Face Recognition for Door Lock and Unlock System

Hanumanth Raju R K, Archana J R, Sushma H, Sushma S V, Vidya G B
Department of Electronic and Communication Engineering
Jain Institute of Technology Davanagere, India

***Abstract*: The project is named "Designing and Implementing the IoT Networked Contactless Doorway Security System for Remote Monitoring Using ESP32-CAM and Cloud Server," and it is being reported internally. When people are at home or away from home, they want to feel protected at all times. An anti-crime organization. A system is a tool or method for preventing or preventing illegal entry to or escape from a computer system region of coverage. The system is designed to work with both hardware and software. It's a one-of-a-kind security mechanism made up of low-cost wireless cameras and sensors that ensure door monitoring and control. The system is in place allowed the user to watch the door by snapping images with a high-performance wireless camera, i.e.The ESP32-CAM is a gadget that allows other devices and sensors to communicate with each other.On a smart phone, the 'Blynk' cloud server programs is utilized for various functions like remote electronic door locking, multitasking, and receiving notifications. The most difficult task was to create a faultless flexible system that could respond in real time and work in a smooth, efficient, intelligent, and feasible manner.**

Keyword:- Face Recognition, Doorway Security System, Internet of Things (IoT) , Blynk cloud server.

I. INTRODUCTION

The studies conducted here shed light on the evolution of IoT systems. In recent years, the Object Internet Research Center has witnessed multi-sectoral growth and development. The Internet of Things (IoT) is the link between mobile devices, cars, buildings, and other embedded items, as well as the electrical equipment, software, sensors, actuators, and network connections that allow these objects to collect and share data. IoT brings together traditional domains such as embedded systems, wireless sensor networks, control systems, and automation systems.As a result, the internet of things is based on the mobile and internet networks' dynamic success.

Faces are often used with biometric to see people. Face recognition has received a lot of attention from security guards due to human activities found in various security systems such as forensic, airport, face tracking, crime detection, etc. Compared to other biometric features such as palm print, finger printing, palm print etc. taken without the knowledge of the visitor and can also be used for security-based programs such as crime detection, face tracking, airport security, and legal investigations etc. Face recognition involves taking a picture of a face on a webcam. They are a visitor photography and are compared to a photo with a saved website. Divide them into known classes and keep them on the website. Facial biometrics is a challenging field for researchers with a wide range of machine facial recognition limitations such as changes in light, head shape, facial features, lip gloss, aging etc. Various methods were suggested by researchers to overcome this claim. Automatic face recognition includes feature removal and face recognition, face detection. Face detection algorithms are divided into two classes as a geometric based element and an image-based template. Template-based methods include the relationship between a template of one or more models and a face to obtain face identity. Key component analysis, kernel methods, linear discrimination analysis etc. used to create face templates. Geometric-based methods are used to analyze specific spatial features and their geometric relationships .Mustiest resolution tools such as ridge lets be found to be useful in analyzing the content of image information and found its effectiveness in pattern recognition, and computer recognition, image processing.

II. LITERATURE SURVEY

We have found various documents identified by the security framework. The author in [1] supervised classification. A 2D filter bank is used and produces a solid 3D surface vector measurement applied to the monitored divider as well as a border-based face verification method used using this process to achieve a high level of visual acuity.

The author of [2] proposed an effective face detection algorithm. This paper introduces key image concepts, a well-functioning AdaBoost segmenter and segmentation thus reducing computation and resulting in a more efficient and faster acquisition algorithm.

The author [3] proposed a system to ensure vehicle safety. The program is based on Arduino and captures a picture of someone trying to launch a car. The algorithm used for facial recognition is PCA.

Authors in [4] Used Embedded forum which was very different and easy to use. They have suggested how to take an image on an embedded system based on the Arduino board.

The author [5] is developing a project called “Arduino Face Recognition in Treasure Box” which is a good example of how to use an Arduino camera and Pi with Open CV computer algorithms. By combining the latest version of Open CV, it can access the latest computer visibility algorithms and is as interesting as face recognition.

The author of [6] has built a system with an advanced surveillance camera that can detect faces and at the same time detect faces that are detected using the OPENCV library, the Eigen face methodology method and all of these processing has been done in Raspbian OS in Arduino.

The authors of [7] have proposed the use of an Arduino 2 B + model with a camera connection to capture the image and

convert this image to a gray image with a digital image processing algorithm.
The author of [8] has suggested that the real-time application of the Face Recognition concept by producing the MATLAB code using the image detection toolbox in the basic method used by PCA using Eigen faces.
Authors in [9] have used a security system where when anyone comes to the door they are notified by the homeowner via email and twitter where the user can see the person standing at the door using a remote camera.

III. BLOCK DIAGRAM

The circuit schematic for facial recognition is shown below, and it contains a few components such as a solenoid lock, 12v power supply, 7805 regulator, ESP-32 CAM, relay module, and LEDs.

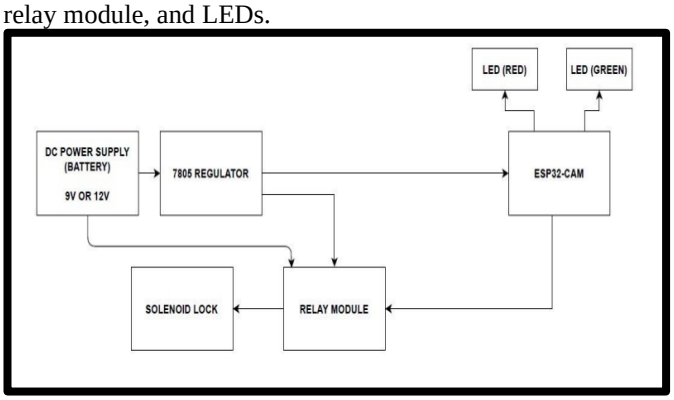

Figure 1:Block Diagram

With a changed gearbox, the solenoid lock is initially powered by 12v, while all other components are powered by 5v and 3.3v. We alter the 12v supply to 5v with the help of a power controller. Although the ESP32-CAM is powered by a 5v supply, we have the option of using a 3.3v or 5v module. The ESP32-CAM was used to identify both positive and negative human faces, and the blue and red LEDs were attached to it.

FLOW CHART:

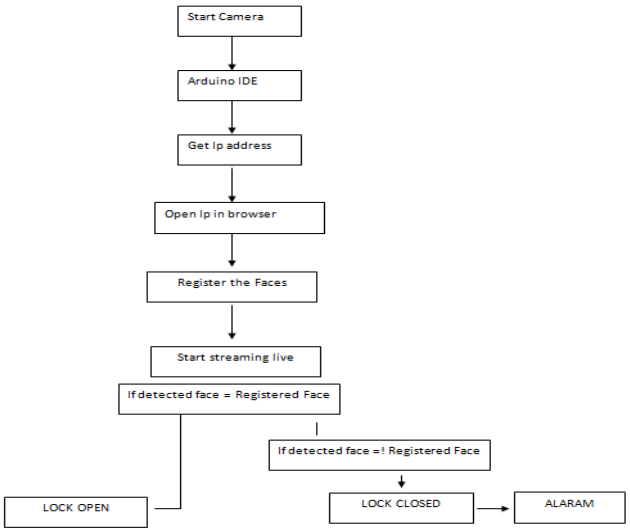

Figure 2: FlowChart

Proposed Program: In this planned program, the ESP 32cam is integrated with the Blynk program. In this system we have 8 AC connected to a small controller with 8 transmissions and solenoid door lock. The voice command controls household appliances. It also focuses on creating a smart wireless home security system that delivers alerts to the owner via an online camera. If somebody is standing in the doorway, the gadget will take a picture and send it to the owner via the ESP32 CAM Node MCU. via email The mobile device is in charge of the entire application. This project costs more than comparable products on the market.This program can also be viewed as CCTV to access live streaming. It also uses the 74HC595 shift register IC to amplify the input pins of the ESP32 cam.

COMPONETS:

ESP32CAM:

Figure 3:ESP32CAM

The ESP32-CAM is a miniature camera module that uses an ESP32-S processor. A OV2640 camera is included with the module. It also features a number of GPIOs that can be used to connect to external devices. The AI-Thinker board is the most popular in the ESP32-CAM module, which is made up of various manufacturers. The controller is built on a 32-bit CPU that runs at up to 240 MHz. It has an internal 520 KB SRAM and an external PSRAM of 4M. It includes a Wi-Fi module (802.11b/g/n) as well as a Bluetooth / BLE SoC. The board is food safe and features a single reset button. However, if you put the Module on the baking board, you won't be able to use the Reset button, as shown below.As a result, when attaching any sensors or modules to the Board, jumper wires are recommended. On the board, there is an LED that can be utilized as an indicator.

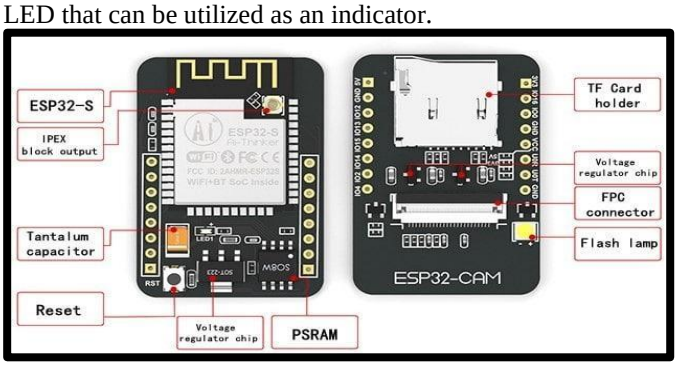

Figure 4:Pin Configuration Of ESP32CAM

OV2460 Camera:

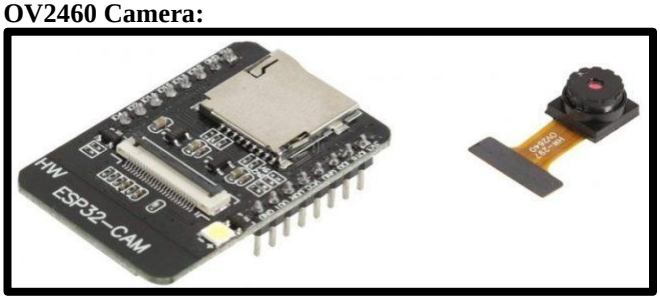

Figure 5:OV2460 Camera

The ESP32CAM Camera Module's most significant component. Module for the camera The OV2640 Camera Module Can Be Used With a 24 Pin Camera Holder. It has a camera with a resolution of 1600 x 1200 pixels. There is a gold-covered connecting line. You may attach this camera to an ESP32 using this connector. Slide this slide to the opposite side to connect. The camera's connecting pins will then be visible. Simply place a camera with a gold plate on the bottom side into the slide and drag it. This module now has a camera linked to it. This module is now ready for use.

Support for SD cards: There is an SD Card Holder in the background that supports SD Cards up to 4GB. However, I discovered that the SD card works perfectly with this module. While working on photo-based projects, an SD card is utilized to store photographs. You can use a 4GB SD Card to learn. Do not simply slide the SD card into the SD card adapter and insert it.

Solenoid lock:

Figure 6:Solenoid lock

The 12V Solenoid lock has a slanted cut slug and a beautiful mounting bracket. It's a basic cabinet, safe, or door that requires an electronic key. When 9-12VDC is used, the slug pulls inwards, preventing it from coming out and allowing the door to open. In this circumstance, it does not utilize any electricity. Automatic door lock systems, such as electric door locks with mounting boards, are very simple to install. This solenoid is especially fine and durable.

12V STEPDOWN TRANSFORMER:

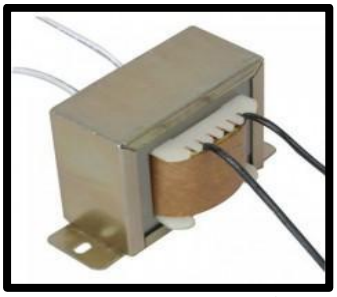

Figure 7:12v Step down Transformer

0-12 500mA Step Down Transformer is a standard chassis mounted mains transformer. Transformer has 230V primary winding and non-center tapped second windings. The transformer has flying connectors with flying colors (Approximately 100 mm long). Transformer acts as a descending transformer reducing AC - 230V to AC - 12V.The Transformer provides output of 12V and 0V.

BUZZER:

Figure 8:Buzzer

features

- 6V DC power rating
- Voltage range: 4 to 8 volts DC
- 30mA rated current
- Resonant Frequency: ~ 2300 Hz

LEDs:

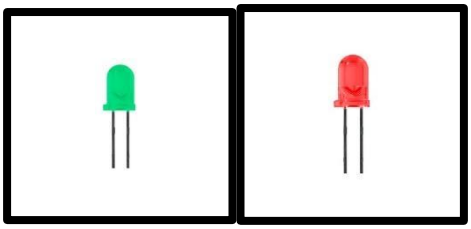

Figure 9:LEDs

- Longevity: LEDs can last more than 100,000 hours (10+ years) when used in limited specifications
- LEDs cannot withstand heat, cold, shock and vibration

RELAY:

Figure 10:Relay

A relay is an electrical device that uses electrical energy to turn on or off the switch contacts. The single-channel relay module is more than just an empty relay, it contains components that make switching and connecting easy and act as indicators to indicate whether the module is enabled and whether the relay is working or not.

SOFTWARE REQUIREMENTS:

Figure 11:Arduino IDE Software

Arduino Integrated Development Environment (IDE) v1
Diagrams are programs built with the Arduino Software (IDE). These graphics are created with a text editor and saved as.ino files. Cutting and pasting, as well as searching and editing, are available in the editor. The message box reveals mistakes and provides feedback while storing and transmitting. The console shows text output from the Arduino Software (IDE), including entire error messages and other data. The fixed board and serial hole may be seen in the window's lower right corner. You can use the toolbar buttons to validate and upload programmes, as well as to generate, open, and save drawings and to launch a serial monitor.

RESULTS:

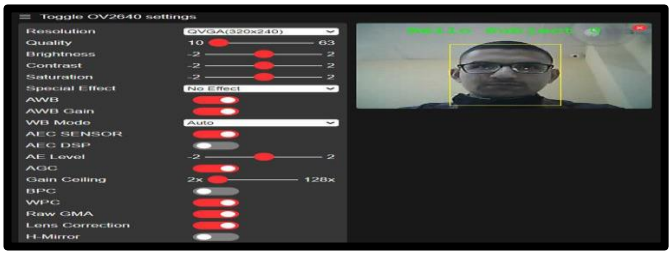

Figure 12:Open When Registration Face Is Found

Figure 13: Does Not Unlock When Not Register Face Is Detected And Alarms

With IoT, we may link many input/output devices, multiple sensors and actuators in the network so that they can speak for themselves, the data acquired from these items can be used to log, monitor, or operate other things without human intervention, and much more. As a result, IoT is analogous to global networks that connect objects to objects, people to people, and people to people. The Internet of Things (IoT) is the expansion of an existing internet hub for managing everything in the world today and in the future. Surveillance, according to this work, is the deliberate detection or monitoring of a person, circle, or other objectespecially one who is concerned or has doubts According to the application requirements, I created a system that includes a sensor, camera, CPU, relays, buzzer, LED indicators, and actuators for the purposes described above. In the local area, the system worked effectively and behaved as predicted. Because it is the most popular IoT platform for connecting devices to the cloud, building applications to remotely manage and monitor, and managing thousands of used products, the Blynk cloud server was appropriate for that type of application. From the example of a linked product to its marketing launch, Blynk software assists individuals and businesses in developing in a fluid manner.

CONCLUSION:

An automated home app that allows people to control home apps with a Smartphone app. It also focuses on being able to lock or unlock the door lock. This is achieved through a central device that connects to the door key, as well as Blynk software that emphasizes low cost and open source configuration. This project also aims to increase the input of microcontroller pins, as we have a limited number of input / output pins. This phone can also be used as CCTV to protect our house. This technology is inexpensive to use because of its widespread use in today's culture. Even if it is difficult to operate, the device can be simply manipulated over time and the requirements can be adjusted.This machine is very useful for people with physical and visual impairments. It also makes life easier for the busy person.This project will cut the cost and time it takes to create an app that controls electrical appliances or gadgets.

FUTERE IMPROVEMENT:

Android apps are also simple to use. Fire tools in android apps are used to turn on and off the system. To improve security, you can also add camera modules to the system. The camera is switched off when someone tries to enter the residence; someone finds and enters the door.

REFERENCES:

[1] Andreasa, Cornelio RevelivanAldawiraa, HandhikaWiratamaPutraa, Novita Hanafiaha, Surya Surjarwoa, Aswin Wibisuryab, Door Security System for Home Monitoring Based on ESP32.

[2] 4th International Conference on Computer Science and Computational Intelligence 2019 (ICCSCI), 12– 13 September 2019.

[3] E.Shirisha, K.M.V Madan Kumar, G.Swarnalatha3, IOT BASED HOME SECURITY AND AUTOMATION USING GOOGLE ASSISTANT, Turkish Journal of Computer and Mathematics Education Vol.12 No.6(2021), 117-122.

[4] Burange AW, Misalkar HD. Review of Internet of Things in development of smart cities with data management & privacy. IEEE International Conference on Advances in Computer Engineering and Applications. 2015 July 23.

[5] Wukkadada B, Wankhede K, Nambiar R, Nair A. Comparison with HTTP and MQTT In Internet of Things (IoT). In Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA 2018); 2018; Coimbatore. p. 249-253.

[6] Vikram N, Harish KS, Nihaal MS, Umesh R, Kumar SAA. A Low Cost Home Automation System Using Wi-Fi Based Wireless Sensor Network Incorporating Internet of Things(IoT). In 2017 IEEE 7th International Advance Computing Conference; 2017; Hyderabad. p. 174- 179.

[7] Alaa M, Zaidan AA, Zaidan BB, Talal , Kiah MLM. A Review of Smart Home Applications based on Internet of Things. Journal of Network and Computer Applications. 2017; 97.

[8] Agarwal A, Hada N, Virmani D, Gupta T. A Novel Design Approach for Smart Door Locking and Home Security using IoT. A High Impact Factor & UGC Approved Journal. 2017 August; 6(8): p. 1-5.

[9] M. N, Kamat , Shinde D. Smart Door Security Control System Using Raspberry Pi. International Journal of Innovations & Advancement in Computer Science. 2017 November; 6(11): p. 1-4.