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IV Semester

ECL405

A PROJECT REPORT
ON

Smart Secure Home IoT Integration

Bachelor of Technology
in
School of Electronics

By
TISHA SINGH (22256)

SCHOOL OF ELECTRONICS

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY UNA
HIMACHAL PRADESH

MAY 2024

BONAFIDE CERTIFICATE

This is to certify that the project titled *Smart Secure Home IoT Integration* is a bonafide record of the work done by

TISHA SINGH (22256)

in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in ECE of the INDIAN INSTITUTE OF INFORMATION TECHNOLOGY UNA, HIMACHAL PRADESH, during the year 2023 - 2024.

under the guidance of

DR. NIKUNJ GOYAL

Project viva-voce held on: ___26/04/2024_____

Internal Examiner External Examiner

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TISHA SINGH (22256)

ABSTRACT

My project, "Smart Secure Home System," represents a pioneering endeavor in the realm of residential technology, as it harnesses the power of IoT to redefine the standards of modern living. By intricately integrating cutting-edge sensors, advanced microcontrollers, and seamless cloud connectivity, this system offers an unprecedented level of home automation and security. Central to its functionality is the incorporation of robust voice control capabilities, courtesy of Google Assistant, and the provision of effortless remote monitoring facilitated by the user-friendly Blynk app.

Embracing user-centric design principles, I have meticulously tailored the firmware and user interfaces of the system to prioritize both convenience and security. Through these efforts, my project not only aims to revolutionize the conventional understanding of home automation but also seeks to empower homeowners with a comprehensive and intuitive solution for efficiently managing their living spaces. By bridging the gap between technological innovation and everyday practicality, "Smart Secure Home System" represents a significant leap forward in the quest for smarter, safer, and more connected homes.

Keywords**:** *IoT, smart home, automation, security, sensors, microcontrollers, cloud connectivity, voice control, Google Assistant, remote monitoring, Blynk app*.

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TISHA SINGH (22256)

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LIST OF ABBREVIATIONS

IoT	Internet of Things
ESP	Espressif Systems Platform
MQ	Metal Oxide Semiconductor
IFTTT	If This Then That
DHT	Digital Humidity and Temperature
PIR	Passive Infrared

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Chapter 1
Introduction

The 'Smart Secure Home IoT Integration' project aims to blend IoT technologies seamlessly to elevate both home automation and security. Through the integration of ESP32 and Node MCU ESP8266 microcontrollers along with various sensors like IR, DHT11, MQ2, flame, PIR motion, and ultrasonic sensors, the project creates a comprehensive system. This system facilitates efficient appliance control, environmental monitoring, and user-friendly interfaces such as Blynk app and Google Assistant integration, ensuring homeowners a sophisticated yet accessible solution for enhancing their living spaces automation and security.

1.1 Background

- The rapid evolution of technology has brought forth the concept of smart homes, revolutionizing the way we interact with our living spaces.
- Smart home solutions leverage Internet of Things (IoT) technologies, integrating sensors, microcontrollers, and cloud connectivity to create intelligent and interconnected systems.
- These systems offer a wide range of capabilities, including automated lighting, climate control, security surveillance, and remote monitoring, enhancing convenience, efficiency, and security in residential settings.

1.2 Motivation

- Address the growing demand for innovative smart home solutions that offer seamless integration, enhanced automation, and robust security features.
- Empower homeowners with advanced tools and technologies to efficiently manage their living spaces, improve energy efficiency, and enhance overall quality of life.

- Foster a culture of innovation and technological advancement, driving progress in the field of residential automation and shaping the future of smart living.
- Empower homeowners with advanced tools to customize and manage their living spaces.

1.3 Objectives

- Develop a comprehensive smart home automation and security system that seamlessly integrates IoT technologies.
- Utilize cutting-edge sensors and microcontrollers to create a cohesive and adaptable smart home ecosystem capable of meeting diverse user needs.
- Implement advanced features such as voice control, artificial intelligence, and machine learning algorithms to enhance user interaction and system intelligence.
- Optimize firmware and user interfaces to ensure intuitive operation, user-friendly customization, and efficient management of smart home devices.
- Conduct thorough testing and evaluation to assess system performance, reliability, and scalability under various usage scenarios and environmental conditions.
- Provide insights and recommendations for further refinement and enhancement of smart home technology, contributing to the continuous evolution of residential living solutions.

1.4 Significance

- Revolutionize the concept of home automation by creating intelligent, adaptable, and interconnected systems that enhance convenience, comfort, and security for users.
- Drive advancements in IoT technology and contribute to the development of scalable, interoperable, and standardized solutions for smart homes.
- Enable new opportunities for collaboration, research, and innovation in the areas of artificial intelligence, data analytics, and human-computer interaction within the context of residential living.
- Inspire a new generation of engineers, designers, and entrepreneurs to explore the possibilities of smart home technology and contribute to its continued evolution and adoption.

1.5 Scope

- Design, develop, and implement a sophisticated smart home automation and security system that integrates state-of-the-art IoT technologies.
- Focus on creating a modular, extensible, and interoperable architecture capable of supporting a wide range of smart devices, protocols, and applications.
- Explore novel approaches to user interaction, device management, and system integration to enhance user experience, system performance, and overall usability.
- Collaborate with industry partners, academic institutions, and community stakeholders to validate system capabilities, gather feedback, and identify opportunities for improvement and expansion.
- Document project findings, insights, and recommendations in academic publications, technical reports, and public presentations to contribute to the broader discourse on smart home technology and inform future research and development efforts**.**

Chapter 2

Review of Literature

2.1 Introduction to Smart Home Technology

- Overview of smart home concepts and their evolution in modern residential living.
- Explanation of smart home automation and security systems.
- Historical background and key developments in smart home technology.

2.1.1 IoT Technologies in Smart Homes

- Introduction to Internet of Things (IoT) and its relevance to smart home applications.
- Explanation of IoT devices, sensors, and actuators used in smart home systems.
- Overview of communication protocols and standards for IoT devices in residential environments.

2.1.2 Home Automation and Security

- Importance of home automation and security in enhancing convenience and safety for homeowners.
- Discussion on automation technologies, including smart switches, thermostats, and door locks.
- Overview of security challenges in smart homes and the role of surveillance systems, access control mechanisms, and encryption protocols.
- Review of currently available solutions for home automation and security, highlighting their features, benefits, and limitations.

2.2 Voice Control and User Interaction

- Introduction to voice-controlled smart home systems and virtual assistants.
- Comparison of popular voice-controlled platforms, such as Amazon Alexa, Google Assistant, and Apple Siri.
- Evaluation of user interaction methods and interfaces for smart home devices.

2.2.1 Cloud Connectivity and Remote Monitoring

- Role of cloud computing in smart home systems for data storage, processing, and remote access.
- Overview of cloud-based platforms and services for managing smart home devices.
- Discussion on remote monitoring capabilities and their importance in enhancing security and convenience for homeowners.

2.2.2 User Experience and Design Considerations

- Importance of user-centric design principles in smart home systems.
- Overview of user interface design considerations for smart home applications.
- Evaluation of user experience (UX) design strategies to improve usability accessibility.

2.3 Currently Available Solutions

- Review of existing smart home automation and security products in the market.
- Analysis of popular smart home platforms, including SmartThings, HomeKit, and Wink.
- Comparison of smart home devices from leading manufacturers, such as Nest, Ring, and Philips Hue.

2.3.1 Integration of Sensors and Actuators

- Overview of sensor types and actuator devices commonly used in smart home systems.
- Evaluation of sensor fusion techniques and data analytics methods for smart home applications.

- Discussion on the integration of sensors and actuators for advanced automation and security features.

2.4 Emerging Trends and Future Directions

- Exploration of emerging trends and technologies in smart home development.
- Discussion on the integration of artificial intelligence (AI) and machine learning (ML) in smart home systems.

2.5 Research Papers

Some of the research papers are as follows:

Table 1: Table of literature of Research Papers

TITLE	YEAR	KEY FINDINGS	REFERENCE NO.
Customary homes to smart homes using Internet of Things (IoT) and mobile application	2017	Transitioning traditional homes into smart residences through IoT integration and mobile application innovation.	[1]
Smart Home Automation and Security System using Arduino and IOT	2018	The smart home system embodies a harmonious blend of automation and security,	[2]
Design of Smart Switch for Home Automation	2019	Efficient control hub for streamlined home automation	[5]
Smart Energy Efficient Home Automation System Using IoT	2019	Optimized energy management through IoT-driven automation	[3]

2.6 CONCLUSION

In conclusion, the review of literature has provided valuable insights into the evolution and current state of smart home technology, emphasizing the pivotal role of IoT integration, mobile applications, and Arduino-based systems in advancing home automation and security. By synthesizing key findings from various sources, this review sets the stage for the development of a comprehensive smart home solution, poised to enhance efficiency, convenience, and security for modern homeowners."

Chapter 3

Methodology

3.1 System Architecture

The system architecture of the smart home automation and security system comprises several interconnected components.

3.1.1 NodeMCU ESP8266

NodeMCU serves as the core controller, responsible for interfacing with the soil moisture sensor and controlling the water pump through the relay module. It connects to the Blynk cloud server for remote monitoring.

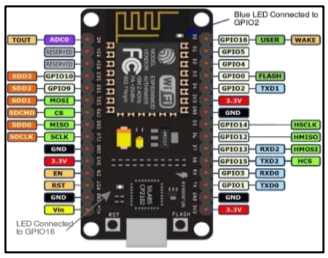

Figure 1:NodeMCU

3.1.2 ESP32

The ESP32 is a highly capable microcontroller known for its dual-core processors,built-in Wi-Fi and Bluetooth connectivity, making it ideal for IoT applications such as smart home automation and security systems.

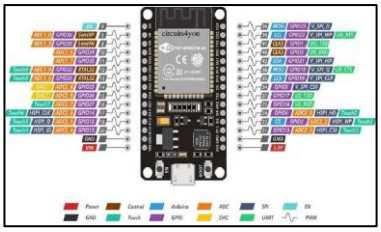

Figure 2: ESP32

3.1.3 MQ2 Sensor

The MQ2 sensor is a popular gas sensor widely used for detecting various gases such as methane, propane, and smoke. It operates on the principle of resistance changes in the presence of target gases, providing reliable detection in diverse environments.

Figure 3:MQ2 Sensor

3.1.4 DHT11 Sensor

The DHT11 sensor accurately measures the ambient temperature in its surroundings. Additionally, the sensor determines the relative humidity, providing insights into the moisture content of the air.

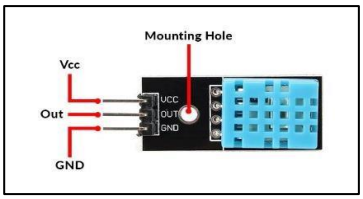

Figure 4:DHT11 sensor

3.1.5 PIR Motion Sensor

The PIR (Passive Infrared) motion sensor detects movement by sensing changes in infrared radiation emitted by objects in its field of view. It is commonly used in security systems and lighting controls to trigger actions, such as turning on lights or sounding alarms, when motion is detected.

Figure 5:PIR Motion Sensor

3.1.6 Ultrasonic Sensor

The ultrasonic sensor detects distance by emitting sound waves and measuring their reflection, finding applications in robotics, automotive, and industrial systems for accurate object detection and ranging.

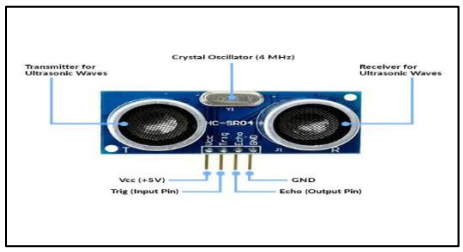

Figure 6:Ultrasonic Sensor

3.1.7 4 Channel Relay Module

The 4-channel relay module allows control of up to four separate electrical circuits using a single microcontroller pin. It is commonly used in home automation projects to switch high-voltage devices such as lights, fans, and appliances on or off remotely.

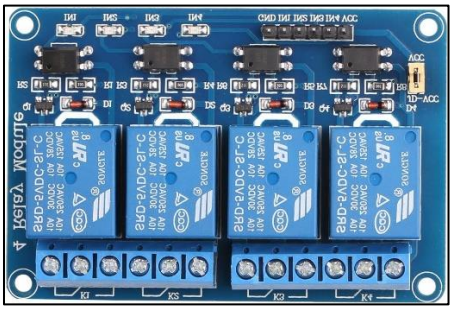

Figure 7:4 channel relay module

3.1.8 Buzzer

The buzzer is an electromechanical device that generates audible sound signals when activated. It is commonly used in alarms, notifications, and warning systems to alert users of specific events or conditions.

Figure 8:Buzzer

3.1.9 Blynk App

Blynk is a mobile app platform that enables users to easily control and monitor IoT devices using their smartphones. It provides a user-friendly interface for creating custom dashboards, controlling devices remotely, and receiving notifications based on sensor data or events.

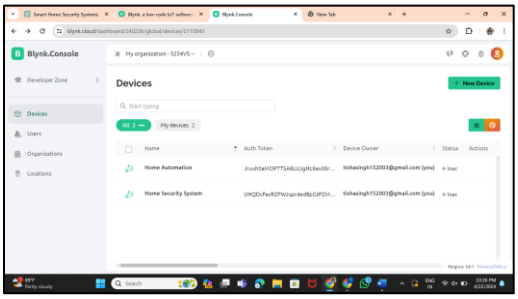

Figure 9:Blynk App

3.1.10 IFTTT Platform

IFTTT (If This, Then That) is a web-based automation platform that allows users to create custom applets to connect and control various online services and devices. By defining trigger-action relationships, users can automate tasks and workflows across different platforms with ease.

3.2 System Interface

The system interface of the 'Smart Secure Home IoT Integration' project is a multifaceted framework meticulously crafted to offer users an immersive and intuitive experience, seamlessly integrating home automation and security functionalities. With a focus on accessibility, convenience, and robustness, the system interface comprises a comprehensive array of components, each contributing to the overall user experience and system efficiency.

3.2.1 Mobile Application Interface:

- The mobile application interface serves as the central command center, providing users with unparalleled control over their smart home ecosystem. Through an elegantly designed and feature-rich interface, users can remotely monitor and manage various aspects of their home environment with effortless precision.
- Leveraging the power of the Blynk app, users can access real-time sensor data, fine-tune appliance settings, and orchestrate intricate automation routines tailored to their unique preferences and lifestyle. The intuitive layout and seamless navigation empower users to interact with the system effortlessly, ensuring a fluid and engaging user experience.

3.2.2 Voice Control Integration:

- Voice control integration heralds a new era of hands-free interaction, enabling users to command and orchestrate their smart home system using natural language commands. With seamless integration with leading voice assistant platforms such as Google Assistant, users can effortlessly control devices, activate automation routines, and query system status using simple voice commands.
- This transformative feature not only enhances accessibility but also redefines the way users interact with their smart home ecosystem, offering unparalleled convenience and efficiency. By bridging the gap between human speech and machine action, voice control integration brings the smart home experience to new heights of sophistication and usability.

3.2.3 Web-Based Dashboard Interface:

- The web-based dashboard interface stands as a testament to the project's commitment to versatility and accessibility, offering users an expansive canvas to monitor and manage their smart home system from any web-enabled device.
- Through an immersive and customizable interface, users can delve deep into the intricacies of their home automation and security setup, visualizing sensor data trends,

fine-tuning automation rules, and reviewing security camera feeds with unprecedented ease and flexibility.

- Designed to cater to the diverse needs and preferences of users, the web-based dashboard interface provides a seamless transition from mobile to desktop environments, ensuring a consistent and intuitive user experience across all platforms.

3.2.4 Sensor Data Monitoring and Alerts:

- At the heart of the system interface lies the robust functionality for sensor data monitoring and alerts, ensuring users stay informed and empowered in real-time. Through sophisticated algorithms and intelligent data processing techniques, the system continuously monitors sensor data streams, detecting anomalies and triggering alerts or notifications in response to predefined events or thresholds.
- Whether it's a security breach, environmental anomaly, or system malfunction, users receive instant alerts on their mobile devices or via email, enabling them to take swift and decisive action to safeguard their home environment.
- With seamless integration with a wide range of sensors, including IR, PIR motion, and ultrasonic sensors, the system interface offers unparalleled visibility and control, empowering users to proactively manage and optimize their smart home ecosystem with confidence and peace of mind.

In essence, the system interface of the 'Smart Secure Home IoT Integration' project represents a harmonious convergence of cutting-edge technology and user-centric design principles, redefining the smart home experience and setting new benchmarks for innovation, usability, and efficiency. Through its seamless integration with IoT technologies and intuitive interfaces, the system interface empowers users to unlock the full potential of their smart home ecosystem, transforming the way they live, work, and interact with their surroundings.

3.3 CIRCUIT DIAGRAM

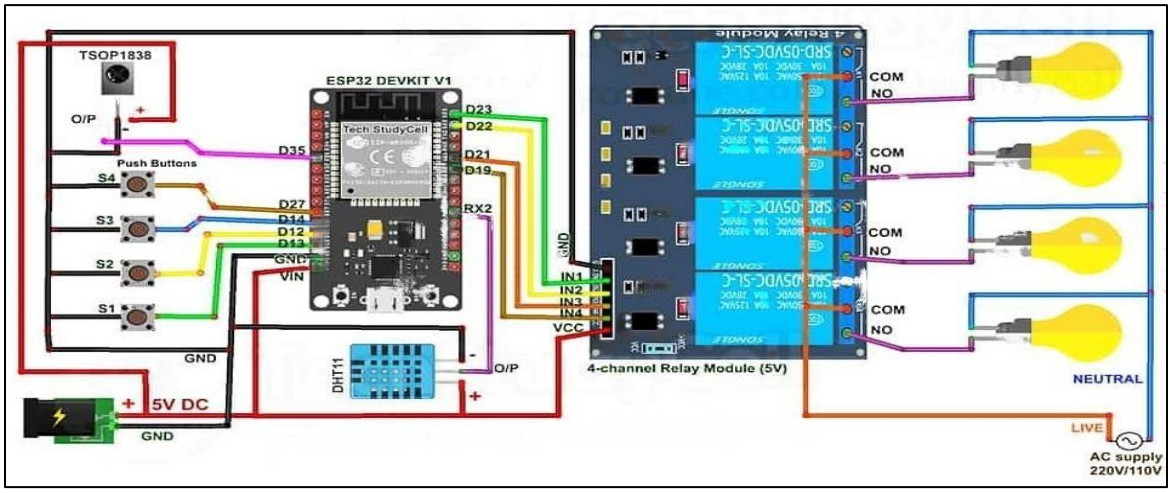

Figure 10:Schematic Diagram of Home Automation

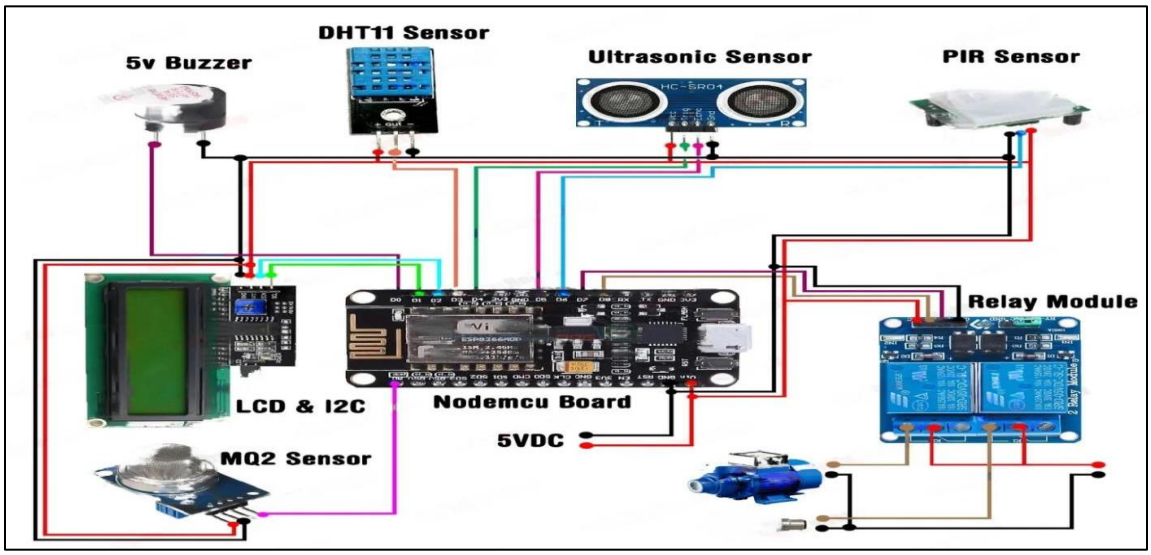

Figure 11:Schematic Diagram of Home Security System

Chapter 4

Result and Conclusion

4.1 Result:

Seamless integration of IoT devices and sensors for advanced home automation and security.

Enhanced user experience with intuitive interfaces and robust functionalities.

Figure 12: Circuit Connection

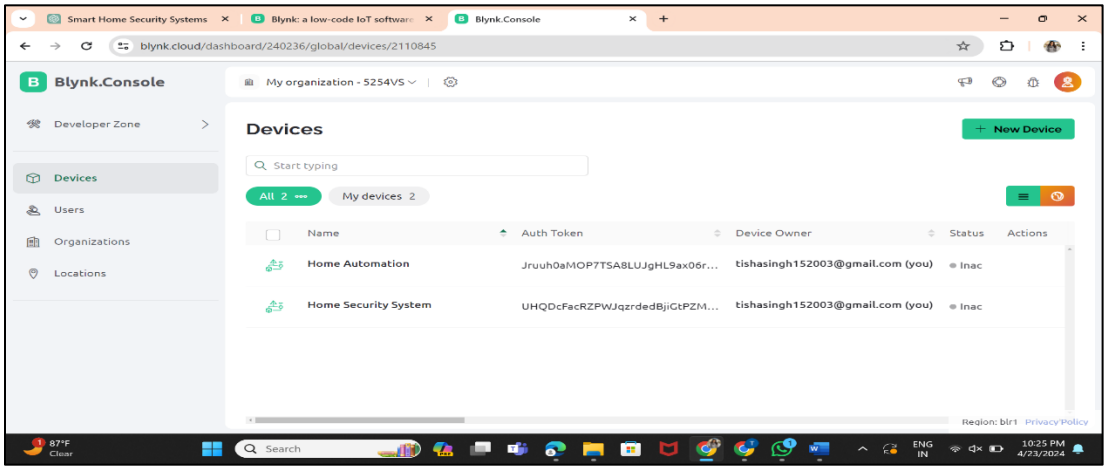

Figure 13:Project on Blynk Console

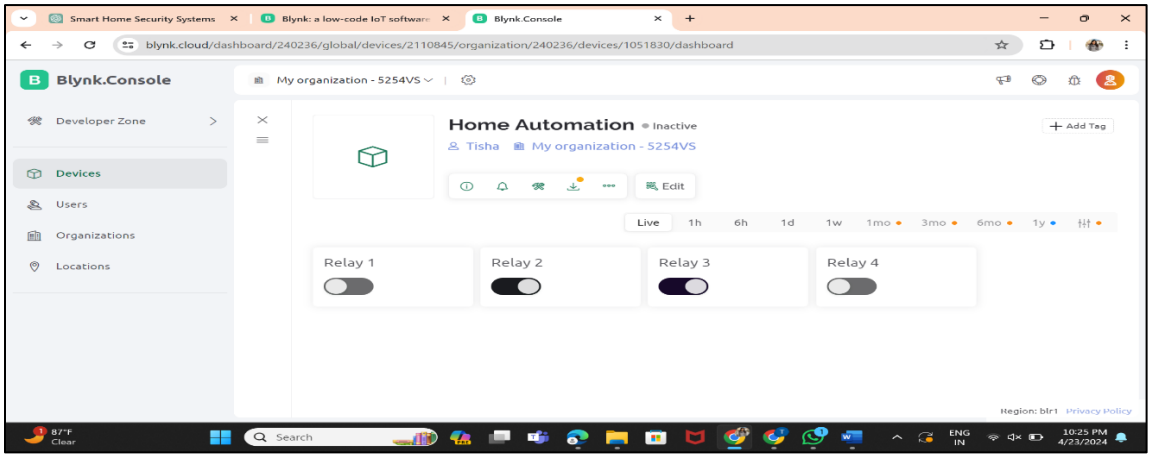

Figure 14:Blynk App for Home Automation

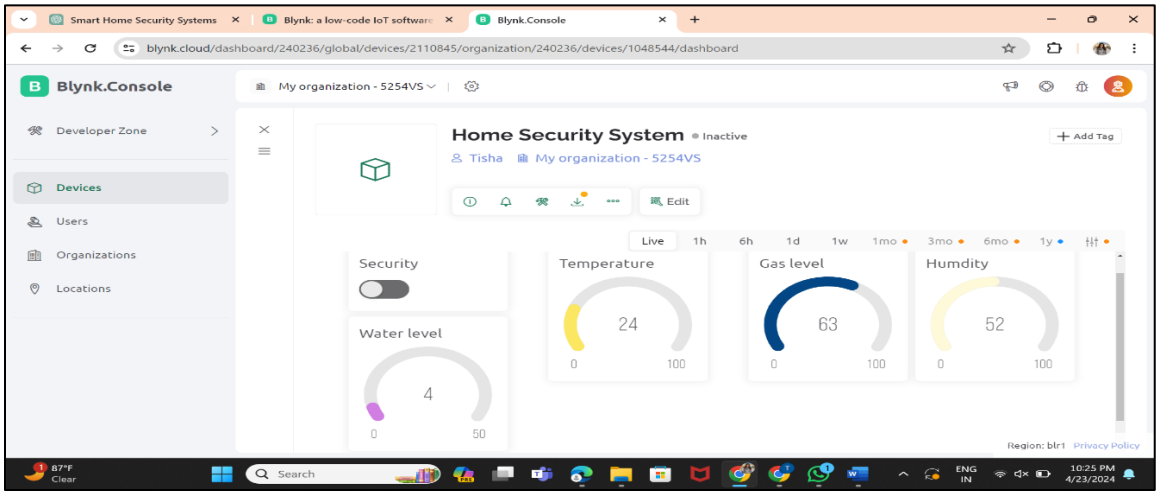

Figure 15:Blynk App for Home Security System

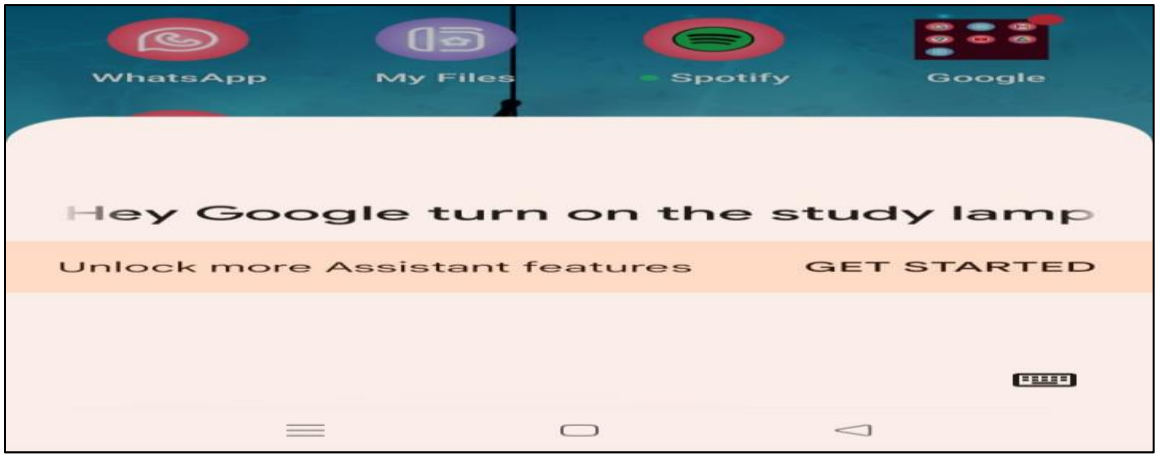

Figure 16:Google Assistant

4.2 Conclusion:

The 'Smart Secure Home IoT Integration' project has achieved its objectives by seamlessly blending IoT technologies to elevate home automation and security. Through the integration of various sensors and microcontrollers, along with user-friendly interfaces like the Blynk app and Google Assistant, the project has provided homeowners with a sophisticated yet accessible solution for enhancing their living spaces. This successful implementation underscores the potential of IoT in revolutionizing modern living, offering convenience, efficiency, and peace of mind to users. Moving forward, continued innovation and refinement of the system will further enhance its capabilities, ensuring ongoing benefits for homeowners in the realm of home automation and security.

Figure 7: Blynk App

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[1] V. Govindraj, M. Sathiyanarayanan and B. Abubakar, "Customary homes to smart homes using Internet of Things (IoT) and mobile application," 2017 International Conference On Smart Technologies For Smart Nation (SmartTechCon),Bengaluru, India, 2017, pp. 1059-1063, doi: 10.1109/SmartTechCon.2017.8358532.

[2] Smart Home Automation and Security System using Arduino and IOT, Siddharth Wadhwani1, Uday Singh2, Prakarsh Singh3, Shraddha Dwivedi, International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 02 | Feb2018.

[3] S. K. Vishwakarma, P. Upadhyaya, B. Kumari and A. K. Mishra, "Smart Energy Efficient Home Automation System Using IoT", 2019 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU), pp. 1-4, 2019.

[4] R. Piyare and M. Tazil, "Bluetooth based home automation system using cell phone," Consumer Electronics (ISCE), 2011IEEE 15th International Symposium on, Singapore, 2011, pp.192-195.

[5] Abhijit Shejal, Amit Pethkar, Akash Zende, Pratyusha Awate, Prof. Sudhir.G.Mane, "DESIGNING OF SMART SWITCH FOR HOME AUTOMATION." Presented at International Research Journal of Engineering Technology (IRJET) 05 | May 2019.

Appendices

Appendix A

Code Attachments

The following is the partial / subset of the code. Code of some module(s) have been wilfully supressed.

A.1 Code for ESP32

```
#define BLYNK_TEMPLATE_ID "TMPL3PrW5WIGm"
#define BLYNK_TEMPLATE_NAME "Home Automation"
#define BLYNK_AUTH_TOKEN "Jruuh0aMOP7TSA8LUJgHL9ax06rJfa6G"


// Comment this out to disable prints and save space



#define BLYNK_PRINT Serial
#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>

char auth[] = "Jruuh0aMOP7TSA8LUJgHL9ax06rJfa6G";//Enter your Auth token
char ssid[] = "Agni Wireless";//Enter your WIFI name
char pass[] = "123tisha";//Enter your WIFI password


BlynkTimer timer;


#define button1_pin 26
#define button2_pin 25
#define button3_pin 33
#define button4_pin 32

#define relay1_pin 13
#define relay2_pin 12
#define relay3_pin 14
```

```
#define relay4_pin 27

int relay1_state = 0;
int relay2_state = 0;
int relay3_state = 0;
int relay4_state = 0;


//Change the virtual pins according the rooms
#define button1_vpin    V1
#define button2_vpin    V2
#define button3_vpin    V3
#define button4_vpin    V4

//------------------------------------------------------------------------
---
// This function is called every time the device is connected to the
Blynk.Cloud
// Request the latest state from the server
BLYNK_CONNECTED() {
  Blynk.syncVirtual(button1_vpin);
  Blynk.syncVirtual(button2_vpin);
  Blynk.syncVirtual(button3_vpin);
  Blynk.syncVirtual(button4_vpin);
}

//------------------------------------------------------------------------
// This function is called every time the Virtual Pin state change
//i.e when web push switch from Blynk App or Web Dashboard
BLYNK_WRITE(button1_vpin) {
  relay1_state = param.asInt();
  digitalWrite(relay1_pin, relay1_state);
}
//------------------------------------------------------------------------
BLYNK_WRITE(button2_vpin) {
  relay2_state = param.asInt();
  digitalWrite(relay2_pin, relay2_state);
}
//------------------------------------------------------------------------
BLYNK_WRITE(button3_vpin) {
  relay3_state = param.asInt();
  digitalWrite(relay3_pin, relay3_state);
}
//------------------------------------------------------------------------
```

```
BLYNK_WRITE(button4_vpin) {
  relay4_state = param.asInt();
  digitalWrite(relay4_pin, relay4_state);
}
//------------------------------------------------------------------------


void setup()
{
  // Debug console
  Serial.begin(115200);
  //------------------------------------------------------------------------
  pinMode(button1_pin, INPUT_PULLUP);
  pinMode(button2_pin, INPUT_PULLUP);
  pinMode(button3_pin, INPUT_PULLUP);
  pinMode(button4_pin, INPUT_PULLUP);
  //------------------------------------------------------------------------
  pinMode(relay1_pin, OUTPUT);
  pinMode(relay2_pin, OUTPUT);
  pinMode(relay3_pin, OUTPUT);
  pinMode(relay4_pin, OUTPUT);
  //------------------------------------------------------------------------
  //During Starting all Relays should TURN OFF
  digitalWrite(relay1_pin, HIGH);
  digitalWrite(relay2_pin, HIGH);
  digitalWrite(relay3_pin, HIGH);
  digitalWrite(relay4_pin, HIGH);
  //------------------------------------------------------------------------
 Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  // You can also specify server:
  //Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);
  //------------------------------------------------------------------------
  Blynk.virtualWrite(button1_vpin, relay1_state);
  Blynk.virtualWrite(button2_vpin, relay2_state);
  Blynk.virtualWrite(button3_vpin, relay3_state);
  Blynk.virtualWrite(button4_vpin, relay4_state);
  //------------------------------------------------------------------------
}

void loop()
{
  Blynk.run();
  timer.run();
```

```
  // You can inject your own code or combine it with other sketches.
  // Check other examples on how to communicate with Blynk. Remember
  // to avoid delay() function!

  listen_push_buttons();
}

//MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MMMMMMMMMMMM
void listen_push_buttons(){
    //-----------------------------------------------------------------------
---
    if(digitalRead(button1_pin) == LOW){
      delay(200);
      control_relay(1);
      Blynk.virtualWrite(button1_vpin, relay1_state); //update button state
    }
    //-----------------------------------------------------------------------
---
    else if (digitalRead(button2_pin) == LOW){
      delay(200);
      control_relay(2);
      Blynk.virtualWrite(button2_vpin, relay2_state); //update button state
    }
    //-----------------------------------------------------------------------
---
    else if (digitalRead(button3_pin) == LOW){
      delay(200);
      control_relay(3);
      Blynk.virtualWrite(button3_vpin, relay3_state); //update button state
    }
    //-----------------------------------------------------------------------
---
    else if (digitalRead(button4_pin) == LOW){
      delay(200);
      control_relay(4);
      Blynk.virtualWrite(button4_vpin, relay4_state); //update button state
    }
    //-----------------------------------------------------------------------
---
}
//MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MMMMMMMMMMMM
```

```
//MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MMMMMMMMMMMM
void control_relay(int relay){
  //-----------------------------------------------
  if(relay == 1){
    relay1_state = !relay1_state;
    digitalWrite(relay1_pin, relay1_state);
    Serial.print("Relay1 State = ");
    Serial.println(relay1_state);
    delay(50);
  }
  //-----------------------------------------------
  else if(relay == 2){
    relay2_state = !relay2_state;
    digitalWrite(relay2_pin, relay2_state);
    delay(50);
  }
  //-----------------------------------------------
  else if(relay == 3){
    relay3_state = !relay3_state;
    digitalWrite(relay3_pin, relay3_state);
    delay(50);
  }
  //-----------------------------------------------
  else if(relay == 4){
    relay4_state = !relay4_state;
    digitalWrite(relay4_pin, relay4_state);
    delay(50);
  }
  //-----------------------------------------------
}
```

A.2 Code for NodeMCU

```
#define BLYNK_TEMPLATE_ID "TMPL30Go70Zcd"
#define BLYNK_TEMPLATE_NAME "Home Security System"
#define BLYNK_AUTH_TOKEN "UHQDcFacRZPWJqzrdedBjiGtPZMkFSVn"
```

```
#include <LiquidCrystal_I2C.h>
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>

//Initialize the LCD display
LiquidCrystal_I2C lcd(0x27, 16, 2);

char auth[] = "UHQDcFacRZPWJqzrdedBjiGtPZMkFSVn";//Enter your Auth token
char ssid[] = "Agni Wireless";//Enter your WIFI name
char pass[] = "123tisha";//Enter your WIFI password

DHT dht(D3, DHT11); //(sensor pin,sensor type)
BlynkTimer timer;
bool pirbutton = 0;

// Define component pins
#define Buzzer D0
#define MQ2 A0
#define trig D4
#define echo D5
#define PIR D6
#define relay1 D7
#define relay2 D8

//Get buttons values
BLYNK_WRITE(V0) {
  pirbutton = param.asInt();
}

void setup() {
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.backlight();
  pinMode(Buzzer, OUTPUT);
  pinMode(PIR, INPUT);
  pinMode(trig, OUTPUT);
  pinMode(echo, INPUT);

  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass, "blynk.cloud", 80);
  dht.begin();
```

```
  lcd.setCursor(0, 0);
  lcd.print("Home Automation");
  lcd.setCursor(4, 1);
  lcd.print("System");
  delay(4000);
  lcd.clear();

//Call the functions
  timer.setInterval(100L, gassensor);
  timer.setInterval(100L, DHT11sensor);
  timer.setInterval(100L, pirsensor);
  timer.setInterval(100L, ultrasonic);
}

//Get the MQ2 sensor values
void gassensor() {
  int value = analogRead(MQ2);
  Serial.println(value);
  value = map(value, 0, 1024, 0, 100);
  if (value <= 55) {
    digitalWrite(Buzzer, LOW);
  } else if (value > 55) {
    Blynk.logEvent("Warning! Gas leak detected");
    digitalWrite(Buzzer, HIGH);
  }
  Blynk.virtualWrite(V1, value);
  lcd.setCursor(0, 0);
  lcd.print("G:");
  lcd.print(" ");
  lcd.print(value);

}

//Get the DHT11 sensor values
void DHT11sensor() {
  float h = dht.readHumidity();
  float t = dht.readTemperature();

  if (isnan(h) || isnan(t)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }
  Blynk.virtualWrite(V2, t);
  Blynk.virtualWrite(V3, h);
```

```
  lcd.setCursor(8, 0);
  lcd.print("T:");
  lcd.print(t);

  lcd.setCursor(0, 1);
  lcd.print("H:");
  lcd.print(h);

}

//Get the PIR sensor values
void pirsensor() {
  bool value = digitalRead(PIR);
  if (pirbutton == 1) {
    if (value == 0) {
      digitalWrite(Buzzer, LOW);
    } else if (value == 1) {
      Blynk.logEvent("Warning! Please check your security system");
      digitalWrite(Buzzer, HIGH);
    }
  }
}

//Get the ultrasonic sensor values
void ultrasonic() {
  digitalWrite(trig, LOW);
  delayMicroseconds(4);
  digitalWrite(trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(trig, LOW);
  long t = pulseIn(echo, HIGH);
  long cm = t / 29 / 2;
  Blynk.virtualWrite(V4, cm);

  lcd.setCursor(8, 1);
  lcd.print("W:");
  lcd.print(cm);
  lcd.print("  ");
}


void loop() {
  Blynk.run();//Run the Blynk library
```

```
  timer.run();//Run the Blynk timer
}
```