

## ESP32 CAM Face Detection Door Lock

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**Abstract** - In this paper, the creation of a door lock system is accomplished using facial recognition in conjunction with the ESP32 CAM for more accurate face detection. The ESP32 CAM is powered by battery that acts because it is the system's backbone, and it controls the door locks and unlocks systems. This door lock system works on facial recognition. Here, the door lock system is controlled by face recognition of a private. A door is one of the defense features to take care of physical security of the house. If the door of the home is often opened easily, a thief can easily enter and steal the contents of the house. At first, a door only requires a physical key to lock or unlock the door but on the other hand, with the advancement of technology, a more modern door has been innovated, namely the digital door which will lock or unlock doors without requiring any physical key. We propose an application called Face detection Door lock which is predicated on Arduino using Internet of Things (IoT) technology to watch the status of the door, control the door and increase security. By the use of ESP32 cam, the door will lock or unlock automatically.

**Key Words:** ESP32-CAM, Camera, IoT, Security, Arduino, Smart Door Lock System

### 1. INTRODUCTION

This Face detection are utilized in smartphones in past few years. It's a cool technology where we will unlock mobile phones or access any application that needs high security. With ESP-32 CAM, we will try to develop an easy project that uses our face as ID. As ESP32 board comes with Camera Web Server example code that used for video stream and face detection. During this ESP-32 cam project, we've made Face Detection Door Lock System using ESP32-CAM. When smart lock detects any enrolled face, it automatically works. So, this is often an easy but very useful home automation project using ESP-32 CAM module.

Information gathered from the face helps people understand others identities. During this face detection approach, a given face is necessarily compared with the authorized faces to spot the right person. Within the field of bioscience, face recognition technology is one of the fastest-growing fields. The necessity of face recognition in security systems is attributed to the increase of economic

interest and thus the event of feasible technologies to support the event of face recognition.

### 2. WORKING

This part covered the essential settings including the ESP32 Camera board manager installation. The system is powered by ESP 32 CAM circuit. The Circuit Diagram for ESP32-CAM Faces Recognition Door Lock System is combined with an FTDI board, Relay Module, and Solenoid Lock. The FTDI board is employed to flash the code into ESP32-CAM because it doesn't have a USB connector while the relay module is employed to modify the Solenoid lock on or off. Here Arduino IDE is employed to program ESP32-CAM. The entire code is split into four parts. One is that the main code for the camera and relay module where the ESP32 locks or unlocks the door consistent with face recognition, and therefore the other three codes are for website, camera index, and camera pins. After completing the code, insert the network credentials. To acknowledge the faces with ESP32-CAM, first, we've to enroll the faces. For that, activate the Face recognition and detection features from settings then click on the Enroll Face button. It takes several attempts to save lots of faces. After enrolling the faces, if a face is recognized within the video feed, ESP32 will make the relay module unlock the door. Whenever the person comes ahead of the door, it recognizes the face and if it's registered then it opens the door.

### 3. CIRCUIT DIAGRAM

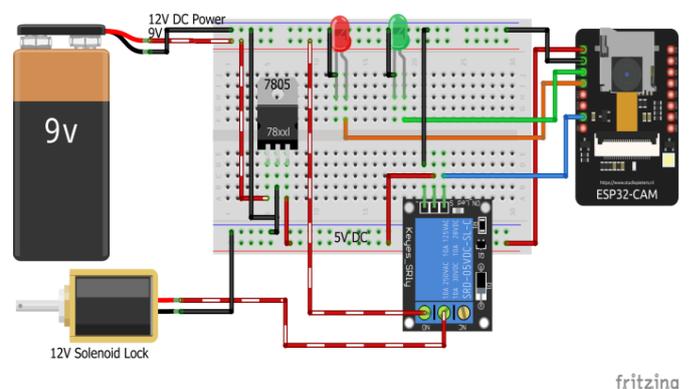


Fig-1: Overall Circuit Diagram

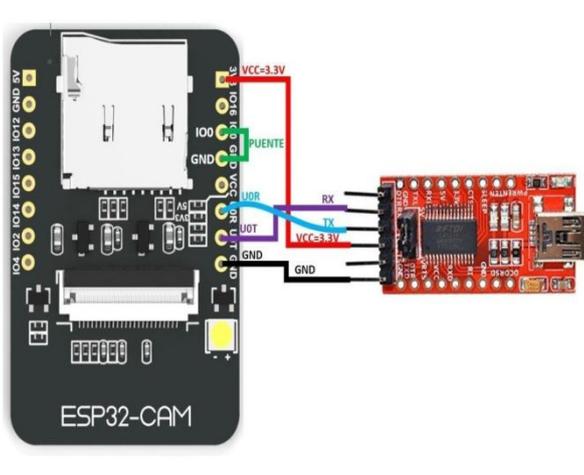


Fig-2: Programming ESP-32CAM with TTL Programmer

#### 4. SCOPE

- **Residential:**
  - Electrical Automation
  - Low power consumption
  - Cost efficient
  - Less Time-Consuming
- **Safety and Security**
  - Monitoring
  - Prevention against theft
- **Health Affecting Variables**
  - No contact needed
  - Hygienic and safe
- **Future Scope**
  - Daily Surveillance
  - Industrial automation & robotics
  - Easy and convenient interface

#### 5. ESP32 CAM

ESP32-CAM, the latest small-size camera module released by Essence. This component can easily work separately due to its tiniest design with a size of 27\*40.5mm and wide sleep current as low as 6mA. ESP32-CAM is usually widely utilized in various IoT applications, suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It's a perfect solution for IoT applications. ESP32-CAM adopts DIP package and should be used directly by plugging within rock bottom plate, realizing the rapid production of products, providing customers with high-reliability connection methods, which is useful for various application in IoT hardware terminal occasions.

#### 6. ARDUINO

Arduino is basically, an electronic prototyping platform that enables users to create interactive electronic objects. The project is built on a family of microcontroller board designs manufactured by Smart Projects in Italy and by several other vendors, using various 8-bit Atmel AVR microcontrollers or 32-bit Atmel ARM processors. These systems provide sets of digital and analog I/O pins which can be interfaced to varied expansion boards and other circuits. These boards have a unique feature to serial communications interfaces that include USB on some models to load programs from an individual computer. For programming, the microcontrollers, the Arduino platform provides an integrated development environment supported by the Processing project, which incorporates support for C, C++, and Java programming languages.

#### 7. CONCLUSION

In this project we successfully developed an ESP32 Cam Face Detection Door lock system that monitors the status of the door and boosts the home security. The System that we are working on is very easily managed and completed so we come to the conclusion part. Here we developed a surveillance and security-based system through this we can avoid unauthorized break-ins and prevention from theft. It can be done by its ESP32 CAM face which is used for capturing the images of an individual to open the door lock.

CCTV is such a lot popular in lately, it only provides surveillance facility but here we will control the break-ins and provides a far better security platform (I.e., door lock after the face recognition) and looking at today's scenario where people avoid physical contacts due to Co-VID19, it's also very helpful and needed at this point for the precaution of an individual. By this technique, we'll reduce the physical contact, cost and also man power required for the safety purposes. Little or no coding is required and one can get a system up and running in very less time.

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