“SMART DOOR LOCK SYSTEM USING BLYNK”

A MINI PROJECT REPORT

Submitted
In the partial fulfilment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY
In
ELECTRONICS AND COMMUNICATION ENGINEERING

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B21EC076

Under the supervision of

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CERTIFICATE

This is to certify that Mini Project report entitled **"SMART DOOR LOCK SYSTEM USING BLYNK"** embodies the original work done by **R.RISHITHA REDDY** bearing Roll Number **B21EC076** studying **VI** Semester in partial fulfilment of the requirement for the award of degree of the **Bachelor of Technology** in **Electronics & Communication Engineering** from **KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL** during the academic year 2023-2024.

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I declare that the Mini Project report is original and has been carried out in the Department of Electronics & Communication Engineering, Kakatiya Institute of Technology and Science, Warangal, Telangana, and to the best of my knowledge it has been not submitted elsewhere for any degree.

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ABSTRACT

In terms of house security, the door is crucial. To keep the residence secure, the owner will keep the door locked at all times. However, owing to a rush when leaving the house, the house owner may forget to lock the door, or they may be unsure if they have closed the door or not. In this paper, we have presented a smart Wi – Fi Door Lock using the ESP8266 and the Blynk App. In this simple working model when a person hits the doorbell, the owner receives a notification on his/her phone with a photo of that person. The owner can also unlock the door from a mobile phone after checking the photo. The proposed Door Security System application uses Wi-Fi Door Lock with ESP8266 and Internet of Things (IoT) technology to monitor the status of the door, manage the door, and increase security in a home. Blynk is a communication protocol that connects a smartphone to a door lock system and is used to increase the security of a home.

The new proposed system allows a video classification network to run on edge devices to alert the homeowner of any significant events happening in front of their home without any other input, such as the button being pressed. The key aspect is the creation of a doorbell dataset that can provide researchers with a set of videos that is large enough to properly train a network that is ready to be implemented on a user's doorstep.

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CHAPTER-1

INTRODUCTION

The WiFi Door Unlock Security system utilizing the ESP32 microcontroller is a modern and innovative approach to securing doors while providing remote access and control capabilities. This system leverages the ESP8266's WiFi connectivity and processing power to create a smart and efficient door locking solution. Here's an overview of its key components and functionalities.

Fig-1.1 Smart Door lock

1.1 OVERVIEW

The WiFi Door Unlock Security system with ESP8266 is a well-liked option for contemporary door security solutions because it provides numerous significant benefits and advantages.

• **Remote Access and Control**: The ability to monitor and operate the door from a distance is one of the main benefits of WiFi-enabled door lock systems. Users benefit from flexibility and convenience as they may lock or unlock the door from any location with an internet connection.

• **Enhanced Security Features**: SSL/TLS encryption methods, user authentication procedures, and access control lists are examples of enhanced security features that WiFi Door Unlock Security systems can incorporate. These characteristics improve general security and guard against unwanted access.

• **Integration with Smart Home Systems**: Users can control their door locks in addition to other smart home devices by integrating the ESP8266-based system with well-known smart

home platforms.

• **Real-time Monitoring and Notifications**: When the door is opened or accessed, users can get real-time notifications via email or on their mobile devices. Users can be informed about the security status of their premises and feel at ease knowing this.

• **Adaptable Access Control**: Systems for WiFi Door Unlock Security are capable of providing adaptable access control regulations. Users have the ability to remotely control access rights, schedule automated locking and unlocking, and grant temporary access to visitors or service providers.

• **Convenience and Usability**: By doing away with the need for physical keys or keycards, the system lowers the possibility of keys being misplaced or stolen. Simply using their cellphones or other approved devices will also allow users to bypass the need for manual unlocking procedures.

• **Scalability and customisation**: There are choices for both scalability and customisation with the ESP32 platform.

• **Energy Efficiency**: Battery-powered or energy-efficient door lock systems can benefit from the low power consumption of the ESP8266 microprocessor. This guarantees dependable performance while consuming less energy.

• **Cost-Effectiveness**: Installing and maintaining WiFi-based security solutions utilizing BLYNK is frequently less expensive than traditional wired security systems. They also provide flexibility with regard to expanding and upgrading the system.

• **Modern Technology Integration**: WiFi Door Unlock Security systems with ESP8266 & BLYNK, which take advantage of WiFi connectivity and IoT capabilities, offer a cutting-edge and contemporary approach to door security. They fit nicely with the expanding trend of linked gadgets and smart houses.

CHAPTER-2

LITERATURE REVIEW

A modern and practical way to secure your home or place of business is with a voice-activated door lock system. Smart technology, which allows you to give commands using an appropriate device, like a smartphone or smart speaker, is frequently used in this kind of system. You may easily use voice commands to lock or unlock your door without ever having to come into contact with the lock itself. This is especially useful if you're in a rush and have full hands. Certain systems are also capable of identifying various users and limiting access to those who are permitted. Research has also explored the potential for integrating other sensors, such as temperature or humidity sensors, to further expand the capabilities of smart door systems. As technology continues to evolve, advancements in machine learning and artificial intelligence may further enhance the predictive capabilities of these systems, allowing them to anticipate user needs and adapt to changing circumstances in real-time.

The integration of smart door systems with Blynk and motion detection represents a significant advancement in home security and automation. By harnessing the capabilities of the Blynk platform, these systems enable users to remotely monitor and control access to their premises with ease. Motion detection adds an extra layer of security by detecting movement near the door and triggering alerts or actions accordingly. Previous research has demonstrated the effectiveness of combining Blynk with motion detection for various applications, including smart doorbells and door locks. However, challenges such as security and interoperability need to be addressed to ensure the widespread adoption and continued development of smart door systems. Overall, the integration of Blynk with motion detection holds great promise for enhancing the functionality and convenience of smart door technologies in the future.

CHAPTER-3

CHALLENGES AND OBJECTIVES

3.1 OBJECTIVES OF PROJECT:

The main objective of this project is to design and construct a door unlock security system using an esp8266 that is operated by a solenoid lock and a Bluetooth module.
The particular objectives include:

• To develop speech recognition software that can identify authorized speakers and open doors.

• Make an esp8266 based control system that can detect motion with a solenoid lock and Bluetooth module.

• To assess the accuracy, speed, and dependability of the system's operation through testing.

3.2 CHALLENGES TO BE ADDRESSED:

1. **Security:** Ensuring secure communication between the smart door system and the Blynk platform to prevent unauthorized access and data breaches.
2. **Privacy:** Implementing measures to protect user privacy, particularly regarding the collection and storage of sensitive data captured by motion detection sensors.
3. **Interoperability:** Ensuring compatibility and seamless integration with existing smart home ecosystems and devices to avoid fragmentation and enhance user experience.
4. **Reliability:** Addressing potential issues such as false alarms or system malfunctions to maintain the reliability and effectiveness of the smart door system.
5. **User Interface:** Designing an intuitive and user-friendly interface on the Blynk platform for easy setup, configuration, and monitoring of the smart door system.
6. **Energy Efficiency:** Optimizing power consumption to prolong the battery life of sensors and devices, reducing maintenance requirements and environmental impact.
7. **Scalability:** Designing the smart door system to scale efficiently with the addition of more sensors or devices, accommodating future expansion and customization needs.

CHAPTER-4

PROPOSED METHODOLOGY & ITS WORKING

4.1 COMPONENTS DESCRIPTION:

4.1.1 NODE-MCU(ESP8266)

The ESP8266 microcontroller serves as the foundation for the NodeMCU ESP8266 development board, which is intended for embedded systems and Internet of Things applications. The following are the main details of NodeMCU ESP8266:

1. Microcontroller: It uses the low-cost, low-power ESP8266 microcontroller, which has built-in Wi-Fi connection.
2. Development Board: The ESP8266 chip is integrated with extra parts including a voltage regulator, USB-to-serial converter, and GPIO pins using the NodeMCU open-source firmware and development kit.
3. Aspects: - Wi-Fi Connectivity: Enables devices to establish a connection with Wi-Fi networks in order to communicate locally or online.
4. GPIO Pins: Allows for the interface with sensors, actuators, and other electronic components. Supports digital input/output, analog input, and PWM output.
5. Programming: The Arduino IDE, the Lua scripting language, or other appropriate development environments can be used for programming.
6. USB Interface: Provides a USB interface for serial computer communication and programming.
7. Applications: Applied to the development and prototype of Internet of Things devices, including environmental monitoring systems, sensor nodes, and smart home controllers.
8. Community Support: Provides a wealth of information, tutorials, and code examples from a vast community of enthusiasts and developers, making it simple for newcomers to begin developing with NodeMCU ESP8266s.
9. Economical: because of its low cost and widespread availability, offers a flexible and affordable platform for Internet of Things development.

The NodeMCU ESP8266 is a popular development board based on the ESP8266 microcontroller. It's widely used for IoT (Internet of Things) projects due to its low cost, built-in Wi-Fi capabilities, and ease of programming. The NodeMCU board provides a convenient way to prototype IoT projects without having to deal with the complexities of wiring and soldering.

Fig-4.1 NodeMCU ESP8266

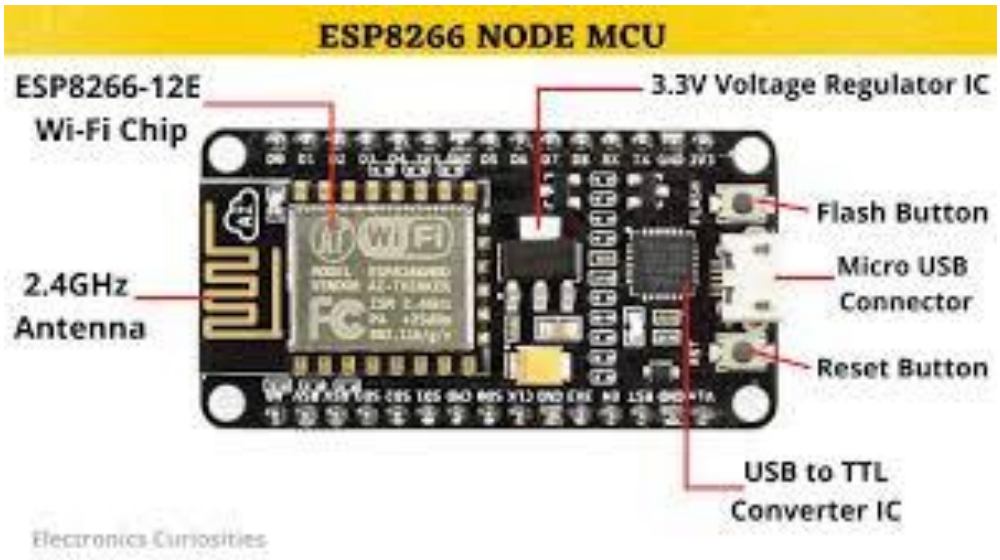

Fig-4.2 pin configuration

SOFTWARE DESCRIPTION:

The Arduino Integrated Development Environment (IDE) is a software platform for programming Arduino boards. The Arduino IDE is used to write, compile, and upload code to the Arduino board in the case of a door lock system controlled by motion detection commands. The Arduino IDE software description for a door lock system with motion instructions contains the following:

✓ **Libraries**: The Arduino IDE has a collection of libraries that can be used to write code for a variety of functions. The IDE includes libraries for Bluetooth connectivity, voice recognition, and relay control for a door lock system that uses voice commands.

✓ **Sketch**: The code for the door lock system that uses voice commands is provided as an Arduino sketch. The setup and loop routines make up the sketch. The setup function initializes the pins, libraries, and variables, whilst the loop function executes the main code.

✓ **SerialMonitor**:The Serial Monitor is an Arduino IDE utility that lets you interface with the Ardui no board via the USB port.During development, it is used to test and debug the code.The Serial Monitor is a tool in the Arduino IDE that allows you to interface with the Arduino board via the USB port. It is used throughout development to test and debug the code.

✓ **Compiler:** The Arduino IDE includes a compiler that converts the code written in the sketch into machine code that the Arduino board can understand.

✓ **Uploader**: The Arduino IDE's uploader utility is used to upload the compiled code to the Arduino board through the USB.

4.1.2. SOLENOID LOCK :

A solenoid lock, an electromechanical device powered by the principles of electromagnetism, is a crucial component in access control and security systems. Comprising a coil of wire (the solenoid), a plunger or armature, and a locking mechanism, solenoid locks

are employed in various settings where controlled access is paramount. Upon application of an electric current to the solenoid, a magnetic field is generated, compelling the plunger inward to disengage the locking mechanism and allow entry. Solenoid locks are adaptable to diverse environments, finding utility in electronic door locks for residential, commercial, and automotive purposes, as well as in vending machines, cabinets, and safes. These locks offer the advantage of rapid response times and reliable operation, making them an ideal choice for scenarios demanding quick and secure access.

Despite their widespread application, solenoid locks may pose security challenges if not appropriately implemented or reinforced. While they afford convenience and compatibility with electronic control systems, their susceptibility to manipulation or forced entry necessitates careful consideration during installation. Fail-safe and fail-secure variants are available to meet specific security requirements, with fail-safe locks defaulting to an unlocked state upon power loss, and fail-secure locks maintaining a locked state.

Fig-4.3 solenoid lock

4.1.3 RELAY MODULE

A relay module is a device that controls high-voltage or high-current devices like solenoid locks. A relay module is often made up of a small control circuit and one or more relays that may turn on or off high-voltage or high-current devices.

Using a relay module to control a solenoid lock has a number of advantages. For starters, it provides exact control over the time and duration of lock activation. Second, it adds an extra degree of security by isolating the control circuit from the solenoid lock's high-voltage or high-current components. Finally, it can control the solenoid lock with a low-voltage signal, making it easier to integrate into electronic security systems.

Fig-4.4 Relay module

4.2 CIRCUIT DIAGRAM

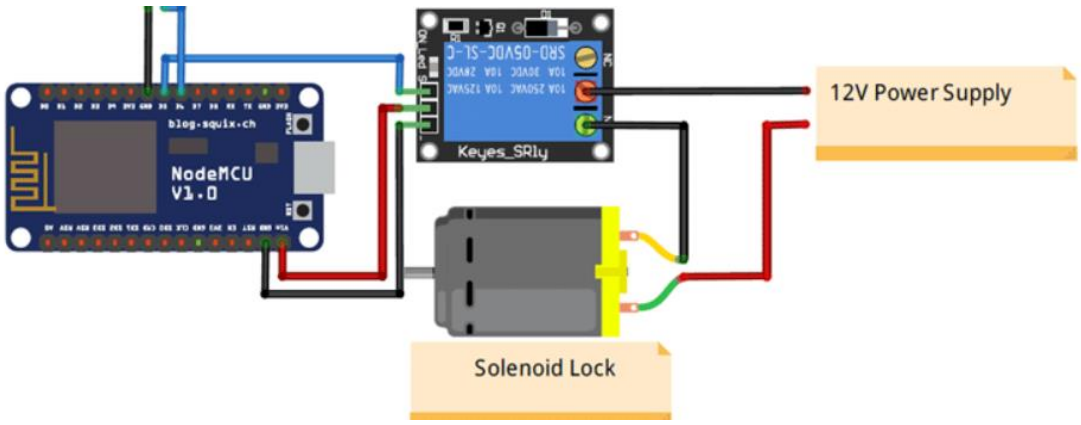

Fig-4.5. Circuit Diagram

4.2.1 BLOCK DIAGRAM:

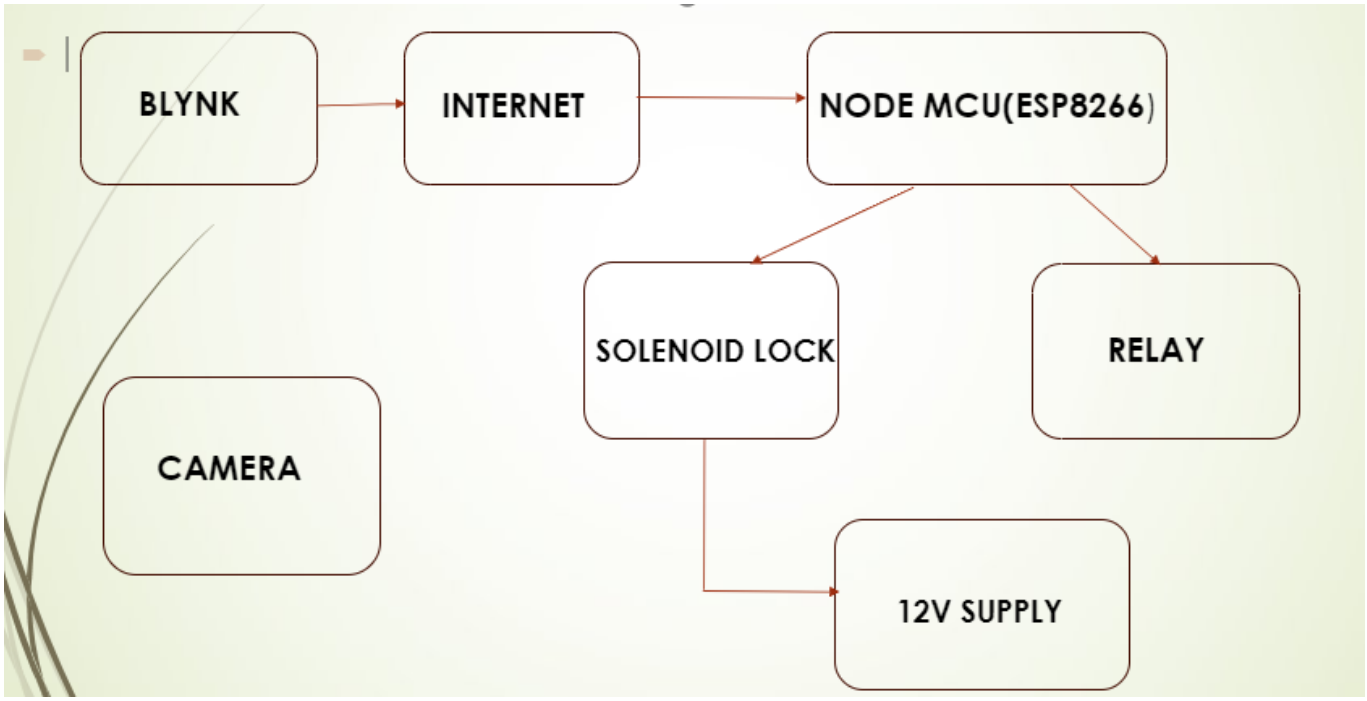

Fig-4.6. Block diagram

METHODOLOGY

Using the ESP8266 microcontroller to create a WiFi doorbell requires a few crucial steps. Establish the needs for the doorbell system first, including the features that you would like to have, including push alerts, video streaming, and remote access. The ESP8266 module, a camera module (if video streaming is needed), a doorbell button, and a power supply are among the hardware parts that you'll need next.

After obtaining the necessary hardware, set it up by hooking the ESP8266 module to the doorbell button and camera module and connecting it to a development board such as NodeMCU.

The ESP8266 microcontroller-powered WiFi doorbell functions by joining a WiFi network and sensing button presses from the doorbell itself. The ESP8266 initiates an event when the doorbell button is hit, such as delivering a push notification to the user's mobile device. If a camera module is included, the system might also offer other functions like live video streaming, which would let users see and talk to people at the door from a distance. A practical and dependable way to monitor and manage door access is to employ security measures like encryption and authentication to guarantee safe access and data transfer.

BLYNK

Blynk is an easy-to-use platform that makes IoT (Internet of Things) creation simpler. Users can create bespoke mobile apps to control connected devices with ease. It provides a wide range of tools and widgets, including graphs, buttons, sliders, and notifications, for creating interactive interfaces. Blynk is adaptable for Internet of Things projects since it supports a broad variety of hardware platforms and communication protocols. Blynk is a great option for Internet of Things enthusiasts and developers who want to create intelligent and connected solutions since it allows users to effortlessly connect their devices to the cloud, monitor sensor data, control actuators, and receive real-time warnings.

CHAPTER-5

EXPERIMENTAL RESULTS & DISCUSSIONS

A WiFi doorbell system built on the ESP8266 platform offers the customer smooth wireless connectivity, real-time notifications to their mobile device, and remote control functionality. In addition to supporting functions like live video streaming, the system efficiently recognizes pushes on doorbell buttons and initiates actions like push notifications. Authentication and encryption are examples of security mechanisms that provide safe access and data transmission, improving home security and enabling easy remote guest interaction. All things considered, the ESP8266 WiFi doorbell system exhibits effective operation and cutting-edge IoT features.

A smart doorbell system powered by Blynk offers a range of advanced features for enhanced home security and convenience. With real-time notifications sent directly to your smartphone, you'll never miss a visitor at the door. The system's live video streaming capability allows you to view visitors from anywhere, while two-way audio communication enables seamless interaction. Motion detection alerts provide added security by notifying you of any activity near your doorstep, even if the doorbell isn't pressed. Remote access ensures you can monitor your home even when you're away, and integration with other smart devices allows for a fully automated and interconnected home environment. With customizable settings and multi-user support, the system can be tailored to suit your specific needs and preferences, providing peace of mind and convenience in one comprehensive package.

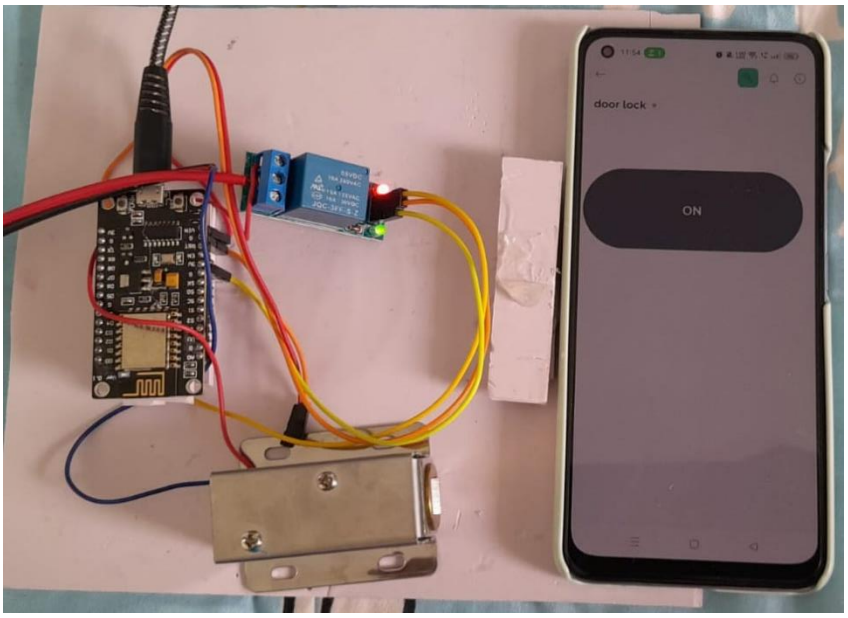

Fig-5. 1.Output (When Door locks)

Fig-5.2.Output (When Door Unlocks)

CHAPTER-6

ADVANTAGES, DIS-ADVANTAGES & APPLICATIONS

6.1ADVANTAGES

1. **Wireless communication**: Without the need for physical connections, the doorbell system can communicate with user devices thanks to the ESP8266's smooth wireless communication to a local WiFi network.

2. **Real-time Notifications**: When the doorbell is rang, users instantly receive push notifications on their mobile devices, giving them access to real-time alerts even when they're not at home.

3. **Customization and Expandability**: Using the ESP8266's GPIO pins and programming flexibility, users can add more sensors, actuators, or features to the system, extending its usefulness to suit their needs.

4. **Cost-effective Solution**: ESP8266 modules are an affordable option for deploying smart doorbell systems without sacrificing functionality, especially when compared to some other IoT platforms..

6.2 DIS-ADVANTAGES

1. **Restricted Processing capability**: In comparison to more sophisticated microcontrollers like the ESP32 or specialized IoT platforms, the ESP8266's processing capability is comparatively restricted. This restriction may make it more difficult for the system to efficiently manage complicated tasks or several concurrent activities.

2. **Limited GPIO Pins**: There are just a few GPIO pins on the ESP8266 that can be used to connect peripherals like sensors, actuators, or extra parts. Careful planning and possible trade-offs in hardware integration may be necessary to overcome this constraint.

3. **Limited Memory**: The ESP8266's onboard memory is constrained, which might cause issues when creating firmware or apps that need a large quantity of code.

6.3 APPLICATIONS

1. **Home security**: The system can be used in houses to improve security and convenience byallowing people to unlock oors using voice commands rather than keys.

2. **Office security**: In offices, the system can be used to regulate access to restricted areas, eliminating the need for keys or access cards.

3. **Hospitals and healthcare facilities**: The system can be used to limit access to sensitive locationssuch as operating rooms, drug storage areas, and patient rooms in hospitals and healthcare facilities.

4. **Educational institutions**: In educational institutions, the system can be used to limit access toclassrooms, labs, and other restricted areas.

CHAPTER-7

CONCLUSION & FUTURE SCOPE

7.1 CONCLUSION

Generally, there are a number of benefits to utilizing the ESP8266 microcontroller to construct a WiFi doorbell project, including wireless connectivity, real-time notifications, remote control capabilities, and affordability. When a doorbell button is pressed, the system efficiently recognizes it, starts activities like push notifications, and, if integrated, offers capabilities like two-way audio and live video streaming. Even though the ESP8266 has constraints, including little memory, GPIO pins, and processor power, these can be overcome with proper design and optimization. In general, the ESP8266 WiFi doorbell project shows off effective operation, cutting-edge IoT features, and improved security and comfort in smart home applications. In conclusion, there are a number of benefits to utilizing the ESP8266 microcontroller to construct a WiFi doorbell project, including wireless connectivity, real-time notifications, remote control capabilities.

In conclusion, navigating the complexities of security, privacy, interoperability, reliability, user interface, energy efficiency, and scalability is pivotal for the successful implementation of the smart door system project integrating Blynk with motion detection. By prioritizing secure communication channels, safeguarding user data, fostering seamless integration with diverse smart home setups, minimizing disruptions through robust reliability measures, crafting an intuitive user interface, optimizing energy consumption, and facilitating effortless expansion, the project aims to deliver a holistic solution for fortifying home security and streamlining automation. By surmounting these challenges, the project endeavors to cultivate a dependable, user-centric, and sustainable smart door system, poised to not only meet but exceed user expectations, thereby catalyzing advancements in IoT applications within the domain of residential security and convenience.

7.2 FUTURE SCOPE

The system may be used with other smart home appliances like security cameras or lighting controls to create a more complete and networked smart home. More voices and languages may be recognized by the system as speech recognition technology develops. Future door lock technology is probably going to incorporate more sophisticated and sophisticated user identification methods, such facial recognition. When choosing a system that suits your needs and tastes, carefully weigh the potential advantages and disadvantages, just like you would with any new technology.

Fig-7.2. Door Lock By motion Recognition

REFERENCES

1. S. S. Roy, S. S. Sarkar, and S. Bhaumik, "Voice-controlled smart door lock system using Arduino and Android app," 2017 International Conference on Circuit, Power and Computing Technologies (ICCPCT), 2017, pp. 1-6, doi: 10.1109/ICCPCT.2017.8074367.
2. Prabhakar, P. Singh, R. Singh, and A. K. Tripathi, "Smart Door Lock using Voice Recognition and Facial Recognition," 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI), 2019, pp. 439-443, doi: 10.1109/ICOEI.2019.8863125.
3. Khan and A. R. Khatait, "Design and implementation of voice-controlled automatic door locking system,"2016 International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2016, pp. 900-905, doi: 10.1109/ICACCI.2016.7732236.
4. M. Ali, S. Anjum, M. Yaqoob, S. Imran, and H. Abbas, "Smart home security using voice command and android app," 2016 13th International Bhurban Conference on Applied Sciences & Technology (IBCAST),2016, pp. 426-431, doi: 10.1109/IBCAST.2016.7428355.
5. V. K. Chandramouli and R. L. Sunil, "Design and Implementation of Voice Controlled Door Lock Systemusing Arduino," 2019 International Conference on Inventive Research in Computing Applications (ICIRCA), 2019, pp. 241-246, doi: 10.1109/ICIRCA.2019.877

APPENDIX

```
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
//Define the relay pins
#define relay1 DO
#define relay2 D1

#define BLYNK_AUTH_TOKEN "NlIpoXSZGC8q0LRKDBe5C5T1pkUPraky" //Enter your blynk auth token

char auth[]=BLYNK_AUTH_TOKEN;
char ssid[] = "Rishitha Reddy";//Enter your WIFI name
char pass[] = "rishitha76"; //Enter your WIFI password
//Get the button values
BLYNK_WRITE(V0) {
bool value1 = param.asInt();
  // Check these values and turn the relay1 ON and OFF
if (value1 == 1) {
    digitalWrite(relay1, LOW);
} else {
    digitalWrite(relay1, HIGH);
}
}
  //Get the button values
BLYNK_WRITE(V1) {
  bool value2 = param.asInt();
  // Check these values and turn the relay2 ON and OFF
  if (value2 == 1) {
      digitalWrite(relay2, LOW);
  } else {

```

```
        digitalWrite(relay2, HIGH);
  }
}
void setup() {

  //Set the relay pins as output pins
  pinMode(relay1, OUTPUT);
  pinMode(relay2, OUTPUT);
  // Turn OFF the relay
  digitalWrite(relay1, HIGH);
  digitalWrite(relay2, HIGH);
//Initialize the Blynk library
   Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
}
void loop() {
   //Run the Blynk library
   Blynk.run();
}
```