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Smart Wi-Fi Doorbell Using Esp32cam with IoT

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Abstract: Regardless of whether they are present at the moment, people need to know who is visiting their organizations regularly. For those who experience a disability that prohibits them from meeting the visitor, this need is much more pressing. This paper suggests a smart doorbell that performs the function of a doorbell to address this issue. It should identify the visitor and notify the user. This proposal includes technology for visitor facial recognition, user alerting, and reaction management to do. The entire procedure, including visitor recognition, user notification, related management challenges, interconnected stages, and standardization concerns, is covered later. Finally, three scenarios were combined to test the model's efficacy. Each scenario was made up of several organizations, and an analysis of the recognition of known and unknown individuals was conducted across each scenario.
Keywords: Alert, Facial recognition, sensors, Integrated Scenarios.

1. Introduction

The human face has a certain form that requires intricate mathematics to identify. Faces are used to identify people and distinguish them from one another. Facial recognition systems are extremely useful for a variety of applications, including the identification of terrorists, security systems, and identity verification access. In actuality, it is used in numerous public and even designated spaces. We can get a very good and satisfying result for face identification and reveal thanks to computer science technologies that are effectively developed. The face-operated details that are retrieved from faces will be examined and contrasted with similar face-operated details that are already present in the Thing Speak database. In this article, hitting the doorbell button starts the face recognition process. A built-in web camera will take numerous photographs of the visitor. The recently scanned face will be checked against the current database. A message with the taken image is generated and shown on the owner's screen in the event of an unknown face.

2. Literature Review

2.1 Study about Smart Doorbell

Kayiram, Kavitha (2019). Smart Doorbell with Smart Surveillance (IJITEE) Modern society now places a high value on home security. When a guest knocks on the door, our smart doorbell may instantly notify the resident by sounding an alarm. The world is evolving into one that is intelligent in every way as we observe a significant technological change. While providing the necessary seclusion, these intelligent devices are intruding into our lives.

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Remotely monitored things are those connected to the Internet of Things (IoT) by IoT devices. In this study, we created a smart doorbell that can automatically send data to the cloud or other storage devices when it detects human presence and rings the doorbell to inform the residents. The developing smart doorbell will contain a PIR or ultrasonic (passive infrared) sensor that can both take pictures of objects close to the door and identify the presence of humans across a certain distance. Additionally, this photograph is sent through email to the registered email address and uploaded to the cloud, providing the necessary privacy.

2.2 Study of Object Detection

"The Real-Time Detection of Traffic Participants Using YOLO Algorithm," 2018 26th Telecommunications Forum (TELFOR), pp. 1-4, doi: 10.1109/TELFOR.2018.8611986, by A. Orovi, V. Ili, S. URI, M. Marijan, and B. Pavkovi. One of the crucial software elements in the upcoming generation of autonomous vehicles is object detection. Traditional techniques for object recognition using computer vision and machine learning often have a lengthy reaction time. Modern artificial neural network-based methods and designs, including the YOLO (You Only Look Once) algorithm, can tackle this issue without suffering accuracy losses. In this study, we demonstrate how to use the most recent YOLOv3 algorithm to identify traffic participants. We have trained the network to recognize objects from five different object classes, including cars, trucks, pedestrians, traffic signs, and lights. We have also shown that the method is successful in a range of driving circumstances, including clear and cloudy skies, snow, fog, and nighttime driving.

2.3 Study about ESP-32 Camera

Marek Babiuch and Jiri Postulka, 2020. Monitoring System for Smart Homes Using ESP32 Microcontrollers 10.5772/intechopen.94589. The implementation of our monitoring system for home security is the subject of this chapter. ESP32 microcontrollers and IoT modules were used in the system's design. The design of the system, its hardware and software components, security measures, communication, data collection and monitoring, and the estimation of costs associated with its development and deployment are all covered in this chapter. The suggested system protects a home by spotting an intruder inside, setting off an alarm, recording the incident on video, and transferring data to the owner's smartphone. The secondary task of the system is to collect data from sensors for monitoring the temperature of an object and presenting it via a web server.

3. Existing Method

The Node MCU controls the household appliances in the current system; however, there are only so many GPIO pins that can be used to control so many appliances. Currently, we use a Raspberry Pi for face lock, which is highly expensive relative to our product.

The project includes GPS and GSM modules. Microcells influenced by multipath when the signal is lost and range issues in high areas are the primary drawbacks of GSM. Any mishap may be detected by the vibration sensor, which can also send a message to the memorized contact number while keeping track of the GPS-tracked location. The major result of position inaccuracy and drifting signals is that GPS signals can occasionally be obstructed by objects

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such as buildings and trees, and occasionally by strong atmospheric conditions like geomagnetic storms.

4. Proposed Method

The main goal of this work is to create an intelligent doorbell system mainly based on face identification (1). The workflow of the proposed system will be shown in below figure (1).

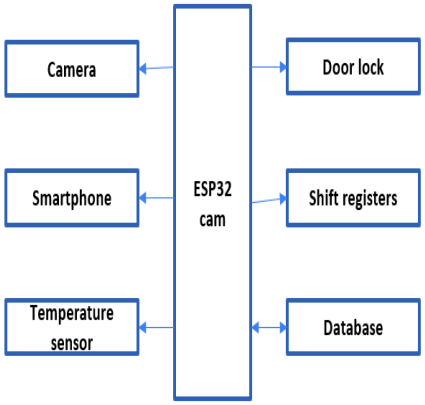

Fig 1. Workflow diagram for the proposed system

Face detection, face extraction, and face recognition are the three steps we broke the face recognition process into to deliver the functionality mentioned. The human face is the easiest method for us to comprehend someone's identity and potential emotions, and how someone is feeling may provide us with cues about how they could act. The face data is crucial to this comprehension. Recognizing certain faces or interpreting an individual's emotional state is frequently essential to a company's operations. Whether it's to stop someone from accessing a restricted area or to find out how customers feel about a new product, recognition must be rapid and precise. This has mostly been a task for security, marketing, etc. personnel thus far. In addition to allowing for a quicker, more adaptable, and dispersed system, an automatic face recognition procedure based on specially created software analyzing video streams from network cameras would also improve overall service for a business and its clients.

Microsoft Cognitive

API It is a Microsoft Cognitive Services face API that allows for automated face identification and matching using machine learning. On envisioning an image categorization pipeline built on top of Azure functions, Microsoft initiated cooperation. Building serverless microservices using the Azure function framework makes it simple to deploy them to the cloud. Scalability is built into Azure functions, and they are simple to administer. Azure function development is supported by Visual Studio. Going serverless provided us the freedom to add or remove features as the pipeline expanded. Face matching and broad picture categorization were the early areas of emphasis. Message queuing is used in the design to transfer photos down the pipeline. Each communication includes the details necessary to advance an image to the following phase, including a link to the image blob and the gathered characteristics above the categorization of the image. The framework will keep an eye out for

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new messages in the Azure storage queue defined in the function. Jason file and call the function when it does. The next section is an example of a function definition.

5. Hardware And Software Requirements.

ESP32 CAMERA:

The ESP32 camera was used by developers for automated picture capture and object detection, and the Arduino IDE was used to set it up. tools and send data to the camera. Automated image capture typically takes between one and three seconds before the image is taken and sent to Google Drive.

IFTTT SETUP FOR WIFI DOORBELL:

IFTTT is a free web service that enables users to build networks of straightforward conditional statements, or "recipes," that are activated in response to modifications made to other web services like Gmail, Facebook, Instagram, and Pinterest. "If This Then That" is referred to as IFTTT. IFTTT is used in this project to send emails if the temperature or humidity exceeds a set threshold. To send emails or SMS on certain events like excessive power consumption, a high pulse rate, an intruder entrance, etc., we have previously utilized IFTTT in several IoT-based applications. To begin, sign in to IFTTT using your credentials or create an account if you don't already have one. Now look for "Webhooks" and choose Webhooks from the Services list.

CLOUD:

Building serverless microservices using the Azure function framework makes it simple to deploy them to the cloud. Scalability is built into Azure functions, and they are simple to administer. Azure function development is supported by Visual Studio. We had the freedom to add or delete functionality as the pipeline expanded since we chose to go serverless. Face matching and broad picture categorization were the early areas of emphasis. Message queuing is used in the design to transfer photos down the pipeline. Each communication includes the details necessary to advance an image to the following phase, including a link to the image blob and the gathered characteristics above the categorization of the image.

6. Future Development

The facial recognition and output processes will be improved. Additionally, we want to offer a user-accessible audio option. It will be quicker to receive the answer message because we are developing the wifi module. Additionally, for the benefit of the user, more security features will be introduced.

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7. Result

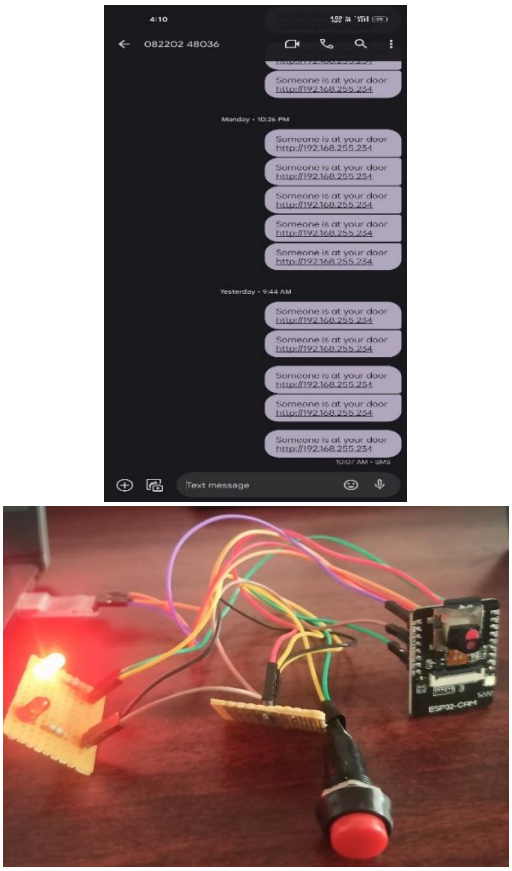

Fig 2. The output of the project

Whenever someone at the door hits the doorbell button, this smart doorbell can simply be charged by an AC outlet and sends a text message with a link to a video streaming page where you can watch the visitor from anywhere in the globe while also playing a particular song on your phone. By recognizing the person at the front door, the person with the connection may then access the video camera and speak with them.

8. Conclusion

There are many different models of smart doorbells available today; the issue is that they are extremely pricey, making them unaffordable for other homeowners. 19% of respondents, according to the results, don't have a smart doorbell. When compared to what we produced, which cost an estimated 2,500 PHP, the market pricing is more expensive and runs up to 9,194 PHP. A low-cost, high-quality camera for making smart doorbells is the ESP32. By doing this, we spread the advantages of smart doorbells to homeowners and leverage technology to make the world a safer and better place.

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