

Door Surveillance with Smart Bell

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Abstract: In today's scenario we completely depend on internet which help us for our day to day activities. The objective of the project is to provide the user with a simple and customized technology to effectively manage his or her visitors visiting or coming to the premises. This project basically aims for controlling the doorbell in a smart way and to intimate the user with a picture of visitor and text message to the user at the doorstep. The aims of the project is to discuss the IOT based doorbell with enhanced security features at a small cost with the help of Raspberry pi toolkit and different components. This new concept includes the security concerned issue present in the current system in an effective manner. the internet of things is used remotely to see the activities going outside the door and get notification when there is a presence of nearby object without any physical contact and whenever a door bell is pressed raspberry pi will check whether the fingerprint matches with the stored fingerprints in database and if it doesn't match then photo will be clicked. The photos are sent through Wi-Fi, to the application present in the users mobile and through the web server. The raspberry pi stores the data of authorized person in the database which is fed by the user. Nowadays, the security doorbell has no internal wiring and they are installed with minimal tools. In this smart doorbell we will place a fingerprint sensor which will sense the visitor and announce his/her name if he or she is the regular visitor and if his data is present in the database and if the visitor is new he will have to get registered. The camera will click images of people whose data is not present and tried to enter the house. If a person outside the door knocks the door instead of pressing the bell then it will be difficult to identify the person so for that reason we are going to implement a system where if a person outside knocks the door who is standing outside the door for a particular time a small video on 10 seconds will be taken and that video will be send to the owners application so that he will come to know who is standing outside the door.

Keywords: Doorbell, Fingerprint sensor, IOT, Camera

1. Introduction

The Internet of Things (IoT) is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the "IoT revolution"—from new market opportunities and business models to concerns about security,

privacy, and technical interoperability.[3] A traditional doorbell system is a wired into the electrical system of the house which is commonly used previously. It contains internal wiring which is used to ring the chime box when a visitor presses the doorbell, a loud voice is generated. It was not easy to carry wires and was also difficult to manage doorbells. Nowadays, the security doorbell has no internal wiring and can be installed with minimum tools. Since it depends on wireless technology, the chime box should be placed near the doorbell transmitter so that it will help the bell to ring. When the doorbell is pressed, fingerprint will be scanned if unknown then image will be captured and send to the owner, so that the owner can see and know who is at the door. The owner will maintain a database where all the data of the visitor like his name his fingerprint and a message after his name which is to be call out when he presses the bell is stored. Whether you want a chime or an efficient front doorbell system, the idea is to expose you to a complete world of wireless video security systems for your home or office when you click the doorbell, the following notifications can be sent to the user on his mobile app.

- The owner will come to know about the person when he presses the bell.
- This will be possible when the owner will store the data of the visitor when the visitor will press the bell his name will be call-out inside the house the scanner will be connected to the Raspberry Pi.
- A speaker is interfaced with the system which will enables the owner to know who is outside his door.
- A snapshot of the person at the door. A script written in python is used to capture the image using the compatible webcam interfaced with the pi and to attach and send it to the user on the user's application.
- A small video will be made if a person is standing outside for longer time so that the owner will come to know who is outside.
- If the user want he can share his database with the watchman so that the watch man will come to know who is going the visit the user so that he can grant access to the visitor. The system will be designed for security purposes. It will work as when bell rings at the door, and also when a human is detected in range for specific period of time the system will use the camera and the camera will capture a small video approximately 10 seconds of the person standing in

front of the door, that will be shown to the user who is away from home or at the home on his application. And then he will identify the person if the person is known then the owner will open the door or else he will wait outside. This increases great security for homes and that too without human interruption.

2. Literature survey

Suprit Das “raspberry pi based smart doorbell system with advanced encryption scheme” 2017 says that “The Raspberry pi based door bell system is helpful for every types of user. Institutions according to their requirements. It is a paradigm for wireless door bell system based on new technologies. Further, in the future, it will become more secure compare to our previous model. Here we are specifying more secure features with good design. The proposed system is a suitable for low cost with more secure features MTQQ. Our next aim is to discuss about delay in between transmission of packet from sender to receiver part” [1].

Authers Jordi Sapes and Francesc Solsona “FingerScanner: Embedding a Fingerprint Scanner in a Raspberry Pi” 2016 says that “The conclusions are based on the project results. The results were good and proved that Finger Scanner could be embedded in a commercial product. The system architecture is well designed. It allows connections to the Finger Scanner from different devices. The front-end (client) can be executed in any computer or mobile devices with a browser. Functionality is easily extensible. These features make the Finger Scanner system robust and flexible. The serial communication server device is slow (115,200 baud). However, it is acceptable, as it does not greatly penalize the overall system performance. It must be said that the scanner device was a good choice, because it gives a good efficiency/cost relation, provided that the sensor is in a static position. In addition, the finger recognition success rate of the FingerScanner system obtained an F score of 0.85. The Raspberry hardware in this project is robust, and it works properly. Its viability was carefully tested, because the CPU and Memory of the Raspberry have several restrictions in computational power and capacity, respectively. However, the CPU behaved properly for its service requirements. Furthermore, the FingerScanner application fit in the Raspberry Memory very well [8].

Authers Jie-Ci Yang, Chin-Lun Lai, Hsin-Teng Sheu and Jiann-Jone Chen, “An Intelligent Automated Door Control System Based on a Smart Camera” 2017 says that The system can first identify a target as person by face detection, and then analyze the path trajectory to determine whether the person has intention to access the door or not, thus to control the door accordingly. It is noted that the system has advantages of low false rate (near 0%), high correct activating rate (99.6%), and short response time (within 2 s) from detecting the target, confirming his intention, to activate the door opening. Moreover, via statistical analysis on detected face in consecutive time sequence, case of passing persons with

missing face can still be confirmed within 4 s thus to activate the door correctly. To sum up, the proposed method builds up the statistic model of moving trajectories in ROI first, and the corresponding probability of a face at certain location can be obtained by lookup table. If the average probability of face trajectory is greater than $thPT$ within T period, the person is said to have intention to go through the entrance. It is observed, by our experiments, that if $thPT$ is set to be the average of ROI, said μPT , the FR_{tot} is about 6.3×10^{-5} and is suitable for most application cases. The proposed intelligent control system, compared with traditional ones, not only reduces the false action rate, but offers extra power saving benefits. For example, less false door activation reduces the energy exhaust of air conditioners as well as the door driver. That is, the proposed system is designed not only as an access control system but also a watch dog in front of the entrance, thus, the CP value of the proposed system is much greater than that of the existing systems”[7].

Authers Ambika, Baswaraj Gadghey, Veeresh Pujari and Pallavi B V, “Smart Bell Using IOT” June 2017 says that, “This paper gives basic idea of how to remotely monitor and control door. It will work as and when bell rings at the door or any motion is sensed at the door, it will act as a trigger to the camera and the camera will capture the image of the person standing in front of the door, that will be shown to the registered user who is away from home and then he will identify the person and through the web server he can control the door lock Smart home security control system has become indispensable in daily life. Smart home security control system has become indispensable in daily life. The design and development of a home security system, based on human face recognition technology and remotely monitoring technology, to confirm visitor identity and to control door accessibility has been reported in this paper. This paper describes about the implementation and deployment of wireless control system and accessibility in to a home environment for authenticated people only. When the buzzer is pressed by the person and if The PIR sensor able to detect the presence of nearby object without any physical contact, the camera is activated, and captures the image of the person standing near the door or in the range of PIR sensor. Here the raspberry pi model is connected to spy camera to capture the image. When image of the person is authorized in the raspberry pi then the servomotor automatically unlock the door. When image of the person is not authorized in raspberry pi then through Wi-Fi an image of that person is sent to an email. The owner get the notification, if he want to unlock the door through the mobile app he can unlock the door. The design and development of a home security system, based on human face recognition technology and remotely monitoring technology, to confirm visitor identity and to control door accessibility has been reported in this paper. This paper describes about the implementation and deployment of wireless control system and accessibility in to a home environment for authenticated people only. When the buzzer is pressed by the person and if The PIR

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woo-hyuk park and yun-gyung cheong “IoT smart bell notification system: Design and implementation” 19th International Conference on Advanced Communication Technology (ICACT) (2017) In this paper, we provide a security system that combines the functions of smart phone and home network system. It enables the users to monitor visitors in real-time, remotely via the IoT-based doorbell installed near the entrance door to a house. If an outsider breaks into the house, the system can help identify the trespasser by acquiring CCTV evidence. Furthermore, this system can be used to report to the police or home security service provider immediately when a trespass occurs [2].

Traditional Doorbells are wired devices and are usually fixed at one place. They are becoming obsolete because of these reasons and are gradually being replace by advanced Wireless Doorbell Devices. With a wireless doorbell, the position of the switch and the bell is not fixed. We can place it anywhere we want and also the installation is pretty simple. The setup of wireless doorbell doesn't require any internal wiring. Also, if the wired doorbell is not fixed while construction, we need to make holes for wiring and installation [10]. Biometric screening using fingerprint or retina scans are not new. Since the advancements in high-resolution cameras and development of 3D facial recognition algorithms in the past few years, facial recognition as a means of biometrics has become pretty popular. My first encounter with this technology was in 2012-13 timeframe when Google first released its Face Unlock, a feature in one of their Android Operating Systems that could unlock the phone by recognizing the owner's face [9].

Nowadays, researchers are paying increasing attention to embedding systems. Cost reduction has led to an increase in the number of platforms supporting the operating system Linux, jointly with the Raspberry Pi motherboard. Thus, embedding devices on Raspberry-Linux systems is a goal in order to make competitive commercial products. This paper presents a low-cost fingerprint recognition system embedded into a Raspberry Pi with Linux [6]. Multifunctional Smart Door System The proposed system will allow to communicate between visitors and owners of the house. Video camera system (the photo of visitors will be sent to the owner of the house), instant message notification, SMS / MMS notification and dual audio / single sided process will be provided with videophone. In addition, cloud storage of image data with a high resolution will be

provided using the system With increasing safety and security is-sues, the use of smart door system increased consistently with the advent of security related electronics, such as digital door locks, advanced video conversation devices, and wire-less home security networks . There are many smart systems proposed to provide safety and security at home and offices. The system is integrated to the gate for recognition people [4]. Previously, for high security areas or in locker rooms for banks, traditional lock systems, passwords, etc., were employed. However, these systems were found to be not perfectly secure. After advancements in technology RFID cards were used. These cards however were not much useful for the user due to chances of getting lost, stolen and forgotten. The purpose of this study is to provide high security for such high end security applications. The aim of this study is to design a smart door access system using finger print module. The use of this device is to provide access to only authorized persons. Both hardware and software technology are used to design it. An emergency beep sound is provided to protect the system by giving alarm if any unauthorized person intrudes into the system. An indicator indicates for any emergency condition. Motors are used for locking and unlocking the door [5].

3. Proposed system

The system which we are going to make contains devices like a camera, speaker ,fingerprint scanner which will provide us features like capturing images of unknown peoples taking videos announcing their names after they scan their fingers through scanner.

Following are the features provided by the system:

- When someone visits the user for the 1st time the speaker will announce that “unknown person is outside the house” then the owner will store all the data like his finger print, message besides his name and other details this can help the user to identify whether the person is known to him or the person is not known to him. The visitor's data will be stored in the database by the user which will be useful when the visitor will visit him again without any issue.
- The user has to store the data of this family members too. So that the user will contain all the information to keep track of the details of the family and visitors of their timing and In/Out.
- When the visitor visits the user again his fingerprint will be scanned and his fingerprint will be searched in the database and if the fingerprint is found the message beside his name is announced inside the users home so that he comes to know who is standing outside his door if the user wants he can open the door our else will not open the door
- A snapshot of the person at the door. A script written in python is used to capture the image using the compatible webcam interfaced with the pi and to attach and send it to the user on the users application

.when some unknown person visits the user and is there for a long while or for more than specified time at that time the user will get an image of the person clicked with camera in his Smartphone so that he will know or decide whether to open the door for that person or not.

- When someone visits the user but doesn't press the bell for a long period of time suppose consider 1 minute of time at that time the camera will take a small video of 10 seconds which will be send to the users application this will be done so that without scanning the figure the user will come to know about the visitor so that he can open the door if he knows the visitor or else will not open it.
- The user can share his database with the societies database if he wants so that whenever some guest is going to visit the user like relatives and parcel is going to come at that time it will be easy for the watchman to recognize the person and allow him or her to get inside the society. It will be convenient for the user as well as the watchman to keep track of all the visitors visiting the user's house.

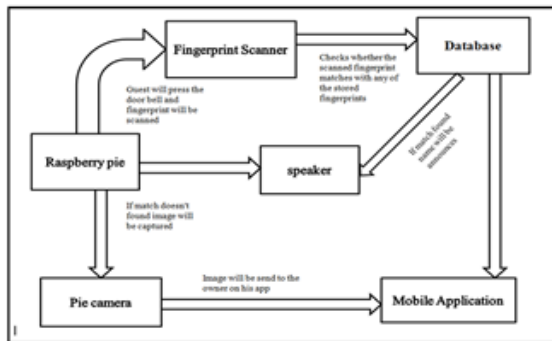


Fig. 1. Block diagram

4. Methodology

- Connect all the hardware appropriately apply power supply as per need.
- Visitor comes near the door and presses the door bell
- Fingerprint of visitor will be scanned by the fingerprint sensor which will be located on the button of the door bell
- Fingerprint will be scanned and sent to raspberry pie. Raspberry pie will extract all the known finger prints stored in the database of the system.
- Finger print will be check for match of fingerprint scanned with the extracted fingerprints stored in the user's database.
- If match found then raspberry pie will announce message through speaker which is stored in the database beside the visitor's name.
- If the Match not found then the default message will be announced through speaker and camera will capture image of visitor and send to database.

- Concurrently notification will be send to user's mobile application. If user discards the notification within one minute then nothing will happen or else image of that visitor will be send to user.
- If someone stays close to door without pressing the doorbell for longer time like 1 minute then a small video of 10 seconds will be take and will be send to the users application.
- User can modify database through his mobile application once he clicks update button form will be displayed on his screen in which details like user name mobile number and a message which is going to be announced and the fingerprint of that visitor.
- Once the user clicks on the submit button then all the entries will be reflected on the database.
- User can modify database track history of visitors and get notification as well as alert messages through mobile application.

A. DFD/flow chart

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated.

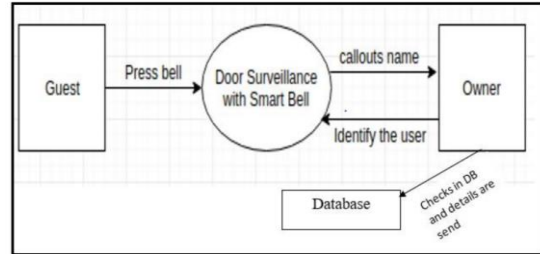


Fig. 2. DFD Level 0

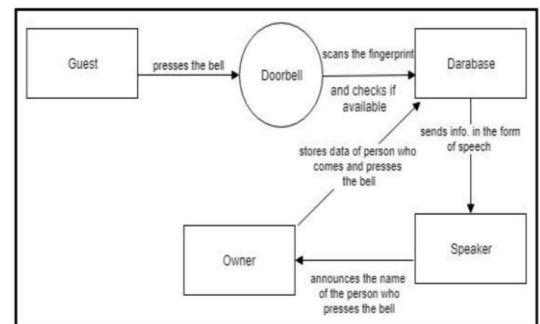


Fig. 3. DFD Level 1

5. Conclusion

Smart Doorbell System is designed to provide home's occupants with the ability of accessing home using their fingerprint instead of traditional systems. For example when someone comes to our home but when we are not available at home but tries to get inside our house a video of 10 seconds will

be captured and send to the user thought internet over Wi-Fi on the users application. Multiple fingerprint of same persons can be stored in the database and can be use the same name will be announced inside the home.

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