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Smart Door Locking System with Intrusion Detection

Amit Vikram Seth**, Ayush Prakash Gupta**, Astha Singh**, Devansh Pandey**, Ms. Harshita Bhardwaj*

** Asst.Professor, Dept. of Computer Science and Engineering, RKGIT, Ghaziabad*
*** Student, Dept. of Computer Science and Engineering, RKGIT, Ghaziabad*

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ABSTRACT
Smart door locking system with intrusion detection uses Solenoid lock which is connected over Wi-Fi with ESP32 CAM and Internet of Things technology to monitor the status of the door and manage the door and thus increasing security in a home or building. The software used in this system for the control of the lock is Blynk which connects a smartphone to a door lock system and it increases the security of our home. The suggested Door Security System application makes use of Internet of Things (IoT) technology, Solenoid lock with Wi-Fi connectivity with ESP32 CAM, and door management to monitor door status, thus giving us relief from the security of our home. A communication protocol called Blynk links a smartphone with a door lock system and improves home security.

I. INTRODUCTION

Nowadays, everyone is worried about security, whether it is the security of their own house or the protection of their data. Nowadays digital locking can be found in modern-day houses. As technology has evolved and the usage of IoT has risen. Digital locking can be done using various technologies like fingerprint systems or it can be pin-protected or voice command base, to open doors instead of a physical key. In today's world, we already have a variety of digital locking system solutions to secure our homes using these various technologies. In this paper, we'll build an Internet of Things-based Wi-Fi Door Lock system using a solenoid lock, an ESP32 CAM. The AI-Thinker ESP32 CAM module is a cheap development board containing an OV2640 camera from OmniVision. It has integrated two high-speed 32-bit LX6 CPUs and a 7-stage pipeline design are features of the Wi-Fi ESP32 S processor. The ESP32 CAM used for the Door Security System application to capture the live status of the door. The Blynk protocol is used to communicate between a smartphone and a solenoid lock system.

II. RELATED WORK

For this study, we considered the following current systems:

- Locking System Using Password
- Door Lock System Using Face Recognition
- Open the Door Using Voice Commands

Below is a brief summary of each of these.

A. Locking System Using Password

A secure password is used when the password is matched correctly the door gets open and the person is allowed to get the access of that area, after some time the door again gets locked. If the entered password is wrong several times then the gate is locked permanently and can only be opened by a physical key. Modern locking mechanisms are gradually replacing conventional lock systems that employ mechanical lock-and-key systems. This method uses a mix of automated and hand-driven equipment and is quite innovative. The two most evident benefits of these unique lock systems are their simplicity and excellent efficiency. In such an automated lock system, an electronic control assembly uses a password to regulate the output load. The output load can be any mechanical or electrical load, such as a motor, light, or lamp. This system uses an 8051 microcontroller.

B. Door Lock System Using Face Recognition

The previous ten years have seen major advancements in face recognition technology, which is now mostly used for security and surveillance. This project is divided into three phases. In the first stage, the face samples required

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to unlock the lock were collected. In the second step, the model was instructed to use these face samples, and in the third phase, the faces were recognised using the trainer data. The Raspberry Pi will unlock the door if it recognises a face. This door-locking system using face recognition is made with a solenoid lock and a Raspberry Pi camera.

C. Open Door Using Voice Commands

This project uses, an ordinary entrance that is changed to include a very smart security locking system that opens using Voice command recognition. Based on our commands the door locks and opens. C# code was used to create a Windows Forms application that can save, check, and unlock trusted faces. In order to communicate with the Wi-Fi Module and Arduino, it employs an IoT Cloud API and a proprietary API for voice verification. The Arduino Uno, which is linked to the Wi-Fi Module, will control a servo motor to lock and open the door.

III. PROPOSED SYSTEM

In this system, we have used the concept of a solenoid lock connected over a Wi-Fi operating an ESP32 CAM that has gained prominence in the world of home appliances. Nowadays, everyone places high importance on security, whether it be personal security or data security. In the past decades, the technology has grown and the usage of the Internet has increased, digital locking system of doors has become rather widespread. Digital locks function without a physical key; they instead use face recognition, voice commands, pins, passwords and many other latest technologies. Researchers have already developed a variety of door lock applications using these latest technologies. In this project, we developed a Wi-Fi door-locking system using the ESP32-CAM and intrusion detection using the PIR sensor.

A cheap development board featuring a micro-SD card connection and a tiny OV2640 camera is the AI-Thinker ESP32 CAM module. It has two highly effective 32-bit LX6 CPUs, an integrated Wi-Fi and Bluetooth chip, a 7-stage pipeline design, and more. Existing models gave a thorough explanation of ESP32 CAM and showed how to utilise it to build a Wi-Fi video doorbell. We developed a Face Recognition-based Door Lock System with a Relay module and Solenoid Lock using the ESP32 CAM and Blynk.

A. Software and Hardware Requirements

This project's main goal was to design and construct a door lock system that would enable users to open a door using facial recognition technology via a door camera. We started our research by verifying the need for such a system among potential clients before constructing a door lock system utilising a modified ESP32 Cam. The following hardware and software were used to build the Wi-Fi door lock system.

1) Software Requirements:

An Arduino-based IDE will be used to type the coding of the system and its functioning. In this platform, the coding to make this platform is done by using C and C++ language commands and it works on every platform like Windows, Linux and Mac OS. It will be used to create the program and will be uploaded on the boards that are compatible with Arduino as well as to boards from other vendors that enable third-party cores.

2) Hardware Requirements:

- ESP32-CAM
- NODE-MCU
- Solenoid Lock
- Breadboard
- PIR Sensor
- Relay
- Push-button
- Servo Motor
- 10k resistor (2 no.)
- 12V DC adaptor
- Transistor

B. System Design

During the development and implementation stage, the prototype is created through an iterative process that adheres to the design requirements. By dissecting the design into smaller components, we may construct and test things in recurring sequences. Up till we have a fully operational design that satisfies the idea objectives, new components can be produced and assessed in each iteration.

A comprehensive prototype specification is developed from the pilot research and taken into consideration. While making the design of our model, we have taken into consideration the common architecture of the pre-designed door-lock models and the security issues in them. Wireless machines continuously emit a radio signal that may be detected by smart devices (such as Mobile Phones) through the SDL, and an appropriate microcontroller to provide the functionality of the desires were a connective protocol (such as Bluetooth), a cloud to help with a safe and reliable

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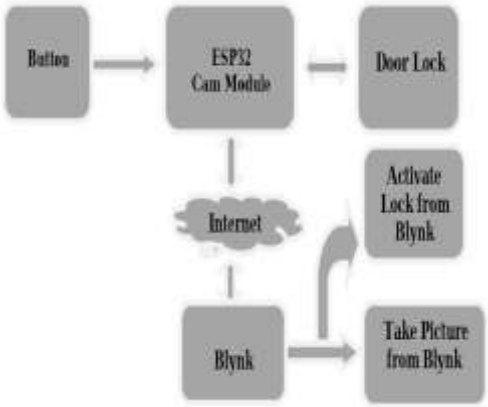
connection and an API to manage the functionality of the SDL.

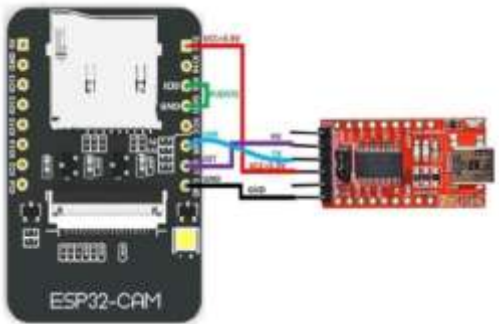
The Door Lock connected to an ESP32 CAM makes use of IoT technology to manage, monitor, and improve the security of the door. A communication protocol called Blynk is employed to boost a home's security. Using the Blynk protocol, a smartphone and a door lock system may communicate.

During the development and implementation stage, the model is created through a step-by-step process that adheres to the design requirements. By dissecting the design into smaller components, we build and test each component in a recurring sequence. Up till we have a completely operational system that satisfies the thesis' objectives, new features can be produced and assessed in each iteration.

In the subsequent block chart represents the architecture of the model presented in this paper.

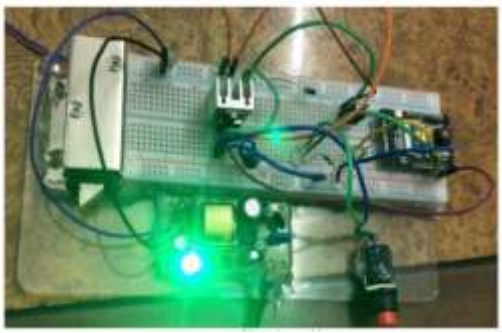


A comprehensive prototype specification is developed from the pilot research and taken into consideration. While making design selections, a basic model of IoT architecture and their security issues were taken into consideration. One of the preferences was an appropriate microcontroller to handle the SDL's functionality. Other preferences included wireless devices transmitting a continuous radio signal that can be detected by smart devices like cell phones via connective protocol (such as Bluetooth), a cloud to support secure and reliable communication and an API to handle the SDL's functionality.



C. Results

The illustration that follows shows how this effort turned out. With the camera and the Blynk App, we were able to create a Smart WIFI door lock for this IOT-based working model. In this design, when someone rings the doorbell, the homeowner receives a smartphone notice with a picture of the visitor. The owner can unlock the door using the Blynk application on his smartphone.



To free the mind of the owner from the security or the tension of whether the door is locked or not, we successfully built a Smart door lock that works over Wi-Fi and also detects an intrusion. The smartphone and the door lock system communicate via the Blynk protocol. The smart locking door system is crucial in this situation because of the COVID situation.

The intrusion system will detect any movement or forceful action on the door and will immediately alert the owner with a notification of its smartphone in addition we can also add a buzzer attached to the gate if the owner wants to alert society of intrusion then he can operate that to from his smartphone.

Additionally, the Android app should eventually be able to control more windows, doors, and basic house electronics. A battery backup

system needs to be taken into consideration to ensure the system's completion.

REFERENCES

[1]. Norarzemi, Ummi Annisa, et al. "Development of Prototype Smart Door System with IoT Application." Progress in Engineering Application and Technology 1.1 (2020): 245-256.

[2]. Aldawira, Cornelio Revelivan, et al. "Door security system for home monitoring based on ESp32." Procedia Computer Science 157 (2019): 673-682.

[3]. Babiuch, Marek, and Jiri Postulka. "Smart Home Monitoring System Using ESP32 Microcontrollers." Internet of Things. IntechOpen, 2020.

[4]. Eethamakula, Kosalendra, et al. "Automatic Detection, Controlling and Monitoring of Temperature in Sericulture Using IOT," IJAEMA 12.8 (2020): 1099-1103.

[5]. Pavelić, Marko, et al. "Internet of things cyber security: Smart door lock system." 2018 international conference on Smart Sy stems and Technologies (SST). IEEE, 2018. [6] Guduru, Tabu Sravani, and SURYA NARAYANA MURTHY THATAVARTHY. "IoT Based Home Monitoring System."