



Smart Locking system

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OVERVIEW:

Our project aims to improve the experience of security in homes, locks, etc. In addition to helping the elderly with giving them an advanced feature.

- The idea depends on Face recognition in the field of IOT.

A face recognition smart locking system is an advanced security solution that utilizes technology to grant access to individuals based on their facial features. This system employs a combination of hardware and software components to accurately identify and authenticate individuals in real-time.

The important idea of our project is to serve the elderly and handicapped, when a person knocks on the door a photo will be sent to the owner's phone, giving him the access to control whether the guest is allowed to enter or not, if the guest is already identified previously, he would be given an access immediately.

HARDWARE COMPONENTS:

- ESP32-CAM board (the main component of the project)
- 12V Electronic Lock
- Relay Module
- 12V DC supply

SOFTWARE COMPONENTS:

- Arduino IDE
- Telegram

❖ ESP 32 CAM:

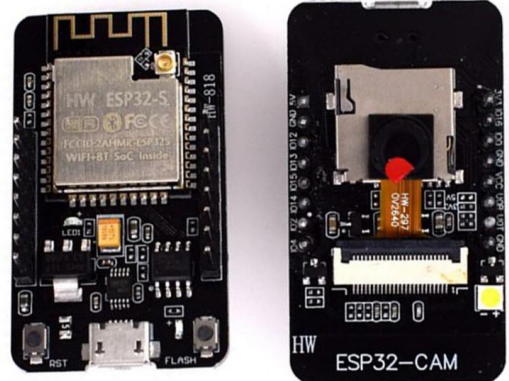
ESP32-CAM is a very small camera module with the ESP32-S chip and support WIFI.

The AI-Thinker ESP32-CAM module comes with an ESP32-S chip, a very small size camera and a micro-SD card slot. Micro SD card slot can be used to store images taken from the camera or to store files. This ESP32-CAM module can be widely used in various IoT applications like face detection system .

ESP32-CAM module also has several GPIO pins to connect the external hardware.

❖ USED VERSION OF THE MODULE:

- ESP32-CAM Development Board Test Board Wi-Fi+ Bluetooth Module ESP32 Serial Port with OV2640 Camera CH340
- Which is programmed directly using Micro USB.



❖ SOLENOID LOCK (12V) & RELAY MODULE:

- A solenoid lock works on the electronic-mechanical locking mechanism.
- When the power is applied, DC creates a magnetic field that moves the slug inside and keeps the door in the unlocked position. The slug will retain its position until the power is removed. When the power is disconnected, the slug moves outside and locks the door.
- The relay module is used to switch the Solenoid lock on or off.

❖ PROBLEM:

The output power of the ESP wasn't enough to drive the relay.

❖ SOLUTION:

We used the UART protocol, the signal was sent to ARDUINO then the ARDUINO was in control of sending the signal to the relay.

❖ PART 1: DOOR LOCK USING FACE RECOGNITION

SOFTWARE:

- Arduino IDE will be used to program the ESP 32 Module
 - After the Installation of ESP 32 package on the IDE , we will deal with **Camera web server** model to Activate “CAMERA_MODEL_AI_THINKER” , it provides the codes are for web page, camera index, and camera pins.
 - Include the libraries of WIFI to set the password and the username before uploading.
 - Include the libraries of the camera.
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CODING CONCEPTS OF RELAY MODULE:

- The relay module is the component which control locking and unlocking the lock
- define the pin where the relay module is connected. We will be using millis() function to lock the door after unlocking it in a defined interval of time for example 5 seconds.
- Serial monitor is used to test the status of network connection.
- define the pin mode for the relay module and set the relay at a low position initially.
- Inside the loop() function, check if the face matches with the enrolled_face. If yes, then unlock the door for 5 seconds and after 5 seconds lock the door again.

VIDEO STREAMING WEB PAGE:

- After programming ESP 32 Module and setting the network connection
 - navigate to the browser and enter the ESP IP address that is copied from the Serial monitor to access the camera streaming. It will take you to the streaming page. To start the video streaming, click on the 'Start Stream' button at the bottom of the page.
 - To recognize the faces with ESP32-CAM, first, we have to enroll the faces. For that, turn on the Face recognition and detection features from settings and then click on the Enroll Face button. It takes several attempts to save the face
 - After enrolling the faces, if a face is recognized in the video feed, ESP32 will make the relay module high to unlock the door.
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❖ PART 2, DOOR LOCK WITH ESP 32 CAM & TELEGRAM:

Another important feature in our project is to make Wi-Fi door lock with photo capture using ESP32-CAM and Telegram app. you can take multiple photos, unlock and lock the door from anywhere in the world with the Telegram app.

When anyone presses the doorbell, you will get a notification in the telegram app with a photo of that person. After that, you can easily unlock and lock the door from the telegram app.

❖ CONFIGURE THE TELEGRAM APP FOR WI-FI LOCK:

For this ESP32-CAM project, We have used the UniversalTelegramBot library. So first you have to download and install it to create Telegram BOT to lock and unlock the door and capture a photo for the person who pressed the bell.

❖ ADVANTAGES & VALUES EXPECTED FROM THE PROJECT:

1. More private places
2. Efficient security system
3. Reduction in robbery rate
4. In the time of this pandemic, provides healthier environment.
5. Providing an easier way for elderly and handicapped to control their locking system.