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Smart Home with Wireless Door bell by using IoT

M. Jagadeeswari Devi, M. DhanaLakshmi,I. Veera Brahmendra[1,2,3]
[1,2,3] Department of Electronics and Communication Engineering, Aditya Engineering College, Surampalem, Andhra Pradesh, India.

Abstract
Smart doors are frequently employed in a variety of settings.For the sake of security, the home's occupants will always keep the door closed. But occasionally, homeowners rush out the door and forget to lock it, or they might be unsure that they locked the door.We suggest the usage of an Android-based application called Door Security System that uses Increasing home security and door activity control with Internet of Things (IoT) technologies. Nowadays, everyone has a smartphone and easy access to the internet. Accessing devices and IOT-based systems are highly beneficial everywhere. Here, we want to create a telegram app-enabled smart door control.The Telegram app is available on both computers and mobile devices. Using the Telegram app, we can control the valve to lock and unlock the door. Additionally, each time it performs a lock or unlock, a photo is sent. Additionally, we can determine the visitor's temperature. This system is accessible from anywhere. The project in question is titled Smart Home with Wireless Doorbell by IoT.

Index Terms—Internet of Things(IoT).

Introduction

The security of the house is greatly influenced by the door. If the door is simple to open, the burglar may find it quite simple to steal the house's contents. At first, a physical key can be used to unlock a door. The digital door was created in later years as technology advanced. Without a real key, we can lock or unlock the door by using the digital door. Although the digital door is an innovation, it can still be broken when no one is home. And only after they get at their homes can the residents of the houses understand this. The residents must always lock the door while they are gone to ensure the security of the home.Additionally, home owners may occasionally forget to lock the door or may question whether they have locked the door or not. This paper's original goal was to provide a flexible, workable, low-power entryway safety solution with real-time reaction. The IoT community and cloud computing have to be included into the gadget as it evolved. The objective was to develop a flexible Wi-Fi door security system that enables the user to gather visitor image identification and make an informed decision about granting that person access to his or her premises. Additionally, if necessary for a few research projects, the data collected using a cloud server may be retrieved. The upgraded tools must be useful and simple to use.
IoT makes use of sensors with the ability to detect Additionally, the information gathered using a cloud server may be retrieved if required for a few research projects. The updated tools must be efficient and straightforward to use.they have been touched internally. These sensors include passive infrared sensors (PIR), magnetic sensors, and internal touch sensors. IoT also makes use of tools like micro managers, which can control other appliances. A mosfet transistor, often known as an automatic switch or an electric strike digital door lock, can appear in one or both of these forms.

Lock or unlock without a physical key; an alarm that can go off or start depending on input; and LED lights that can be turned on or off.

The Message Queue Telemetry Transport (MQTT) protocol is extensively used for network communication in the Internet of Things. The system enables a publish/subscribe mechanism. A receiver appliance can create a single connection with

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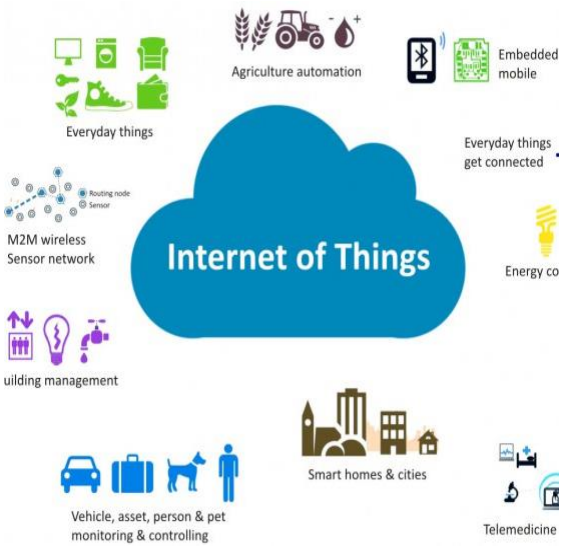
the server to subscribe for a certain topic. In this work, we contributed perception to the development of IoT structures.



The area of study surrounding the Internet of Things has expanded and become more interdisciplinary in recent years. The Internet of Things (IoT) is the networked linking of physical devices like cars, homes, appliances, and other machinery that have sensors, actuators, electronics, software, and network connections. The typical disciplines of embedded systems, wireless sensor networks, management setups, and automation structures all influence the IoT. That takes into account how the network of factors changes as the cellular and network group gradually fill out.The recipient will then receive the message whenever it is generated for a certain topic. When using HTTP, in contrast, an appliance (client) that wants to receive a message must periodically request server whether thereis a message or not. The safety of a home can be improved by paying care to thesafety close of a door.

In order to improve the security of residential doors, research will make use of IoT technology that allows users to remotely lock and open a door using a smartphone and an encrypted MQTT cloud.

In the event that the door is pushed open, it will also sound an alarm and use MQTT cloud to notify the owner's smartphone.

Literature Survey

IoT has been used to remotely operate and monitor a number of appliances, including fans, air conditioners, gas and water heaters and fire appliances, in earlier studies on smart home technologies. A few studies focus on efficiency to lower energy consumption. Several studies have been conducted on home security systems, including the ones listed below.

Agarwal et al.'s HDSL approach promises to liberate individuals from anxiety and boredom. The HDSL system itself has two main features: "Home Security," which can examine people outside the door, and "Smart Locking," which allows homeowners to freely control the locking mechanism via mobile. This system, which controls hardware including cameras, motion detectors, and electronic locks, requires a Rasberry Pi. In this study's approach, Bluetooth is used to control the locking mechanism. After shaking hands, the technology opens the door; it then locks it after a certain length of time. If there is no Bluetooth handshake, the system will check to see if any messages have been received. When the system hears the command to "unlock door," it willit will unlock the door, and when it receives the message "lock door," it will lock the door.

If there is no message, the system will search for the possibility of a visitor. If the bell signals it to, the system will use the camera to take photographs and send them to the user's email. If there is no bell signal and the motion sensor detects movement, the system will utilise the camera to snap pictures, send the pictures to the user's email as a warning, and send a warning message over the internet as a warning of an intruder. A system that uses cellphones and mobile devices to operate doors is described in research by Nareshkumar, Kamat, and Shinde. For this project, a mobile phone, a Raspberry Pi Model B3 with an integrated WiFi/GSM module, a camera, a PIR sensor, a biometric system, andthis system. . When someone is in front of the door, the camera will detect them and send a picture to

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the mobile device. Users may open the door with their smartphones. The mobile device offers specifications for the appliances that can be used to control the system. When a person's presence is sensed, the web camera picks up the signal, records the person's image, and then sends it to the user's mobile device over the Internet of Things through a Raspberry Pi.

Gupta et al. suggested a remote access control door entry system for residential and commercial buildings. Using the internet, a remote access control system enables users to remotely manage furniture, electronics, and other items in their homes or places of business. The equipment used includes a Raspberry Pi board, a camera for guest authentication, a solenoid, a speaker set, and a bell switch. When guests arrive, they will press the bell switch, which will activate the sound recording through the speaker and prompt guests to strike a pose for the camera.The image will then be sent with the subject "Someone at the door" to the primary host email and, if necessary, to the backup host as well. Following that, the image will be sent with the subject "Someone at the door" to both the primary host email and, if necessary, the backup host. If the primary host wants to let the visitor in, they can reply to the email with the subject "Allow person". If the primary host decides not to open the door, they can reply to the email without altering any of its contents. The primary host has a limited amount of time to decide whether to open the door or not. The system sends a visitor photo to the backup host and alerts the guest that the primary host isn't responding when it happens. Email is available on additional hosts without any content changes.

Kodali et al. recommended installing a PIR motion sensor as part of a home security system. After sensing motion, the system will make a voice call to the homeowner. The owner must then decide if it is a trespasser. Kodali2016's inquiry was still mute regarding how the prototype would help the owner distinguish between a visitor and an intruder. However, it is mentioned that future research will use the camera. Sahoo and Pati's model of a home security system included both an IP camera for verification and PIR motion detection for alert production. The gadget makes use of the Zigbee protocol and may send SMS to the homeowner's mobile phone through GSM. Additionally, Tanwar et al. recommended an IP-based intrusion detection system. A single Raspberry Pi minicomputer is used in the simulation, which connects to a variety of sensors scattered around a home or other structure. When motion is detected, the Raspberry Pi emails the user. Kumar et al. suggested an idea for smart home security that not only warns of intruders but also of fire and gas utilising the proper sensors. One of the sensors will detect an event, and the GSM module will use the owner's phone to send an SMS or voice call to alert them. The study by Kodali2016, Sahoo, Tanwar, and Kumar did not contain any techniques for locking or unlocking doors; instead, it focused on intruder detection and remote alert to the Prabaharan, et al. investigated to build smart houses that incorporated security modules, such as alarm buzzers and door locks.

The mobile device of the homeowner is connected to the MQTT-based prototype through the GSM module. The mobile phone can lock or unlock the door and receive an alarm buzz when there is a potential intruder from the perspective of home security. However, there is no interaction between these two security-related features. The alarm buzzer and the door lock/unlocker are still separate devices. Pandit, et al.'s research uses a magnetic sensor to ascertain if a door is open or closed. An intrusion is discovered when a door should be locked but is really unlocked. The magnetic sensor is also used to lock the door automatically when it is closed.In addition to face recognition using an IP camera and door entrance authentication using

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the owner's smartphone through Bluetooth, the model incorporates a magnetic sensor. Dutta et al. proposed IoT-based resident or guest authorisation in a public building.

We look at the following work to get the idea for this project:

1. A door lock system based on a password A password-based door lock system is a good place to start for a novice. This project's system, which required a password to be provided in order to unlock the door, was controlled by an 8051 microprocessor. The door would unlock if the password entered was correct. You will be requested to enter the code or password once more if another individual approaches. The door will remain locked and remain closed if the entered information does not match, preventing anyone who might not be authorised to be there from entering.
2. Face Identification Smart Door Lock System: This modern innovation uses cutting-edge technology. Self-recognition of images is a component of face recognition. Image processing is the major type of technology used. Self-monitoring, face matching, security, and OpenCV all employ face recognition. Image processing is a method where an image is taken using a camera and then compared to photographs that are saved in a database. The size of the nose, eye contact, and face color of database images are compared to those in the acquired image.
3. Door Unlock System with Fingerprint Recognition: Data security is crucial in today's high-tech society. The system must be protected by a dependable system. The fingerprint technique is accurate, and no two people have exactly the same fingerprint. When the fingerprint matches the one that has been saved in this door lock system, the door is unlocked. When a visitor pushes their thumb against the scanner, the pattern is captured, and the image closely matches the one that was previously saved.

A resident must have personal RFID connected to an Arduino microcontroller in the suggested model. The building's security must input guest information in the interim. Every action a person takes when entering or leaving a building can be tracked using this technology and stored in a database for later auditing. Few researchers discuss the Internet of Things, home security systems, and remote doors according to the literature review that has been discussed. As a result, we conduct research to create tools that can remotely monitor and control the door, send alerts when movement is detected close to the door, grant access to the door to trusted individuals, view the door access history log and user access, and receive a notification when the door is still open after a predetermined period of time. The main differences between the existing system and the one we proposed are that our programme can grant access to additional users, and the home's owner can view a history of door activity, including who opened and shut the door and when the action took place.

3. PROPOSED SYSTEM

Nowadays, everyone is worried about their safety, whether it is their own safety or the safety of their data. Since technology has advanced and the Internet of Things has expanded, digital door locks are now frequently used. Instead of a physical key, a digital lock that is operated by RFID, a fingerprint, Face ID, a pin, passwords, etc. controls the door lock. We have developed a number of digital door lock applications in the past using these diverse technologies. In this article, we'll demonstrate how to set up a Face ID-controlled digital door lock using the ESP32-CAM.

The ESP32-CAM is mounted on a daughter board and has a 5V power supply as well as all of the digital pinouts. For simple connectivity, we may quickly attach the ESP32-CAM on this daughter board. Relay connected to the ESP32-CAM digital pin and has solenoid valve control. The ESP32-CAM digital pin is also attached to the toggle button. This digital pin enables us to notify the Telegram app about requests. We will receive a notification and photo on the Telegram app after tapping this button. The door can then be unlocked using an app. When using the Telegram app to

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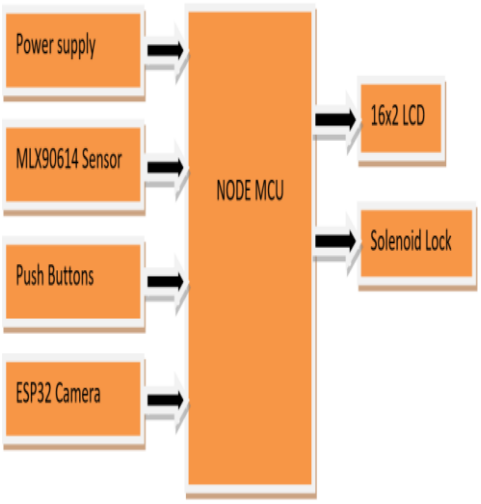
access the ESP32-CAM, the green LED will be on.

Compared to other web-based or cloud-based IOT applications or systems, this smart door lock is very efficient and has very quick communication. As a means of achieving its goal, this work utilized an experimental setup based entirely on studies.

Block Diagram:



4. DESIGN AND DEVELOPMENT

The Solenoid Lock, Relay Module, and FTDI board were all components of the circuit below. The FTDI board is used to flash the code into the ESP32-CAM because it lacks a USB port. The solenoid lock is switched on and off using the relay module. The VCC and GND pins of the ESP32-CAM are connected to those of the FTDI board and the relay module respectively.TX and RX of The RX and TX of the ESP32 are connected to the FTDI board, while the IN pin of the relay module is linked to IO4 of the ESP32-CAM.

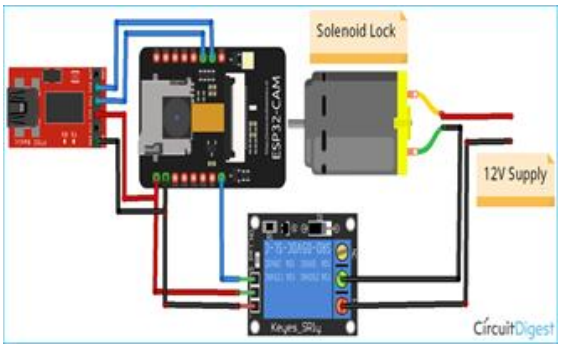
Circuit Diagram:

The Hardware Parts required in this project are:-

The Hardware Parts required in this project are:-

1. ESP32Camera

2. NodeMCU



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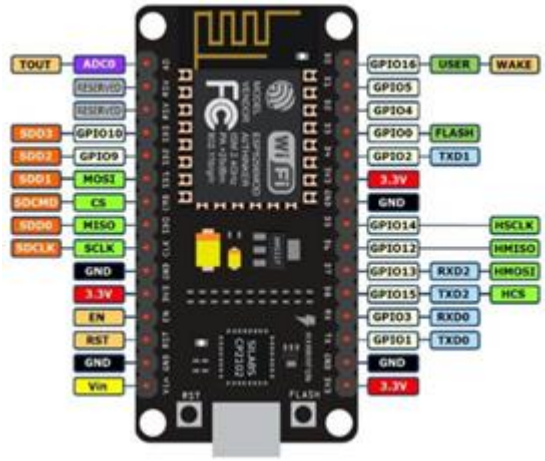
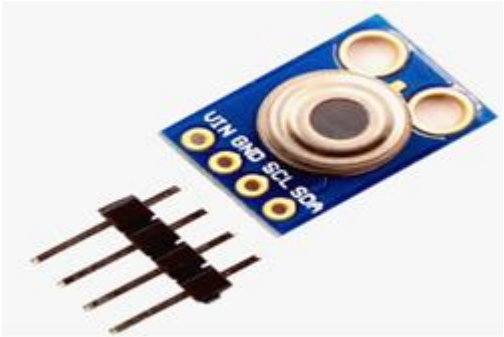


MLX90614 Temperature Sensor

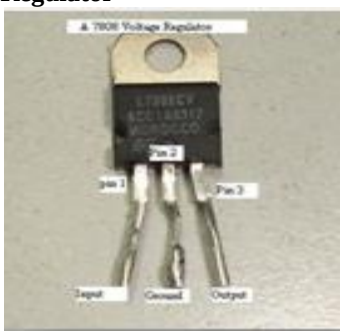


Servo Motor

16x2LCD

Push Buttons

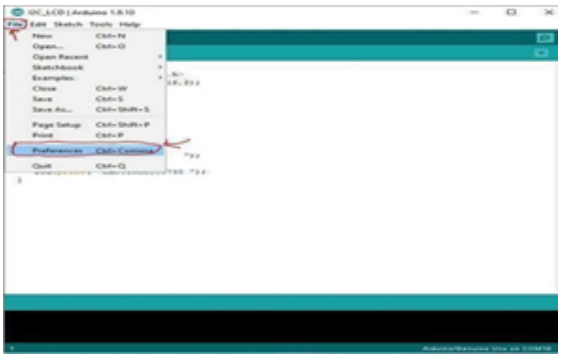
Regulator



Software requirements:

Arduino IDE

Blynk app



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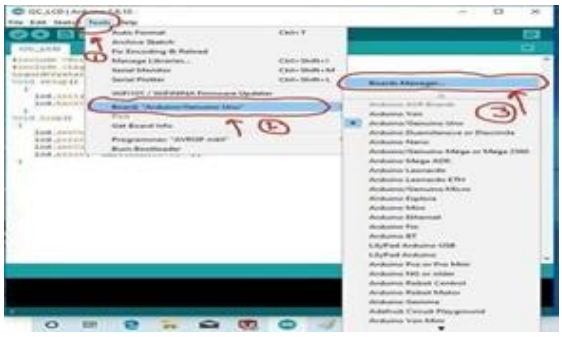
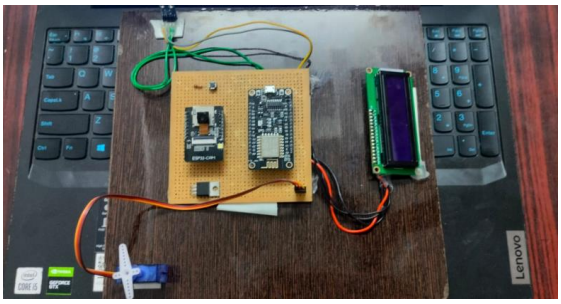
This work used the experimental installation-based overall strategy to studies since it was meant to show how hardware interacted with a cloud server and how to use a Wi-Fi local area network to remotely transfer information for monitoring and control-based applications. An ESP32CAM board, a low-cost, high-performance computing platform with Wi-Fi capabilities and an integrated digital camera, is the hardware used in this project. For connecting to external input/output devices, it features many GPIOs. Here, additional parts have been used to implement the suggested device, including a solenoid lock, +5V and +12V DC, a buzzer, a two-channel relay module, an infrared proximity sensor module, a tactile push button, a USB TTL UART Convertor to software ESP32-CAM board, and finally a smartphone with a "Blynk" account. The artwork should be supported by the experimental findings from the hardware setup. Datasheets on various additives utilised to make the gear will be gathered for the investigations in order to provide information. Data gathered from those research activities were used to develop the general design,



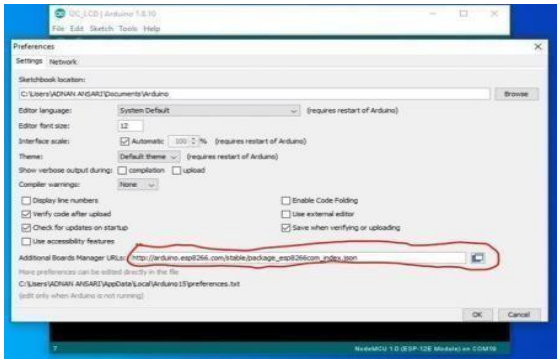
expansion, and implementation strategy for the device. The previous record also included appropriate tables, flowcharts, and illustrations the snapshots of the operating prototype.

Kit Diagram



Step by step commands for nodemcu Arduino setup

Step1
Copy Arduino IDE software on your PC and install it properly.
Step2
Open the software, select "File" from the menu in the left-hand corner, and then select "Preference." In the following step, paste the shared link after selecting your preference.
Step 3
Pastethegiven link into the additional board manager URL.http://arduino.esp8266.com/stable/package_esp8266com_index.json
Step 4
The last step requires you to select a tool from the available list. To add the board to the app, click on the Arduino or Arduino Uno board and then choose the board manager.



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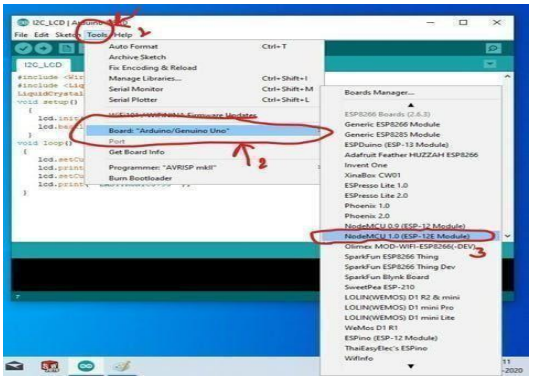
Step5
Write esp8266 in the search and install the board to the software.



Step 6
Now choose the board as mentioned in the screenshot below.

Step 7

Select the set-up port in which the nodemcuis connected.

Now, you can check again and Upload an example code to the nodemcu, you need to join nodemcu with the USB cable to the pc and up load the code by following the above-given commands.

Software Programming
The programme or source code used to create the face recognition-based door access setup utilising the ESP 32-CAM module is written in the C++ programming language in a free open-source programme called the ARDUINO IDE software.
STEP 1: open the ARDUINO IDE software
STEP2:choosefile->newfile->save
STEP3:writethesourcecode/programcodeinthefile(createdjustnow)
STEP4:gotofile->preferences->addtheURL https://dl.espressif.com/dl/package_esp32_index.json,http://arduino.esp8266.com/stable/package_esp8266com_index.json->Press OK
STEP5:Gototools->Board settings
STEP6:pressonverify->noerrorandnowarnings
STEP7: UploadthecodeintotheESP32-CAMusingtheFTDItool.
Hardware Setup
ESP32-CAMCONNECTIONWITHFTDI

Because the ESP32-CAM lacks a USB connector, the FTDI board is used to flash the code into it.

The VCC and GND pins of the ESP32-CAM are connected, respectively, to the VCC and GND pins of the FTDI board and the Relay module. The TX and RX of the FTDI board are connected to the RX and TX of the ESP32, and the IN pin of the relay module is connected to IO4 of the ESP32-CAM.

Before downloading the application, connect the IO0 to the ground. IO0 determines if the ESP32 is in the flashing mode. When GPIO 0 is connected to GND, the ESP32 is in flashing mode.

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Since the ESP32-CAM module can't be connected to a laptop or computer directly, an FDTI board is used to enable serial communication between the laptop and the ESP32-CAM so that it can be uploaded to or programmed.

The following are the circuit connections for the ESP32-CAM setup for automatic door access:

After programming the ESP32 with the code, CAM module through the interfacing with FTDI board.

STEP8:Opentheserialobserveandchoose115200baudrate.

STEP 9: Copy the IP address and paste it into the browser of any type and in any appliance such as a laptop or mobile phone.

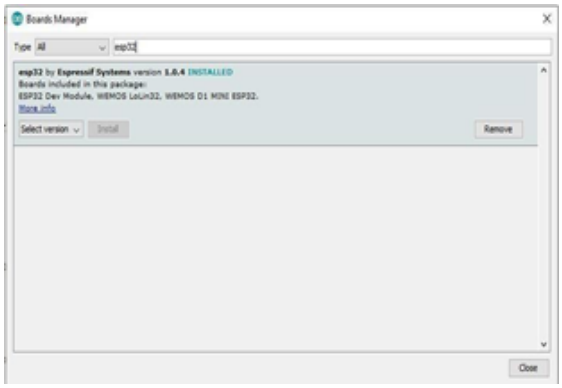
Then, the screen shows the options like start stream, enrol face, Face detection, Face recognition, etc in the manager bar.

STEP10: If the in truder tries to enter through the door it shows as intruder alert.

STEP 11: Enrolling the faces into the ESP32-CAM, takes up to 5 samples to identify or to implement a facial recognition-based door manage set-up.

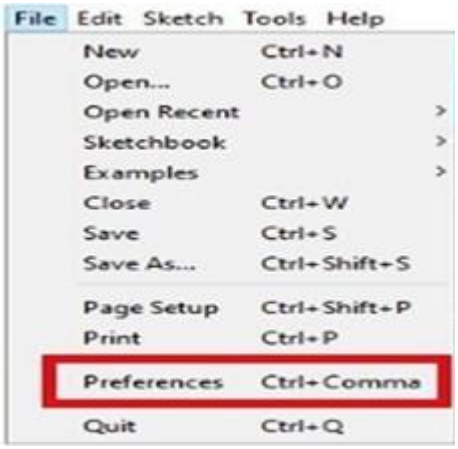
STEP 12: after enrolment of the face it gives access to the
authorized user and shows a “hello subject” message. Based on the enrolled faces or authorized users the door gets locked and unlocked.

Install ESP32 Boardon Arduino IDE

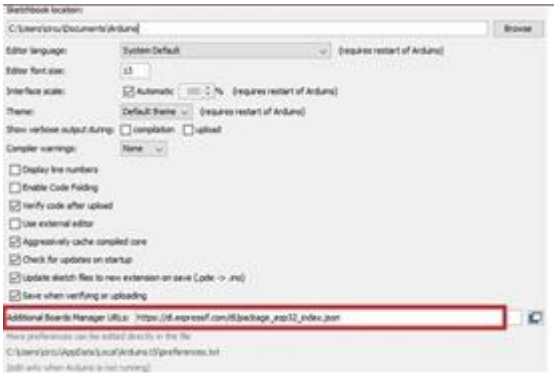


Here, ESP32-CAM is programmed with the Arduino IDE. Install the ESP32add-onon the Arduino IDE first to prepare for that.

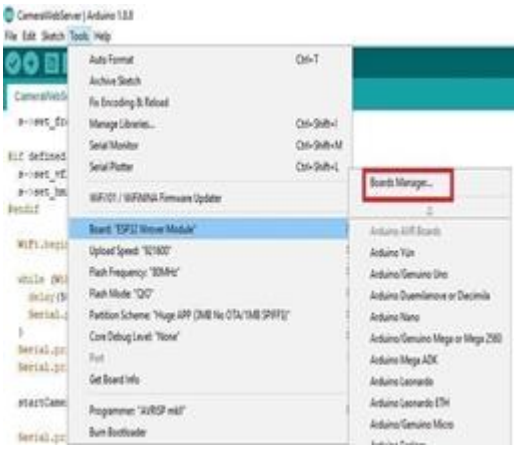
Go to File> Preferences in your Arduino IDE to add the ESP32 board.



As seen in the figure below, copy the link below and paste it into the "Additional Board Manager URLs" area. the "OK" button**https://dl.espressif.com/dl/package_esp32_index.json**



Now goto **Tools>Board>Boards Manager**



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In Board Manager, search for ESP32 and install the "ESP32 by Es Press if Set-ups".

TABLE:

ESP32-CAM	**FTDIBoard**
5V	VCC
GND	GND
UOR	TX
UOT	RX
ESP32-CAM	**RelayModule**
5V	VCC
GND	GND
IO4	IN

Connect the IO0 to the ground before submitting the code, please note.

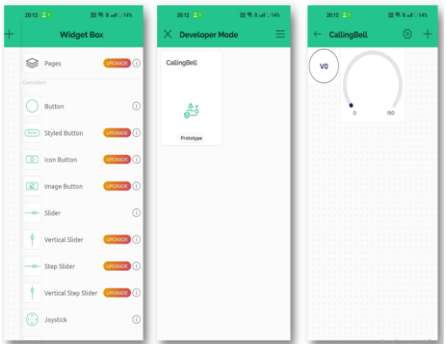
IO0 determines if the ESP32 is in the flashing mode. When GPIO 0 is connected to GND, the ESP32 is in flashing mode.

Process:
The visitor must touch the push button at the door each time they arrive at the house. The visitor's picture will then be taken by the ESP32 CAM and sent to the host via the Telegram app. Additionally, the visitor's temperature will be detected and displayed in the Blynk app. The procedure is displayed below.

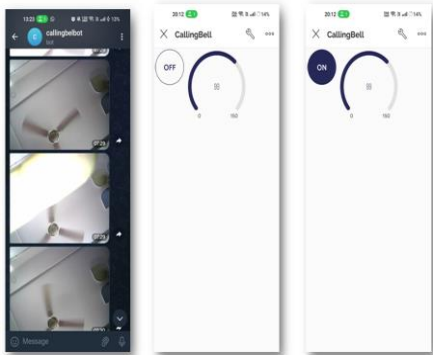
1. Create a name using Bot Father in Telegram.

2. Commands will be given.

3. Create a graphical interface in blynk app and connect our calling Bell bot to the Blynk app.



4. Photo will be sent in telegram and temperature can be shown in Blynk app.



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5. RESULTS AND DISCUSSION

The offered image serves as a representation of the project's outcome. For this IOT and Bluetooth-based project model, we developed a smart door lock with video surveillance using an ESP32-CAM, an Arduino, and a Bluetooth module. In this working model, the owner can check who is at the door by accessing the ESP portal (192.168.43.27 in our example) after pressing the doorbell. After verification, the owner can use the Bluetooth Arduino Controller App on an authenticated mobile phone to use voice, gesture, and touch methods to unlock the electric door lock. The offered image serves as a representation of the project's outcome. For this IOT and Bluetooth-based project model, we developed a smart door lock with video surveillance using an ESP32-CAM, an Arduino, and a Bluetooth module. In this working model, the owner can check who is at the door by accessing the ESP portal (192.168.43.27 in our example) after pressing the doorbell. After verification, the owner can use the Bluetooth Arduino Controller App on an authenticated mobile phone to use voice, gesture, and touch methods to unlock the electric door lock.

6. FUTURE SCOPE

Using Ethernet Arduino and a Wi-Fi module, this setup can be turned into an IOT project. With feedback from the appliances, it can be controlled from anywhere in the world and further increase energy savings. This circuit allows for a double safety arrangement. We can control door locks with AI by using registered faces and face detection. We are able to share a message with the guests by mounting an LED display on the door. The android application can also be used to control multiple doors, curtains, and to check the visitors' temperatures in the future. Both circuits should have a battery backup setup for operation in the event of an electric outage.

7. CONCLUSION AND DISCUSSIONS

This system may be converted into an IOT project by using an Ethernet Arduino and a Wi-Fi module. It can be controlled from anywhere in the world and can further boost energy savings with input from the appliances. This circuit enables a dual safety configuration. With the use of AI, door locks may be operated by registered faces and facial detection. By installing an LED display on the door, we can communicate with the visitors.

The Android app may also be used to regulate multiple doors, curtains, and to monitor future visitor temperatures. A battery backup system should be installed for both circuits to allow operation in the event of an electrical blackout. In order to achieve the aforementioned goals, I have created a system that is outfitted with the sensors, cameras, processors, relays, buzzers, LEDs, and actuators necessary for the application. The system performs admirably in the neighbourhood and lives up to expectations. The most popular IoT platform for connecting devices to the cloud, creating applications to control and monitor them remotely, and managing thousands of deployed items, Blynk cloud server is ideal for this type of application Blynk software enables people and businesses to transition smoothly from connected product prototypes to market launches. Utilising this software is very simple. It works with microcontrollers like the Arduino, Raspberry Pi, Node-MCU, and others. One can easily get a system up and operating with very little coding.

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