Smart Access Control System With Face Recognition And Security Using Machine Learning

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Abstract- This paper deals with the challenges that exist with a security system. Nowadays providing strong security in our homes, especially if there is more safety risk in your area. The door is important for home security. 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, The digital door is a more advanced door that can lock or unlock doors without the use of a physical key. This smart security system application uses a Wi-Fi door lock with ESP32 cam and IOT (Internet Of Things) technology using ML (Machine Learning) to monitor the status of the room, manage the door and increase security at home Using the Blynk protocol, a smartphone and a door lock system can communicate.

Keywords- IoT(Internet of Things), ESP 32 Board, Smart Door lock, Android application, ESP32 Camera, Sensor, Temperature Sensing, Alert Alarm, Security System.

I. INTRODUCTION

Many operations are now automated thanks to the widespread use of smart devices.. Home automation is one of the aggressively developed technology use by high end society. It's far tough to consider blindly on traditional and simple security features of the device..Only the individual whose face matches can unlock the door. Consequently, the restriction on using keys will be removed.This technology will now not only improve security but also make the device keyless. Many people have tried to create door automation systems based on smart candies, thumbs, and iris scans, but very few of them have been successful. Although this technique is quite promising, it also has some drawbacks. When we employ face detection, we also encounter several difficulties like lightening and variable brightness. The primary benefit of this method is that the door is acquired using a face detection approach, and the full face is recognized..Face recognition technology comprises extracting attributes from a facial image with the aid of a smart door model, and an intense growth is anticipated in the security sector as well as the synergy of everyday products. The door lock is controlled by a digital lock instead of a physical key

using RFID, a fingerprint, Face ID, a pin, a password, etc. We have developed a number of digital door lock applications in the past using these various technologies. In this tutorial, we'll use the ESP32-CAM to build a Face ID-controlled digital door lock system.

Our proposed project will address the three issues highlighted in the preceding paragraphs. In the first, we'll provide high security smart door lock system. In the second challenge, we can provide access to the door from anywhere. The third one is multiple application added to the project to bring out the best and efficient use of the device.

II. LITERATURE REVIEW

Many locations have deployed IoT-based smart door lock systems. According to one study, IoT-based smart access systems include Raspberry pi and a cloud server. This research used Haar Cascade Algorithm for face detection on Linux platform[1]. There is calling bell & wireless camera at the output terminal, there are Lcd and magnetic door lock along with a Wi-Fi dongle[2]. In another study [3], a small display unit is described as being installed at the entrance with a solenoid-operated lock via GSM connection with the aid of a stepper motor.[4] This study examines door unlocking through RFID, iris, and fingerprint
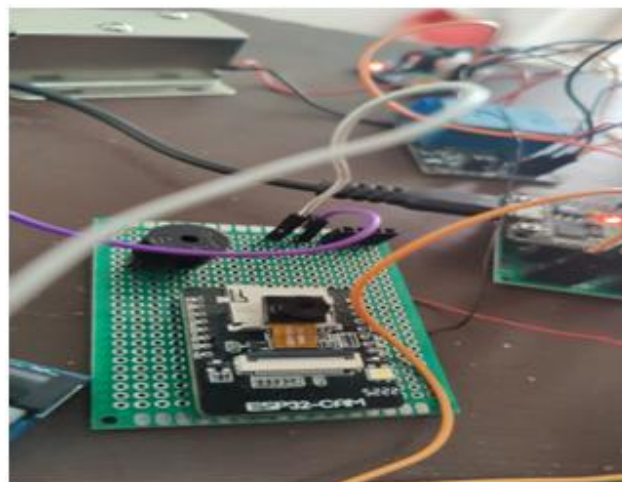
Figure

Finally,At this stage of the project we have included applications like temperature sensing , alert alarm and LCD display. The above applications are significant in their own ways. They ensure security and communication to the owner.

III. METHODOLOGY

The methodology of this project had been divided into three parts

1) Face Recognization
2) Access through Blynk
3) Application

In the first oneESP32 is programmed such that it receives data from ESP-32 Camera Module and then the data received from ESP-32 is processed and if more than 80% face is detected then the LED becomes HIGH .Depending on which the LDR value varies .If LDR value matches with the value specified in the code then the lock gets unlocked .

In second one, we are providing access to unlock the door if face is not recognized .Through Blynk platform we are sending to the owners home along with the buzzer sound produced from the device that is connected to it.This is done by connecting the mobile phone and the device through the Blynk cloud .
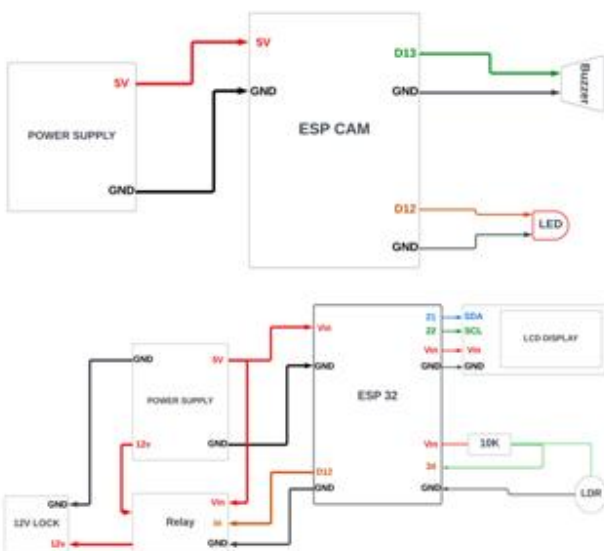
.The block diagram of this is given below.

Figure 3.2 Block Diagram of Anti-Theft Detection

IV. FLOWCHART

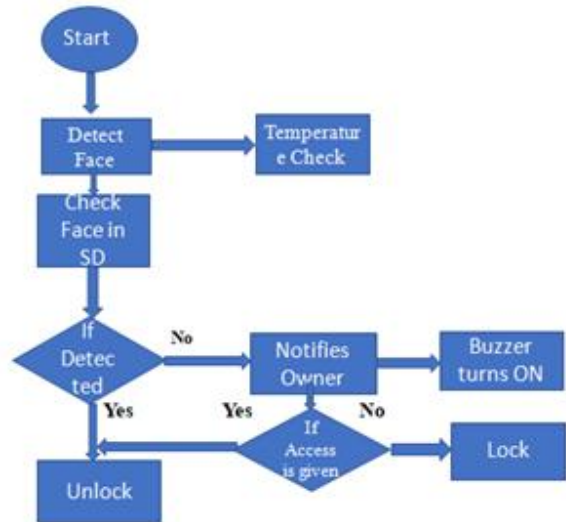In the following figures hows the flow of the project which is divided in to three diagrams.
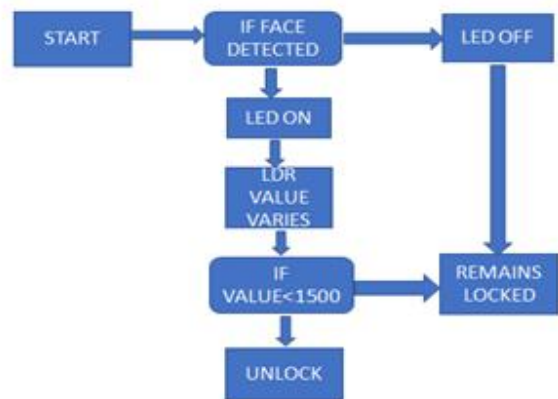

Figure4.1Flowchart of Smart Access Control System

Figure4.3Flowchart for Face Detection

V. HARDWARE REQUIRED

5.1BUZZER:

There are numerous channels for user and product communication. Using a buzzer IC for audio communication is among the greatest methods.

Figure5.1 Buzzer

5.2 LED:

Of all the varieties of semiconductor diodes currently on the market, Light Emitting Diodes (LEDs) are the most commonly utilised.. Light emitting diodes emit either visible light or invisible infrared light when forward biased. Remote controls employ LEDs that emit infrared light that cannot be seen.

LCD Display Module:

The Hitachi HD44780 driver-compatible LCD monitors can be controlled using the Liquid Crystal library..There are numerous of them, and the 16-pin interface usually identifies them.

Figure5.3LCD Display Module

ESP32-CAM

The ESP32-CAM is a tiny, low-cost ESP32-baseddevelopment board with an embedded camera. The cameramodule is used for capturing photographs .

Figure5.4ESP32CAM

Solenoid Lock:

A latch for electrical locking and unlocking is referred to as a solenoid lock. It is offered in locking and keeping and unlocking in the power-on mode types, both of which can be employed in different circumstances.

Figure5.5 Solenoid Lock

IR Temperature Sensor:

Infrared(IR) thermometers help measure temperature in a variety of industrial and clinical environments .When other types of thermometers are impractical or the object is delicate and unsafe to approach, these non-contact temperature measurement tools work effectively.
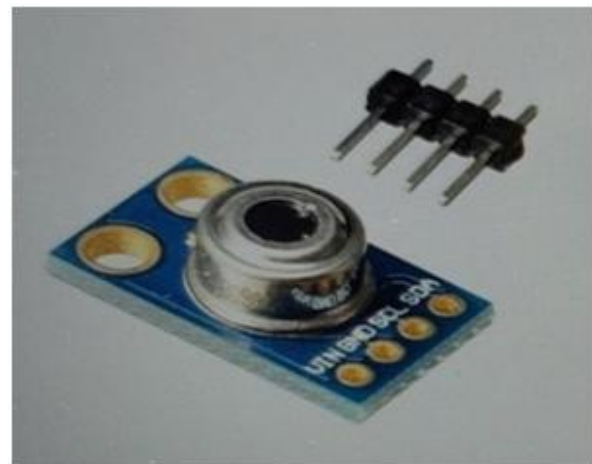

Figure 5.6 IR Temperature sensor

Resistor:

An electrical component known as a resistor controls or restricts the flow of current in an electronic circuit..Resistorscanalsobeusedtosupplyspecificvoltagestoactivedevicessuchas transistors.
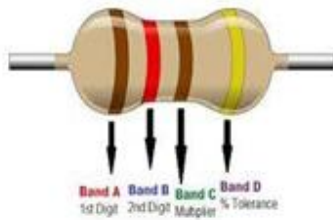
Figure 5.7 resistor

12V DC Adaptor:

One of the most widely used power sources in use today is the 12V power supply (also known as the 12VDC power supply). Typically, a transformer, a pair of diodes, and a transistor are used in tandem to convert a 120VAC or 240VAC input into a 12VDC output.

Figure 5.8 12V DC adaptor

LCD Display Module:

The LCD Library allows you to drive LCD displays compatible with the Hitachi HD44780 driver. There are many of these, and they are usually identifiable by their16-pin interface.
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Figure5.9 LCD Display

LDR Sensor:

A photoresistor ,also known as a light dependent resistor(LDR), is a light sensitive device most commonly used to indicate the presence or absence of light or to measure the intensity of light.
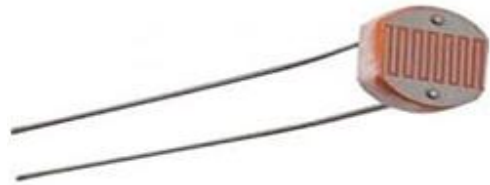

Figure5.10 LDR Sensor

VI. MOBILE APPLICATION

Thedoor is locked and unlocked using face recognization. At first the camera analyses the face and then compares it with the stored data.When the face is recognised, the LED will be in ON condition then by the intensity of light LDR sensor's value get reduced .If this value matches the value specified in the code, the door will be unlocked. Otherwise the door will remains locked.
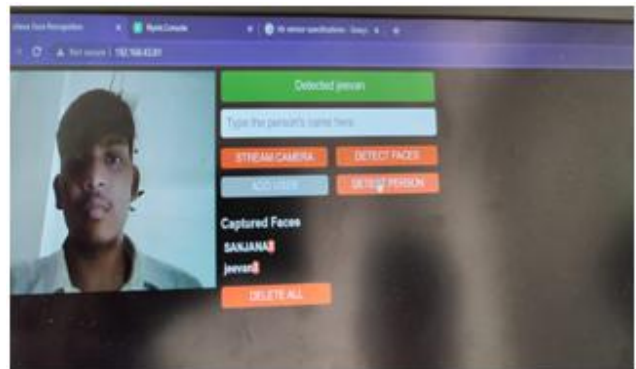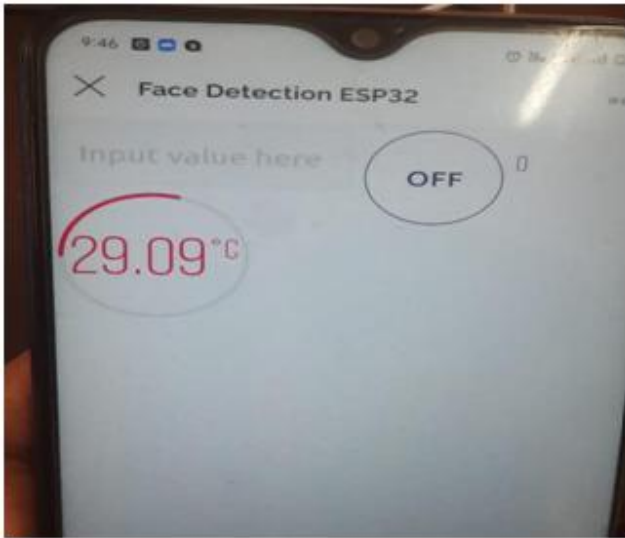

Figure 6.2 face detection

Figure6.3 temperature detection

If face is not recognized,then the door remains unlocked along with the buzzer which also acts as an alarm.

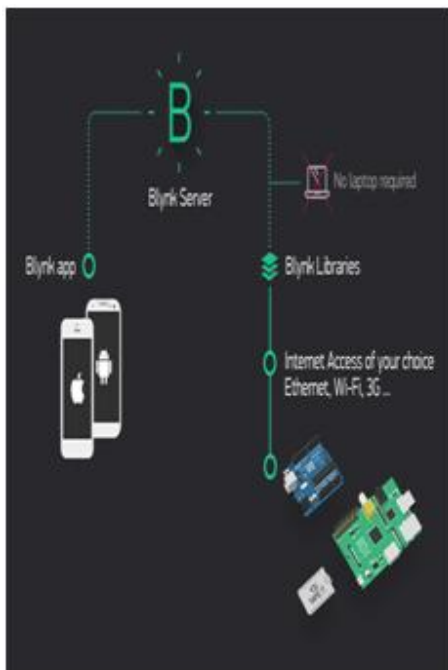## VII. .RESULTS AN DOUTPUT

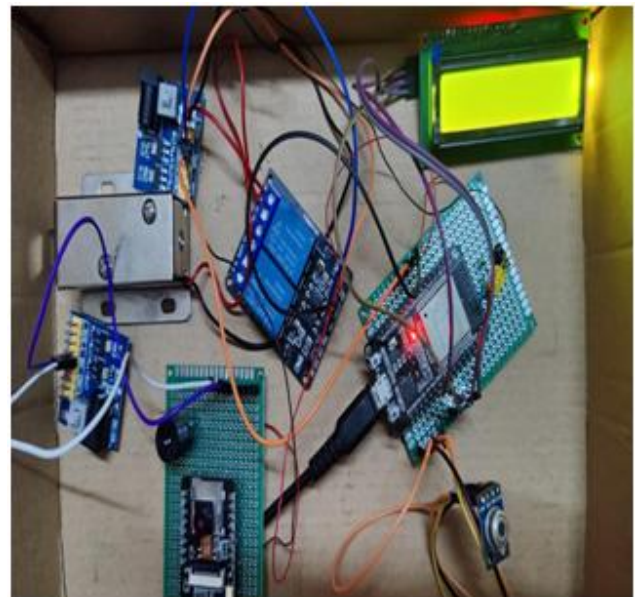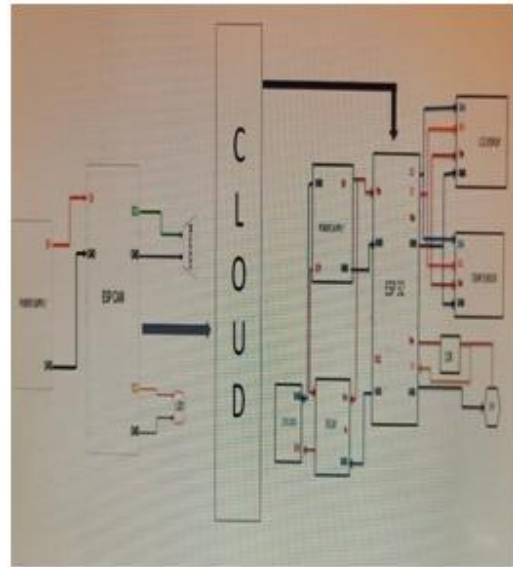The results obtained are shown below:

Figure7.1 Blynk

Figure7.2SecuritySystemFinalOutput

VIII. CONCLUSION

The system in able to accurately detect, recognize the face and provide access to   the person.Incase if the face is unrecognized then the device produces an alarm.. The owner is able to remotely access the door from any other location.Along with this there are additional features like the temperature sensing. The project is roughly separated into three sections, first one is the automatic face recognition door lock system, providing access through Blynk and multiple applications. Another one is the security of the house. .This idea's unique characteristics will assist people to solve their issues with keys and make their house secure. Also, it will also decrease wastage of time.

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