IoT-Based Contactless Doorbell Security

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Abstract:

World Health Organization(WHO) suggests preventing infection by regularly washing your hands, donning a mask in public, covering your mouth and nose when you sneeze or cough, and staying away from others who are sick. The article provides a practical and economical way for citizens to manage the flow of visitors to their properties using customized technology. For home security, it is a real-time smart doorbell notification system. The system combines smart home and home network functionality. It allows customers to keep an eye on guests in real-time using an IOT-based doorbell that is placed close to a home's front door. Clever control of the doorbell allows the user to receive a picture and text message of the guest.

When a visitor rings the doorbell, an SMS is sent to the resident's registered mobile number, and the response is then shown on an LCD screen next to the door so that the visitor can see it and respond appropriately.

systems and to make living easier.

Keywords- IOT, Arduino, Smart doorbell

I. INTRODUCTION

Recognizing the unique shape of human faces is a complex task that requires advanced calculations. Face recognition is commonly used to identify individuals, and is embedded in various practical applications such as security systems, access verification, and identifying terrorists. This technology has been widely implemented in public and dedicated areas due to the significant advancements in computer science. Thanks to these technological developments, face identification and verification can produce reliable and accurate results. The faces' collected details will be examined and compared to related face-operated details already included in the Things Peak database. In this article, hitting the doorbell button starts the face recognition process. In fact, a built-in web camera will record multiple images of the visitor. The recently scanned face will be examined in the current database. A notice is generated and shown on the owner's screen when an unknown face is detected. In contrast, if a known face is detected, the door will open automatically for a brief period of time once the real face ID is matched with the face IDs that are already recorded in the database. Additionally, the owner will receive information via his connected device.

Only 44% of the population actually wears face masks, according to a poll done in 18 cities by the NGO ApnaMask, yet 90% of people are aware of the necessity of doing so. Even more alarming are the numbers on social alienation and sanitization. The nation is a significant hub for smartphones, thus connected technology is pervasive even in faraway regions. Many services, notably jobs, and schooling, have moved online as a result.

II. LITERATURE REVIEW

A. Smart Home Functions

Applications designed on top of IoT infrastructure make up a smart home framework. The following are some of the key features that smart home apps can provide [3], [6- 19].

2.1.1 Alert

The smart home system will detect it and send notifications to the user via their registered computer or account. The information in the warning is linked to environmental data. This data may include the concentrations of various gases in the atmosphere, as well as temperature, humidity, and light intensity. The consumer may receive a warning regularly at a predetermined time. Alerts may be sent via email, text messages, tweets, or any other form of social media [4].

2.1.2 Security

Security is one of the most vital elements of a smart house. With the help of numerous sensors and camera feeds an intelligent house will track its environment. Surveillance is an important feature considering that it keeps an eye on all behavior in a clever house, which is the main requirement for any subsequent activity or choice. As an example, tracking area temperature levels and alerting the consumer to turn on the air condition unit if the temperature level rises above a specific degree.

2.1.3 Control

This smart home feature allows the user to monitor a range of activities. Switching on/off lights, air conditioners, and appliances, locking/unlocking doors, opening/closing windows and doors, and many other things are possible Things can be controlled by the user from the same location or at a remote location. This feature also helps users to automate activities such as turning on/off the air conditioner when the room temperature rises or falls. Consumers benefit from smart homes because they can integrate energy-saving features such as lighting, air conditioning, and home appliances.

2.1.4 Intelligence

The importance of intelligence in a smart home cannot be overstated. To achieve house intelligence (HI), which is the capability of the smart home environment to make judgments based on numerous occurrences, the artificial intelligence (AI) process is crucial. HI serves as the brain of the smart home by operating as a linked ecosystem, and the AI mechanism must be able to perceive and respond appropriately to changing situations and occurrences. Since it can immediately alert the user and deliver an automatic response in the event of irregular or strange happenings, HI is crucial for home security. Additionally, smart homes can improve energy efficiency by monitoring every device's energy use within the structure, allowing for the planning of high-power equipment. Overall, HI is critical for achieving the full potential of smart homes, making daily life more comfortable, efficient, and secure.

III. METHODOLOGY

The proposed model for a smart door is unique due to its combination of features and simplicity. It reduces overhead by directly opening the door for identified users and sending images to the application program interface for unknown users. It is also cost-effective, avoiding unnecessary components like stepper motors and using a high-quality HD camera for facial recognition. The goal of the model is to provide a solution to the problem of burglary and promote the implementation of IoT systems, utilizing Neural Networks and IoT APIs and protocols.

Fig 3.1. System Flowchart

IV. PROPOSED WORK

The Presented in the project dashboard for Blynk. The virtual button caused a relay module, which is connected to the Indoor Unit via Wi-Fi, to unlock the door. To guarantee its dependability and security, the suggested system was tested under a variety of circumstances. The technology operated effectively in each case, and the results were very pleasing. The suggested system differs from conventional security systems in a number of ways, including contactless operation, remote access control, and instant notification capability. Additionally, it was less expensive and more dependable than other security systems because it used an ESP32-CAM board with an infrared proximity sensor and an LED torch. In conclusion, the suggested technique offers a simple, low-cost method of protecting doorways that is also practical and efficient.

4..1 COMPONENT REQUIRED

4.1.1 Computational Platform: ESP32-CAM

The ESP32-CAM has a very competitive small-size camera module that can operate independently as a minimum system with a footprint of only 27*40.5*4.5mm and a deep sleep current of up to 6mA. ESP-32CAM can be widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals, and other IoT applications. It is an ideal solution for IoT applications. ESP-32CAM adopts a DIP package and can be directly inserted into the backplane to realize rapid production of products, providing customers with a high-reliability connection mode, which is convenient for application in various IoT hardware terminals.
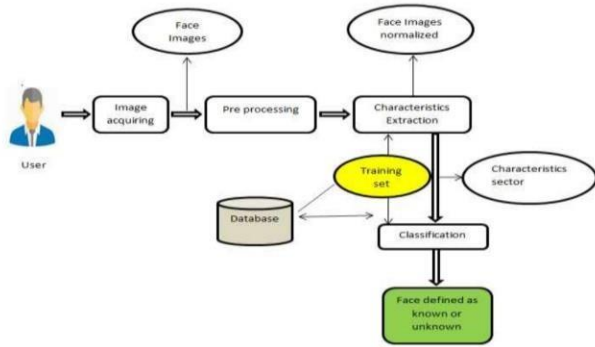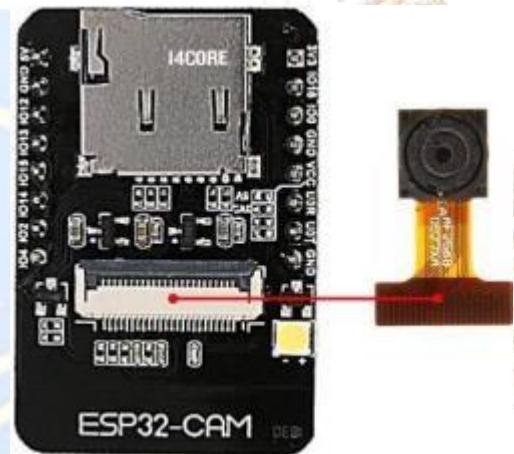

Fig 1: ESP32-CAM Board

4.1.2 Relay Board

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. Relays are the components that allow a low-power circuit to switch a relatively high current on and off, or to control signals that must be electrically isolated from the controlling circuit itself. To operate a relay, we must pass a suitable pull-in and hold current (DC) through its energizing coils. Generally, relay coils are designed to operate on a supply voltage often 12V or 5V.
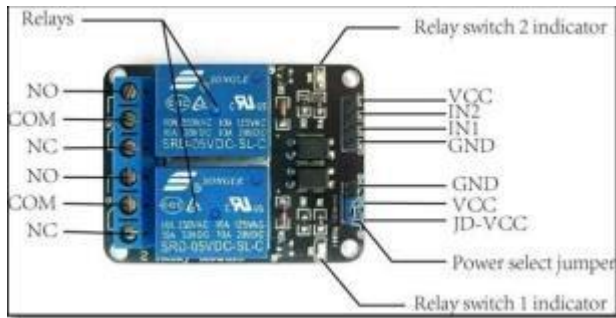
Fig 2: Relay Board

4.3 IR Proximity

Sensor Module Proximity Sensor is used to detect objects and obstacles in front of the sensor. The sensor keeps transmitting infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object. It can be used in robots for obstacle avoidance, automatic doors, parking aid devices or security alarm systems, or contactless tachometers by measuring the RPM of rotation objects like fan blades.
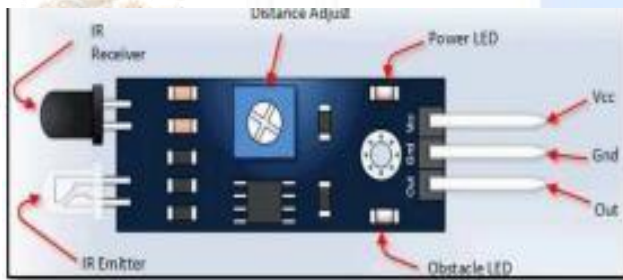

Fig 3: IR Proximity Sensor Module

4.4 Tactile Push Button Module

The tactile push button is the most commonly used mechanical switching device used in electrical and electronic circuits and panels. These small-sized switches are placed on Printed Circuit Boards (PCBs) and are used to close an electrical circuit when the button is pressed by a person. When the button is pressed, the switch turns ON and when the button is released, the switch turns OFF. The switch is used to supply an input signal to actuate a device or equipment, to generate an interrupt, to increment or decrement a value manually, to change the mode of operation of a device, as a key in a matrix keypad. A pull-up resistor is interfaced to the switch line to prevent the detection of false triggers when the line is in a high-impedance state or tri-state.

4.5 LED Indicator Module

LED (Light Emitting Diode) is basically a pn-junction diode that emits light when connected to the power source in forward bias mode and doesn't operate in reverse bias mode. The Red colored LED usually consumes 2.2V–2.4V and 10mA–20mA current. A current limiting resistor is required to connect in series with it as per the source voltage.

4.6 PIR motion sensor

Passive Changes in the amount of infrared radiation can be detected by infrared sensors. Infrared radiation is generally emitted by all objects, but its intensity varies with temperature. As a result, when a person passes by the sensor, their presence will be detected due to the difference in radiation between their body and items in the background. This sensor helped us create a system with two operational modes: When motion is detected in the first operational mode, the temperature is measured and relayed to the application to alert the user. Even in high temperatures, the door will automatically open if the algorithm identifies the face as an authorized person. For homes and other private properties, this program is helpful because The user must enter their own home while having a high body temperature. Offices and other work environments benefit from the second operational mode. When there is motion, the temperature sensor will take the visitor's temperature and transmit it to the user. Even if the user was detected by the algorithm, the door will not open automatically if the temperature is higher than the limit, which is 37.5°.

4.7 Android Studio

It is a software development kit and environment used for building applications, it is built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. A mobile Application will be developed using the android studio to create an interface through which the user can control appliances.

V. CONCLUSION

The "Smart IOT Doorbell Surveillance" project has been designed with the domain of the Internet of Things. The basic concepts and workings of IOT have been displayed in the running of the project. The project uses mainly an Arduino Board and OOPS programming concept. Since, today, in a technologically enhancing environment, security issues are of utmost concern, this project shows how technology can be used to enhance the security features of people's homes. A doorbell is constructed which has the feature to send a notification to the owner when somebody is at the door, with an attached picture of the person. It uses materials such as an Arduino Board, an Ethernet Shield (to send notifications across services), a doorbell, resistors, and a web camera. This project enables users to stay connected to their homes and ensure safety, even when they're traveling.

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