result
AC Bulb	Connect With Blynk Apps Connected And When turned on from mobile.	Blub is On.	Pass
AC Power Socket	Connect With Blynk Apps Connected And When turned on from mobile.	AC Power Socket is On.	Pass
DC Fan	Connect With Blynk Apps Connected And When turned on from mobile.	DC Fan is On.	Pass
Door Lock	Connect With Blynk Apps Connected And When turned on from mobile.	Door Lock is On.	Pass
Motion Sensor	Connect With Blynk Apps Connected And When turned on from mobile.	Motion Sensor is Detected in Object.	Pass
Fire Sensor	Always Active with Blynk Apps.	Fire alarm or notification is coming in case of fire	Pass

5.4 Test Result and Reports

In this project, we are able to manage home appliances with the help of Blynk app to be very effective in your IoT home automation tasks. Download the application on a smart telephone from the Google Play Store and then create a contract on it. We are able to manipulate a bulb connected to AC mains through Blynk app and relay module via ESP32. Blynk along with Arduino IDE can be very suitable app to build complete projects based on IoT.

CHAPTER 6
IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

Automating your home saves users, a lot of extra time and effort in the process. By supporting the workforce, smart homes will increase the construction of a richer economy. It is cheaper, cheaper and easy to use and can be used by any class of society. It is safe and has privacy for use at home. With the emergence of innovation, new housing and housing are increasingly adopting systems that can not only maintain electricity, but also maintain it longer. He ensured that safety incidents such as theft and gas leaks in the kitchen were avoided and that electricity consumption, such as light sources, fumes and other electronic devices, were reduced. Smart Home Automation has no legal problems.

6.2 Impact on Environment

Smart home technologies offer many environmental benefits, including reliable monitoring, monitoring and remote-controlled functions. Suppose getting your home more automated would save money and the impact of the carbon footprint. It would reduce more than ever the cost-effective technology systems of the household's carbon footprint. It is an environmentally friendly model of sustainability in smart homes. Increased urbanization must ensure the sustainability of communities because many citizens live in large cities. Exposure to a wide range of public infrastructure such as renewable and reliable energy requires healthy communities. Energy consumption levels are increasing year by year worldwide. One way to ensure efficiency is to offer a variety of effective solutions to control energy consumption and increase energy consumption. Such innovations will lead to worldwide initiatives to establish accessibility to safe and sustainable resources for city residents, as well as to promote environmental sustainability initiatives.

6.3 Ethical Aspects

The smart home ethic has ignited conversations about privacy, informed consent, social isolation and ease of use. As smart home technology improves our lives at home, it can also be used to destroy our personal identity. The ability to respond to potential ethical abuses is critical to the future deployment of smart home technology

Privacy:

Privacy concerns always start out as a fleeting and controversial concept. Unfortunately, based on online information, this suggests that most people are careless about their privacy. Follow the simple steps to unbox and start using your new smart home he device. First, you must agree to the Terms of Service.

Choice:

Choice, The second important theme that emerged is choice. This is closely related to privacy, a concept that seems to be related to the concept of consent. Researchers often seek to end user choice in order to resolve ethical dilemmas related to ensuring privacy. However, the end-user's commitment to choice is at odds with the researcher's role in defining the boundaries of those choices. Researchers' arguments about their own choices imply certain moral positions, and how these influence and even constrain end-user choices are materially inconsistent with our commitments. There is likely to be.

Social isolation:

Many places have argued that smart homes can effectively eliminate or minimize social isolation. These smart homes can track visitors and provide social contacts. Meanwhile, Alexa-like devices allow users to access the community's calendar of events, receive messages, listen to their favorite music and audiobooks, and set medication reminders. Equally important, these devices allow users to connect with each other through cool new things they can do.

The use of smart home technology is not only a technical issue, but also an ethical one. Ethical reviews of these technologies concern privacy, validity of consent, and preservation of discretion. From a developer's perspective, they need to identify and resolve ethical issues and point out issues that may or may not be solvable. Difficult to resolve, find moral justification or raise concerns. This collaboration between ethics and engineers is essential to developing technologically and ethically sound solutions in a rapidly evolving field [16].

CHAPTER 7
CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

Based on the project performed initially, we discover the pricing gadget to be properly low and consumer-friendly. The whole house is always under the control of the person. In the future, we may identify more reliable, faster, and cheaper tools. We tried to manipulate and ring security gadgets. The components we used can be modified with contemporary gear, but need to have the right software and drivers. All responsibilities of this initiative have been properly completed. We were able to achieve our objectives with this device. We have time and cost limits, but we hope to serve as the basis for numerous new AI systems in addition to the Western International locations. Almost all clinical techniques and cutting-edge have appropriate and terrifying aspects. This doesn't mean we have to stay away from technology. Such work motivates us to do higher things for our country.

7.2 Scope for Further Developments

Our initiative has encountered some obstacles in the future at some unspecified time. As our work is completely net based, our home equipment is fully managed with the help of internet to get admission. As we operate fully online devices, we need to check the internet speed too. Otherwise, machine delays will occur because the Ethernet shield will no longer act as a community issuer for the circuit. The challenge depends on the power supply. Even assuming a power outage, the internet connection may be shut down. Access rights to the database will be terminated. Consequently, without security measures, there is not always a complete supply of protection. Although they require less circles, their charge is not less. To get an attachment, clients need an account for it the price of putting in a home automation machine can be pretty high. But it depends on the device. The more sophisticated the device, the more expensive it will be. This actual machine is limited to a time server base for one person, meaning that the best one character can run the machine without delay. If the cable or fiber breaks due to rupture, the total device may be destroyed. Consequently, it cannot be a case of some sort of warning or radio signal. It will be difficult to retain the signal. If someone does not use the method now securely or uses unique keys to perform operations, human error can occur. There is human error without delay to destroy the device.

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APPENDIX

```
// TTGO T-Call pin definitions
#define MODEM_RST            5
#define MODEM_PWKEY          4
#define MODEM_POWER_ON       23
#define MODEM_TX             27
#define MODEM_RX             26
#define I2C_SDA              21
#define I2C_SCL              22

#define BLYNK_PRINT Serial
#define BLYNK_HEARTBEAT 30
#define TINY_GSM_MODEM_SIM800

#include <TinyGsmClient.h>
#include <BlynkSimpleSIM800.h>

#include <Wire.h>
// #include <TinyGsmClient.h>
#include "utilities.h"

// Set serial for debug console (to the Serial Monitor, default speed 115200)
#define SerialMon Serial

// Hardware Serial on Mega, Leonardo, Micro
#define SerialAT Serial1


const char apn[]  = "internet";
const char user[] = "";
const char pass[] = "";

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
const char auth[] = "ZraMYcbaFgWFS-L4SXnsdeBYESdgdciY";

TinyGsm modem(SerialAT);

const int buzzerPin = 15;
const int flameSensor = 0;

const int pirPin = 32;
int pirValue;
int pinValue;

int Socket = 13;
int acLight = 12;
int dcFan = 2;
int doorLock = 18;
```

```
BLYNK_WRITE(V0)
{
  pinValue = param.asInt();
}

void setup()
{
  // Set console baud rate
  SerialMon.begin(115200);
  delay(10);

  pinMode(Socket, OUTPUT);
  pinMode(acLight, OUTPUT);
  pinMode(dcFan, OUTPUT);
  pinMode(doorLock, OUTPUT);
  digitalWrite(Socket, HIGH);
  digitalWrite(acLight, HIGH);
  digitalWrite(dcFan, HIGH);
  digitalWrite(doorLock, HIGH);

  pinMode(pirPin, INPUT_PULLUP );
  //digitalPinToInterrupt(pirPin)
  // Keep power when running from battery
  Wire.begin(I2C_SDA, I2C_SCL);
  bool   isOk = setPowerBoostKeepOn(1);
  SerialMon.println(String("IP5306 KeepOn ") + (isOk ? "OK" : "FAIL"));

  // Set-up modem reset, enable, power pins
  pinMode(MODEM_PWKEY, OUTPUT);
  pinMode(MODEM_RST, OUTPUT);
  pinMode(MODEM_POWER_ON, OUTPUT);

  digitalWrite(MODEM_PWKEY, LOW);
  digitalWrite(MODEM_RST, HIGH);
  digitalWrite(MODEM_POWER_ON, HIGH);

  // Set GSM module baud rate and UART pins
  SerialAT.begin(115200, SERIAL_8N1, MODEM_RX, MODEM_TX);
  delay(3000);

  // Restart takes quite some time
  // To skip it, call init() instead of restart()
  SerialMon.println("Initializing modem...");
  modem.restart();

  String modemInfo = modem.getModemInfo();
  SerialMon.print("Modem: ");
  SerialMon.println(modemInfo);
```

```
  // Unlock your SIM card with a PIN
  //modem.simUnlock("1234");

  SerialMon.print("Waiting for network...");
  if (!modem.waitForNetwork(240000L)) {
    SerialMon.println(" fail");
    delay(10000);
    return;
  }
  SerialMon.println(" OK");

  if (modem.isNetworkConnected()) {
    SerialMon.println("Network connected");
  }

  SerialMon.print(F("Connecting to APN: "));
  SerialMon.print(apn);
  if (!modem.gprsConnect(apn, user, pass)) {
    SerialMon.println(" fail");
    delay(10000);
    return;
  }
  SerialMon.println(" OK");

  Blynk.begin(auth, modem, apn, user, pass, "blynk.iot-cm.com", 8080);
  // Blynk.begin(auth, modem, apn, user, pass);
  //Blynk.begin(auth, modem, apn, user, pass, "blynk-cloud.com", 8080);

  pinMode(buzzerPin, OUTPUT);
  pinMode(flameSensor, INPUT);
}

void loop()
{
  Blynk.run();

  int flameValues = analogRead(flameSensor);
  //Serial.print("Flame Values: ");
  //Serial.println(flameValues);

  if (flameValues <= 2000)
  {
    Blynk.notify("Fire detected");
    digitalWrite(buzzerPin, LOW);
    delay(500);
  }
  else
  {
    digitalWrite(buzzerPin, HIGH);
  }
```

```
  if (pinValue == HIGH)
  {
    getPirValue();
  }
}

void getPirValue(void)
{
  pirValue = digitalRead(pirPin);

  if (pirValue == 1)
  {
    Serial.println("MOTION DETECTED");
    Blynk.notify("Motion detected");
    delay(500);
  }

}
```

GSM Home

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