International Journal of Research Publication and Reviews

Automatic Door Opener using Password

Sahil Vagal¹, Mukta Redij ², Shruti Avhad³, Harsh Bhosale ⁴,Trupti Dudhat⁵

1,2,3,4 Student, Information Technology, Vidyalankar Polytechnic, Wadala
⁵Mentor, Information Technology, Vidyalankar Polytechnic, Wadala

A B S T R A C T

As thefts are increasing day by day security is becoming a major concern nowadays. Door locks have played a vital role in human life for a long time. As the rate of theft rises, security has become a top priority in recent years. Door locks are intended to keep us and our belongings safe and secure from thieves. People used to lock home doors with physical keys, and they required the key to unlock doors. If they lost the key, it was unlikely to be repaired, and it was expensive. Now, those door lock systems may be replaced with new locking technologies. They integrate with IoT systems, enabling remote access control and monitoring. They integrate with IoT systems, enabling remote access control and monitoring. In this project we have made a digital door lock system using password with ESP32. It will open the door only when the correct password is entered by the user, and it will also display the output as 'Door locked' or 'Door unlocked' on the LCD display. The door can also be opened by a supported web application where the user can authenticate with the username & password and the user will be able to lock and unlock the door without entering the password through this web application

Keywords: Digital Door Lock System, remote access control and monitoring , IoT systems

1. Introduction

Technology has made it easier for humans to live comfortably in the modern world due to a growing number of facilities. As a result of the introduction of several technologies, people are now able to accomplish many things more easily in their day-to-day lives. However, it can lead to security concerns as well. Therefore, we must ensure the security of our lives and our personal belongings. It is imperative that researchers continue to pay more attention to gadgets and locks to safeguard our lives and properties are protected in the long run. The problem with conventionally installed door locks is that almost anyone can break them and gain access to the home. Only a metal lock that can be disfigured or melted cannot neglect security issues. People are vulnerable to security threats due to the ease with which conventional door locks can be broken. Crime rates have increased in many countries that use mechanical locks due to the ease with which they can be broken. It is not even possible to identify who has illegally entered a house or apartment where mechanical locks are used. Thus, overcoming these obstacles is a very challenging task. Earlier, people used to lock home doors with physical keys, and they required the key to unlock doors. If they lost the key, it was unlikely to be repaired, and it was expensive. Now, those door lock systems may be replaced with new locking technologies. For this purpose, we have developed Automatic Door Opener using Password.

2. Literature Review:

Smart buildings have recently become the foundation for the Internet of Things (IoT). Connecting devices in homes to the internet increases internet usage, making homes more comfortable, provident, pleasant, and secure. The proposed approach focuses on a key security feature of smart home technologies: the door lock mechanism. The door lock system sets up security by allowing the owner to check the buildings using an Arduino UNO-controlled, Bluetooth-connected system. Installing the built android application on devices such as tablets, smartphones, laptops, and other computers allows users to open or close the door lock by entering login credentials such as username and password, which are confirmed in a database over the internet. If the credentials are incorrect, the buzzer sounds and an SMS notice is issued to the building's owner, increasing security. Using other wireless connectivity, this concept can be extended out to commercial sectors such as ATMs, vending machines, and so on. Keyless Entry System Based on Arduino Board with Wi-Fi Technology, an Arduino circuit board, a Wi-Fi module, and the PHP programming language are used to allow access to a closed door in this keyless entry system. The proposed method is explained, which involves using an Arduino Uno board and a Wi-Fi shield to unlock the door without a key. Unlike earlier systems, which have a restricted range, the internet connection allows the device to unlock the door from anywhere. Ease of use in a variety of computing situations.

3. Problem Statement:

In an era marked by rapid technological advancements, the traditional landscape of home security is undergoing a transformative shift, propelled by the integration of smart technologies. Among these innovations, smart locks have emerged as a cornerstone, revolutionizing the way we control and monitor access to our homes. Unlike their mechanical counterparts, smart locks leverage cutting-edge electronics, connectivity, and sophisticated algorithms to provide users with a secure, convenient, and intelligent access control solution. The focus is on creating well-secured households through innovative locking mechanisms that go beyond traditional metal locks. Studies also explore the security aspects of smart locks to ensure their effectiveness. Currently, traditional locking systems are prone to security breaches and inconvenient for users who need to carry physical keys. Additionally, traditional locks do not integrate with smart home systems, limiting their functionality. The aim of this project is to develop a smart lock system that addresses these issues by providing advanced security features, remote access control, and integration with existing home automation systems.

4. Methodology:

1. Introduction

In this project, we have used an ESP32 and a keypad to create an Automatic Door Opener using Password. Thefts and frauds are becoming more common by the day; therefore, security is becoming a serious worry. As a result, a smart lock with a digital code can simply secure our home, business, locker, and other valuables. It will open the door only when the correct password is entered by the user, and it will also display the output as 'Door locked' or 'Door unlocked' on the LCD display. The door can also be opened by a supported web application where the user can authenticate with the username & password and the user will be able to lock and unlock the door without entering the password through this web application Due to a password-based door lock mechanism, only authorized personnel are permitted access to the restricted areas. The ESP32 oversees the project's overall operation. A 4×4 keypad can be used to input the necessary password.

2. Working Principle

There are two cases in this system. The purpose of this system is to provide a smart door-locking mechanism that opens or closes the lock on the door automatically with password or it can be opened by the supported web application.

Case1: The lock will open and close

When a password is entered via keypad, the ESP32 checks the password and finds out if it is right or wrong. If the password matches with the stored password in the ESP32, the ESP32 sends the signal to the LCD display for showing "Lock opened" as well as the microcontroller sends the signal to Servo Motor. Then the motor is rotated by 0° to 180° and opens the lock, allowing the door to be unlocked. Later, by pressing '#' button, the Servo motor is rotated again by 180° to 0° closing the door.

Case 2: The lock will not open

If the wrong password is entered, the system shows "Access denied" and Servo Motor is not rotated. A bit of time the system automatically starts beginning.

Case 3: The lock will open and close by Web Application

The user can login with the valid credentials. After successful login, the user will be able to lock and unlock door. If the user enters wrong username or password ; the web application shows "Invalid credentials. Please try again".

3. Important Components

- Hardware:

1. ESP32

2. 4×4 Matrix Keypad

3. SG90 Micro Servo Motor

4. 16×2 LCD I2C

5. Connecting wires

- Software:

1. Arduino IDE

1.ESP32:

The ESP32 is a versatile System on a Chip (SoC), featuring integrated Wi-Fi and dual-mode Bluetooth connectivity. It is engineered for a wide range of IoT applications, offering a high level of integration with features like in-built antenna switches, power management modules, and more. The ESP32 is

known for its ultra-low power consumption, making it suitable for mobile devices, wearable electronics, and IoT applications. This SoC can function reliably in industrial environments with an operating temperature ranging from -40°C to +125°C. Additionally, the ESP32 can operate as a standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor.
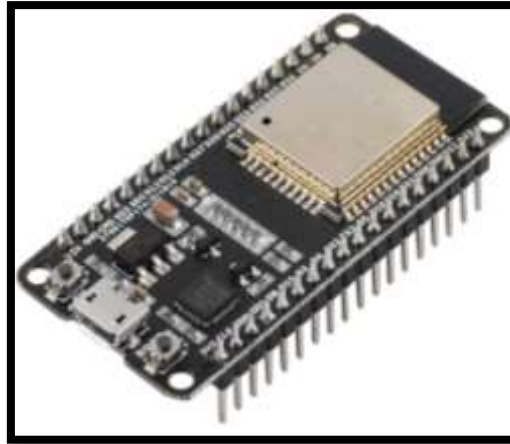
2. 4×4 Matrix Keypad:

This 4x4 matrix keypad has 16 built-in push button contacts connected to row and column lines. A microcontroller can scan these lines for a button-pressed state. In the keypad library, the Propeller sets all the column lines to input, and all the row lines to input. Then, it picks a row and sets it high. After that, it checks the column lines one at a time. If the column connection stays low, the button on the row has not been pressed. If it goes high, the microcontroller knows which row (the one it set high), and which column, (the one that was detected high when checked). See the schematic in the "Circuit" section, above, for a visual reference of the keypad layout. The keypad library supports pretty much any number of rows and columns. So, the program has to tell us that our keypad has 4 rows and 4 columns, which I/O pins the lines are connected to, and what value each button represents. The rows, cols, and values arrays store that information. The rows array will be used to tell the keypad library that the top row is connected to D13, the second row to D12 and so on. Likewise, the cols array lists the leftmost column as connected to D26, the next over connected to D25 and so on. The values array stores the value we want the program to give us for each button press. For example, if the top-left button is pressed, we want the number 1, and if the next one is pressed, we want the number two. If the top right button is pressed, we want the ASCII code for the 'A' character, which is 65.

3. SG90 Micro Servo Motor:

Micro Servo Motor SG90 is a tiny and lightweight servo motor with high output power. Servo can rotate approximately 180 degrees and works just. like the standard kinds but smaller. You can use any servo code, hardware, or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with 3 horns (arms) and hardware.


4.16×2 LCD I2C:

LCD I2C typically refers to the combination of a liquid crystal display (LCD) and an I2C (Inter-Integrated Circuit) interface. This is a common setup for connecting an LCD to a microcontroller or other embedded systems. The I2C protocol is a serial communication protocol that allows multiple devices to communicate with each other using only two wires: a data line (SDA) and a clock line (SCL). When an LCD is combined with an I2C interface, it simplifies the wiring and reduces the number of required pins on the microcontroller, making it easier to connect and control the display. Instead of using a separate set of pins for data and control signals, the I2C interface allows data and control signals to be transmitted over the same two-wire bus.

4.Implementation

At first, the keypad was connected with the ESP32. We connected all the necessary pins of the Keypad to the ESP32. All 7 pins were connected using connecting wires. Then we connected a 16×2 LCD I2C to ESP32. Later we connected Servo Motor to the ESP32, the rotation of Servo Motor allows us to open or close the door. All the pins were connected using connecting wires.
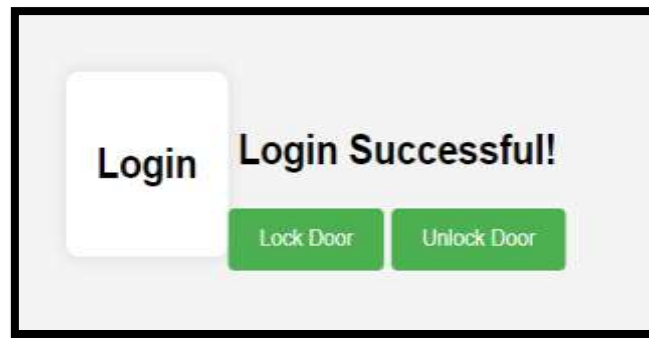

5.Results:

GUI
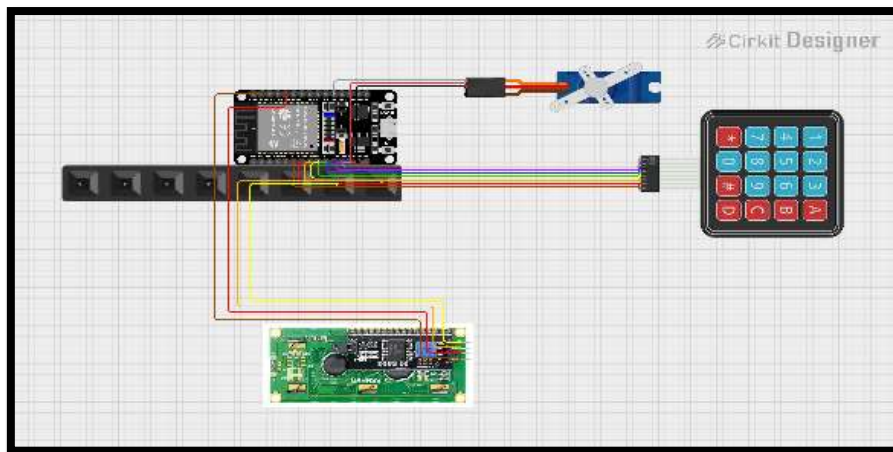
Home Page

Lock Door

Unlock door

6. Conclusion:

As a result, the "Automatic Door Opener using Password " is a modern take on the traditional door lock. The innovation generated by the lock system with no more direct touch betwen the user and the lock is the end of the topic of smart Lock utilizing ESP32. This method is both inexpensive and simple to set up. Finally, it was revealed that the project developed had applied all things by creating the home in real life that it can be implemented. Because the ESP32 microcontroller is used in this project, the design is simple, and the project may be completed in less time than with other techniques. A safe

locking/unlocking system based on a keypad and ESP32 is proposed in this paper. Adding a password on the ESP32 side improves the security of the system. The web application also enhances the system by simply logging in with the credentials and accessing the smart door system. This also provides a smarter solution and can be further integrated with Home Automation Systems.

7.**References:**

- http://www.ijrerd.com/papers/v3-i4/8-IJRERD-C109.pdf

- https://www.researchgate.net/publication/360182339_Automatic_Door_Lock_System

- https://www.academia.edu/63402211/A_PROJECT_REPORT_ON_Smart_Door_Locking_System_Using_Arduino_

- https://www.google.co.in/