

# SMART DOOR SECURITY SYSTEM FOR HOME MONITORING BASED ON ESP32-CAM

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**Abstract**— Door plays an important role in home security. When visitor comes in front of the door, the IR sensor triggers and ESP32-camera powered up and sends notification with captured image to the owner through blynk app. Therefore owner can open/close the door remotely by pressing the option. The most important aim of this project is control the movement of the door by android application installed on smart phone. So it will enhance complete security to the home/office.

The evaluation results shows that motion detection sensor can detect movement accurately up to 1.6m ahead, and messages published between Smartphone and door lock encrypted properly so messages are sent safely.

**Keywords**- IR Sensor, ESP32-CAM, door, Blynk, Smart phone.

## I. INTRODUCTION

Everyone these days is worried about security, whether it is data security or the security of their own home. Digital door locks have grown pretty common in current years as technology has advanced and the use of IOT has increased. Digital locks do not require a physical key to operate, instead relying on Radio-Frequency Identification (RFID), fingerprint, Face ID, pins, passwords, and other methods to do so. Using these various technologies, we have previously built a number of digital door lock applications. In this article, we will use the Espressif Systems' Camera (ESP32 CAM) to create an IOT-based Wi-Fi Door Lock system. Door Security System application uses ESP32 CAM and Internet of Things (IOT) technology to check the status of the door. Blynk is a communication protocol that is used to connecting a smart phone and a door lock system. The Door Security System is available on Android [1].

The intention of this work was to achieve versatile, viable, low power doorway security solutions with real-time response. The System developed should be included with IoT network and cloud computing. The goal was to develop a dynamic wireless doorway security system which empowers the user to collect visitor's photo identity and take an informed decision for give that person access into his/her place. Also the data collected by the cloud server cloud be retrieve if

required for some investigation purpose. The developed system must be user friendly and feasible [5].

## II. METHODOLOGY

The main goal of this project was to design and build a door lock system that allows users to unlock or lock a door via blynk app, through a camera implanted on the door. When a person is in within a certain radius IR sensor detects the person and activates the ESP32-CAM. The image of the person in front of the door is captured by ESP32- camera and sends to the user via blynk app. The system coding was implemented in arduino integrated development environment (IDE) using embedded C language.

## III. BLOCK DIAGRAM

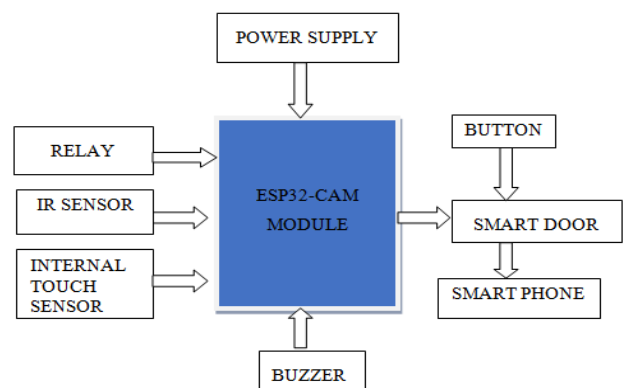


Figure 1.1: Block Diagram

Figure 1 shows the block diagram of Smart Door Security System of Home Monitoring Based on ESP32 cam. The main part is ESP32 cam which has inbuilt Wi-Fi module, which will help in controlling devices over the Internet. This project also focuses on building a sensible wireless home security which sends the alerts to the owner by using ESP32 cam module just in case of anyone standing on the doorstep the device capture the photo and sends it to the owner. IR sensor used at the front of door, which detects the motion of human and captures the image and send it to the owner via blynk app where the door can be through smart phone.

#### IV. FLOW CHART

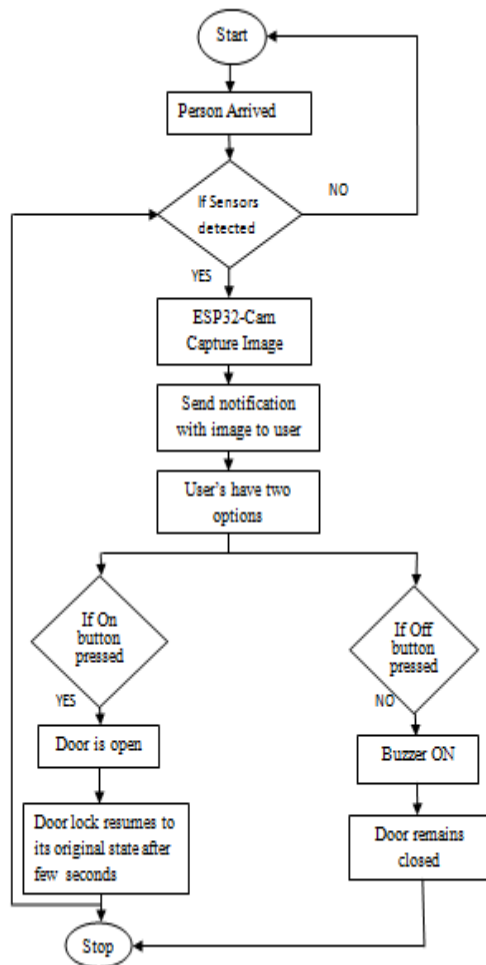


Fig 2: Flow Chart

Fig 2 shows that, the system consists of IR sensor, ESP32 CAM and Touch sensor. If the IR sensor detects any motion, then the camera will be triggered from sleep mode and will capture the image of the person in the front door. The system must be able to warn the user in case of any alert conditions. The user will get an alert notification on the Smartphone with the photo of that person. After checking the photo user can choose to unlock the door from the Smartphone using blynk app or else door remains closed. Blynk app is the medium between the user and the system. It allows to control the door anywhere and anytime.

#### V. HARDWARE REQUIREMENTS

##### HARDWARE COMPONENTS

##### ESP32-CAM:

The ESP32-CAM may be small size, low power consumption camera with module which contain a micro SD card. The images shot by the ESP32-CAM can be saved in a micro SD card. ESP32 comes with the in-built Wi-Fi and Bluetooth module. This Wi-Fi

module is used to assign the IP address. The ESP32-CAM are often extensively utilized in clever IOT applications like wireless video monitoring, Wi-Fi image upload ,QR identification, and so on.It is a 2 megapixel camera of dimension of 40.5 mm x 27 mm x 4.5 mm. The ESP32 web camera internal memory includes 448 kb of ROM for booting and core functions, 520 kb of on-chip SRAM for data and instructions and embedded flash.



Fig 3: ESP32-CAM

##### RELAY MODULE:

The Relay module is an electromechanical device that uses an electric current to open or close the contacts of a switch. The single-channel relay module is much more than just a plain relay, it comprises of components that makes switching and connection easier and act as indicators to show if the module is powered and if the relay is active or not. The single Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino. It also comes with a LED to indicate the status of relay.



Figure 4: RELAY MODULE

##### IR SENSOR:

The active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflect off of the object and is detected by the receiver. Passive infrared sensors only detect infrared radiation and do not emit it from an LED.



Figure 5: IR SENSOR

##### SOLENOID LOCK:

The Solenoid lock has a slug with a slanted cut and a good mounting bracket. Its essentially an electronic lock, designed for a basic cabinet, safe or door. When 9-12V DC is applied, the slug pulls in so it does not stick out and the door can be opened. It does not use any power in this state. It is

very easy to install for automatic door lock systems like electric door lock with the mounting board. This solenoid in particular is nice and strong. The solenoid lock denotes a latch for electrical locking and unlocking.



Figure 6: SOLENOID LOCK

## SOFTWARE REQUIREMENTS

### Blynk App:

The Blynk mobile app acts as a control panel to visualize and manage the hardware kit. It can be used for both Android and IOS. The app provides a productive guidelines and different widgets. Blynk is functioning on a currency called energy, which is his own. With a free Blynk account, new users get 2000 quantities of Blynk energy and therefore energy is used to purchase and buy deploy in-project widgets. The most impressive aspect of the Blynk Framework is the Blynk Server, where almost the whole thing can do. Blynk server is the main reason for security and also allows different types of communication between devices. With a little tinkering, the Blynk server is also an open source so one can make your own server and make even more safe.

## VI. APPLICATIONS

This low cost system with minimum requirements takes care of both home security as well as Home automation. More useful for handicapped and aged people.  
Devices can be controlled from long distance.  
More secure due to picture capture.

## VII. ADVANTAGES

Home automation and security.  
System uses Wi-Fi this makes system both accurate and reliable.  
Anonymous surveillance.  
By using smart app elderly and disabled people can control the door.

## VIII. RESULTS AND DISCUSSION

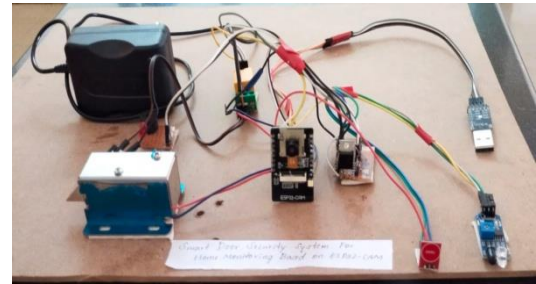
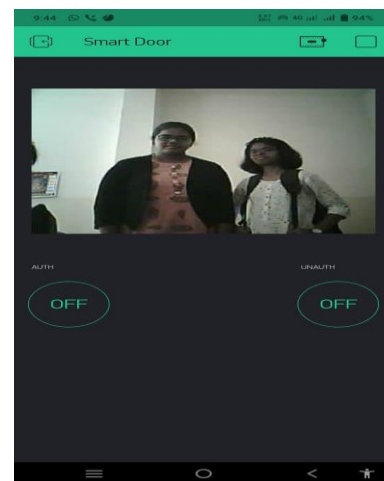


Fig 7: Connection of Components

In this project we successfully developed ESP32- CAM image capturing door lock system that monitor position of the door and control the door remotely. Our proposed system uses ESP32-CAM for capturing the visitor images and sends to the owner for authentication. The command to open door is



also known only to the owner this adds another layer of security. Since our proposed system is based on Blynk server, it can be easily installed as a system. Hence, it can be used by any device with Wi-Fi connectivity.

Fig 7: Results on Smart Phone

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