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Remotely Accessible Smart Door Lock System Using IoT

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Abstract – *In the todays world a robust door locking system is the first and primary thing to assure security of a home. Due to the increasing responsibilities and daily routine tasks most of the times people stays out of their houses. In such situations, recognizing a visitor and getting remote access to their home is necessary. A smart door lock mechanism which can be completely monitored and controlled from a remote location using smartphone is proposed in this paper. When a visitor presses a calling bell/push button at the door, a Raspberry Pi with attached HD camera gets powered up and notifies the owner with a message.The owner, based on his willingness, can easily open/close the door remotely by sending a password that was pre-set to the visitor.*

Key Words: IoT, Smart Bell, Raspberry PI, Home Security, etc.

1. INTRODUCTION

This project is a significant step towards smart home and living. With the increase in trend of online shopping combined with conventional trends of delivery we realized that a major inconvenience is faced by the customer as well as the delivery person if the concerned one is not present at his home at time of delivery. This also extends to friends and relatives who may visit your place unannounced. There is also a security concern in the old systems as we cannot see the person outside clearly. The old aged people are also mostly are targeted for crime and looting.

Thus the two fold problem identified is as following :

- There is no smart means through which the owner of the house is notified about the visitor in case he is outdoors or unable to hear the bell.
- There is no smart means through which the owner of the house can communicate and pass instructions to the visitor at the door.

Using the microcomputer, 'Raspberry pi', the smart doorbell, hence solves the problem of visitors remaining unattended in case the concerned person is not available. This smart doorbell alerts you when the bell is rung and lets you see visitors from your smart phone, anytime and anywhere.With the most important feature being able to live stream the feed of your front door to your device, be that you're mobile or laptop or your TV according to how one has configured the Raspberry Pi. The medium of course being the Internet. The system also includes an inbuilt 'Face Recognition' module to distinguish between a known and unknown visitor and hence accordingly enable or disable notifications based on the user's preference settings.

2. LITERATURE REVIEW

"Home Security System for Alone Elderly People" is a project which was implemented for elderly people in Thailand. It is proposed for the aging society as the number of elderly population is more and it keeps increasing every year. The proposed system uses pure mobile development and API's to facilitate the working. The user avoids direct contact with the person on the door as it transfer the live feed directly to the phone and therefore user doesn't have to go to the door if they doesn't know who is on the door. It gives a security measure for the elderly people living alone in the house. Several API's are used to insert various features, like the user can listen through the inbuilt microphone in the doorbell and even can talk through the phone via the in built speaker in the doorbell. The connections are pure internet based.

"PiCam: IoT based Wireless Alert System for Deaf and Hard of Hearing" is a project which was implemented for deaf and people with hearing impairment. The project uses complicated system to alert the person by wearable device with a display showing the feed from the camera attached on the doorbell. It uses Bluetooth to transfer the feed. It uses normal raspberry pi codes for the working of the system.

"Dash bell: A Low-cost Smart Doorbell System for Home Use" is a project which allows the house owner to introduce more security to their doorbell system. The project uses advance technology involving AWS, MySQL, and cloud computing. This project is not basically for people with hearing impairment, as it provides the notification via a buzzer whenever the doorbell (dash-bell) is pressed. It gives a live feed on the application and the users have the privileges to add or reject the request for saving the data in the cloud. It is costly because of such high end technologies involved and the connections are made through Wi-Fi and internet connections. In future, they have planned to use neural networks so that the doorbell itself can identify the person on the door and allow him the access through the door or not.

"Sky bell: A smart doorbell system using Over Grive" is a project which sends the image of the visitor to the occupier

no matter where he/she is at the moment. The proposed system uses buzzer to allow guest to announce their presence at the door request entry into the house. The proposed system will prevent the occupier from missing any important guests and will also prevent any break-ins or robbery. It uses a simple architecture of a raspberry pi 3 connected with a webcam, which then uses Over grive to save the data from the webcam. It provides greater security for the user as he can see the feed from anywhere if connected to internet.

"IOT Smart Bell Notification System: Design and Implementation" proposes to add together the services of smart phones and home/building network systems. It aims to remotely access the IOT based doorbell to monitor the visitors in real-time. Using CCTV evidence the system will help to identify trespasser when there is an attempted break-in in the house. This system would be helpful in acquiring the necessary evidence to report to police or home security provider immediately if any trespass occurs. The authors have proposed that this system can be further improved by adding voice recognition and facial recognition functionalities as this would only strengthen the system.

3. OBJECTIVES

- Prevent the unauthorized access to home/building.
- Monitor and control the access of home remotely.
- To provide more secure and also a cost-Effective technique of door locking system.
- Overcome the limitation/drawbacks of existing security systems. such as whoever needs access to the lock has to maintain a proper physical key with them and there is chances that key may lost, stolen and forged. Even if the owner wants to give access in his absence, the currently available conventional system cannot provide remote access to particular users without the actual keys

4. PROPOSED SYSTEM

In this proposed system, we are having database of authorized persons list by registering their faces, so that non authorized person can't able to enter the home until the owner's permission. Whenever some person presses calling bell switch, the camera gets triggered and capture the image of the intruder and checks that the image within the database using face recognition technique, if that face is not matching with the database, it sends an email containing that intruder image and OTP, when intruder type the OTP by the owners knowledge then it allows to enter, otherwise the door will remain lock.

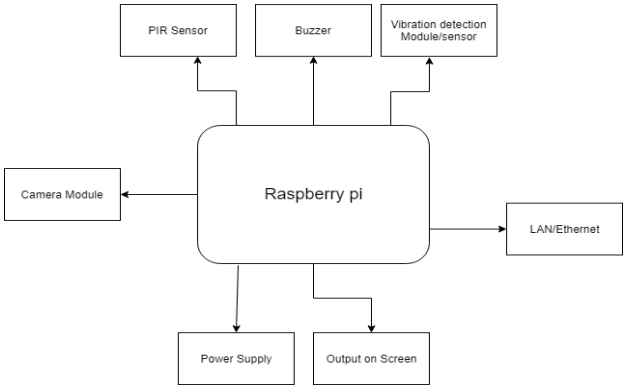

Fig -4.1: Block diagram for proposed system

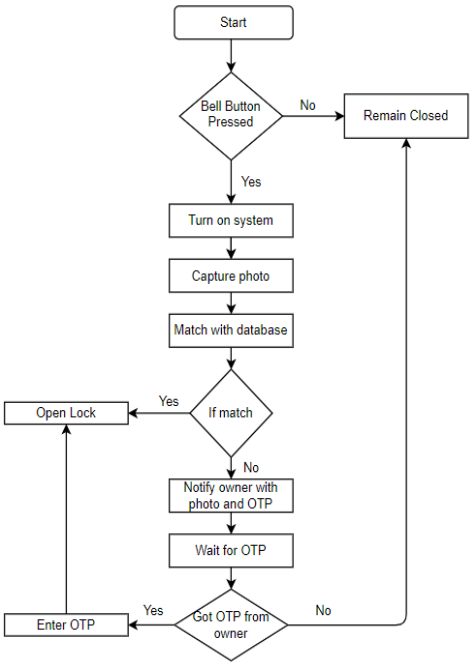

Fig -4.2: Flowchart for proposed system

5. SYSTEM REQUIREMENT

5.1 Software:

- Python IDE
- Arduino IDE
- OpenCV

5.2 Hardware :

[1]Raspberry Pi:

Fig -5.2.1: Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

[2] Raspberry Pi camera:

Fig -5.2.2: Raspberry Pi

The Raspberry Pi Camera Module v2 replaced the original Camera Module in April 2016. The v2 Camera Module has a Sony IMX219 8-megapixel sensor (compared to the 5-megapixel Omni Vision OV5647 sensor of the original camera).It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi.

[3] GSM Module:

Fig -5.2.1: GSM Module

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system

6. CONCLUSION

The whole project takes a new look at the traditional bell vs the modern technology using IoT. With the use of Raspberry Pi, Camera, sensors and other various important modules, our homes are certainly more monitored and secured. This technology will definitely improve the security of our houses. We proposed a system of real time smart door to provide communication between clients and home security. In order to provide effective system, we used Raspberry Pi embedded system which is integrated on the door of a house. The system is relies on video technology which is extremely popular technology for providing security and safety in urban areas. We used Raspberry Pi because it is a strong and reliable embedded system device for solving complex and challenging tasks. Using both technologies in the system provide various benefits to increase the efficiency in terms of communication between visitor and owner of the house and providing safety of home, thus making use of IoT and integrating it into our day to day lives.

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