Smart Door Monitoring and Locking system

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Abstract:

Protection, security, and safety are the most important things in our daily life. These days, the advancement of Technology has evolved into one of the leading IoT-based projects such as smart home technology. For An instance, this type of system makes livelihood more safe, convenient, and secure. people are more familiar with these technologies nowadays and smart home applications provide a controlled way of action just within the tip of a finger, for example, managing the schedules for home lightning, electricity bills,groceries list, and home security as well. the facial and fingerprint recognition of authorized persons is well established to keep the homes more secured for accessibility. A setup of a display monitor connection with the camera in front of the door is also required to send the information to the owner who is trying to enter his house through that door and the owner has the right to give access to the person who wants to open the door. Even we can provide voice lock by texting voice with raspberry pi arm processor which can revert any messages to the owner. To satisfy all these needs we came up with a new solution that is more secure, reliable, looks, and works smart. For this, we used a raspberry pi microcontroller linked with a biometric sensor for fingerprint recognition and a camera module for capturing the user image and used a bot in telegram for communication like sending alert messages and receiving commands from the owner.

Keywords: **Door access control through Telegram Bot, Fingerprint recognition, Raspberry Pi; Relay,Web camera module.**

Introduction:

The way of living, the lifestyle of people is changing. security and safety became the most precious things these days. People lookfor comfort in their day-to-day activities andtherefore demand for digitalization is the need of the hour. As a result, automation is the key to a technological era. One of them is video surveillance. Video Surveillance is often done where security must be there, to prevent theft, or else to monitor the work ofemployees. Elderly people, differently-abled people, or kids are most of the time at home,without anyone over to supervise them. Providing security and safety is our major concern here. This paper proposes a" DOOR MONITORING AND SECURITY SYSTEM" ,using face detection, fingerprint recognition, and automated door locks (to open and close the door) using raspberry pi. A data set with the fingerprintsof the permitted people are made and stored.When some face is detected in front of the camera, the frame will be captured as a temporary image file in the face detection part. Next, the user will start accessing the door by using biometrics. Here, fingerprint recognition will be done by comparing the user's fingerprint with the fingerprints stored in the dataset. If a match is found, thatis, the person is been successfully recognized. The signal will be given toraspberry pi, access will be granted and the door will be opened. If there is no match, access will be denied and the door will not open. then comes the second situation now the captured image is sent to the owner through a telegram message and asks for access if granted, the door will open otherwise it remains closed.

This paper will use python inbuilt libraries (Ex: Tele pot) and APIs to implement this. Python is a huge and rich community with proper documentation and works to be used.The proposed work is less costly and affordable to working people for their households. The system is efficient and easyto use

1. Literature Survey

Nowadays people are more concerned about the security of keeping their assets securely. And many people are facing difficulties in securing their assets. So, securing the places became more and more important. Without providing rightful

security to the system, it can be accessed by an Unauthorized Person. As there are various researches done on the door locking systems, such as face recognition systems, Thumb Scanner, Radio Frequency Identification based, and manymore.

There are several ways to make smart door lock systems which are important for securing places like homes, offices, banks, vehicles, etc. In these places possibility of robberies constantly rising. Over the last fewyears research has been done on different types of smart door locking systems consisting of sound alarms, but with the emergence of technologies smart doors nowwork on microcontrollers, sensor-based IoT based Global Positioning Systems, and some technologies like MP lab, GSM, proteus, Iris scanner, biometric locks, a smart card with chip and password, etc. Each one of them hasits pros and cons. In most systems, communication is done through SMS so the system can be cost-efficient and the message will be delivered quickly.

Here, in this paper, we have chosen the mostsecured, reliable smart locking system whichis a biometric door locking system with image capture. We opted for the biometric- based lock technology which is more secure when compared to other locking systems. The gsm-centered thumb locking system scans the fingerprint and provides access to authorized individuals [4]. Then it captures the photograph of the person who is near to the camera, PIR sensor detects if any personis standing in front of the door and it's designed in such a way it will only capture the photograph of the person if he is standing from a certain distance from the door which was stored in the database system. Firstly, the system scans the fingerprint and it will start the process of recognizing the user print which was stored in the database. It minimizes the chance of error in detecting the person [5].

When an unauthorized person tries to enterthe door motion sensor detects the presenceof the person, captures the image, and sends it to the owner through a bot created in telegram API. which can pretty much be secured and reliable. For suppose a person whose fingerprint details are not stored in the database system wants to enter the roomwith the owner's permission, it can be done by the image capture which will beforwarded to the owner through SMS in Telegram. Then the owner can grant access by the open or close command which will beonly available to the owner

2. System setup:

The goal of our project is to get an effective and home automated entrance lock system using, Fingerprint sensor, camera, Raspberry Pi, Telegram bot API, and electronic lock. Human detection is to control the door lock automatically. Humansare tracked in actual time using a frontal face XML file once the human face is detected, then send an instruction to the Raspberry PiBoard to open the Door Lock. These instructions are sent serially from the VisualBasic application.

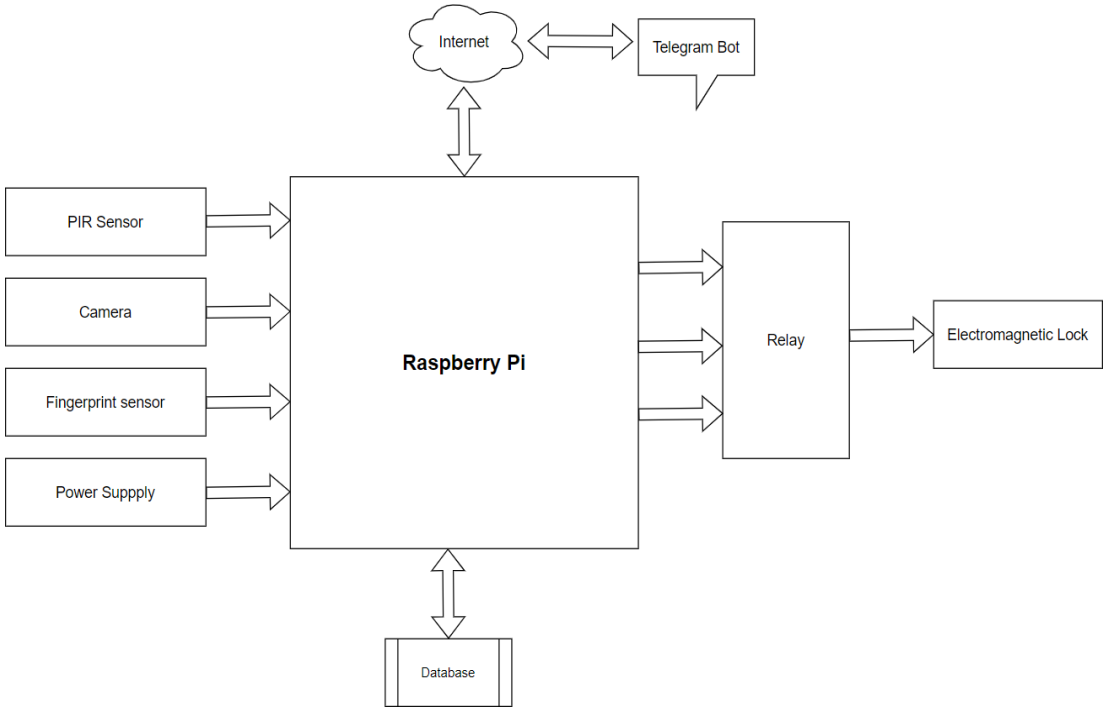

Fig 2.1 Schematic Diagram of Proposed work

3.1 Hardware components used:

3.1.1 Raspberry Pi: As known, the microcontroller is one of the major components for any IoT device as a part of this we selected raspberry pi for this proposed system. As it contains inbuilt Wi-Fi and Bluetooth modules int and has a BCM 2835 SOC processor and contains a 1 GHz clock speed and 512 MB RAM

3.1.2 RELAY: We used an SPDT type relay it operates at twelve volts. It is electrically operated to pass the current through its coil.

The relay would be on when logic 'one' is passed through the port. It is turned off when logic 'zero' is passed through the port.

3.1.3 PIR Sensor: Passive InfraRed sensors,also known as PIR, are often used to detect objects or humans. These sensors are widelyused to sense a person's presence in smart systems like alarms and automated light systems. Here in this case PIR sensor is placed to detect a person who comes near tothe system.

3.1.4 FINGERPRINT SENSOR: Biometric or fingerprint sensors are used to scan,authenticate and recognize the person or individual who is trying to access the system.these sensors replaced the password or pin system as this is more reliable. Here in this system fingerprint sensor is placed to check whether the authorized user is trying to enter the door or not

3.2 Software Requirements:

3.2.1 Python Idle: we used it to do programming as per our requirements. Programming is done in Python language. It is open-source software that makes it easy towrite and upload to the Raspberry Pi.

3.2.2 Telegram Bot API: Telegram Bot APIis a new and advanced opensource feature which is developed by Telegram to create and develop bots in an HTTP interface most easily and efficiently for free

3. Working model in a flow chart:

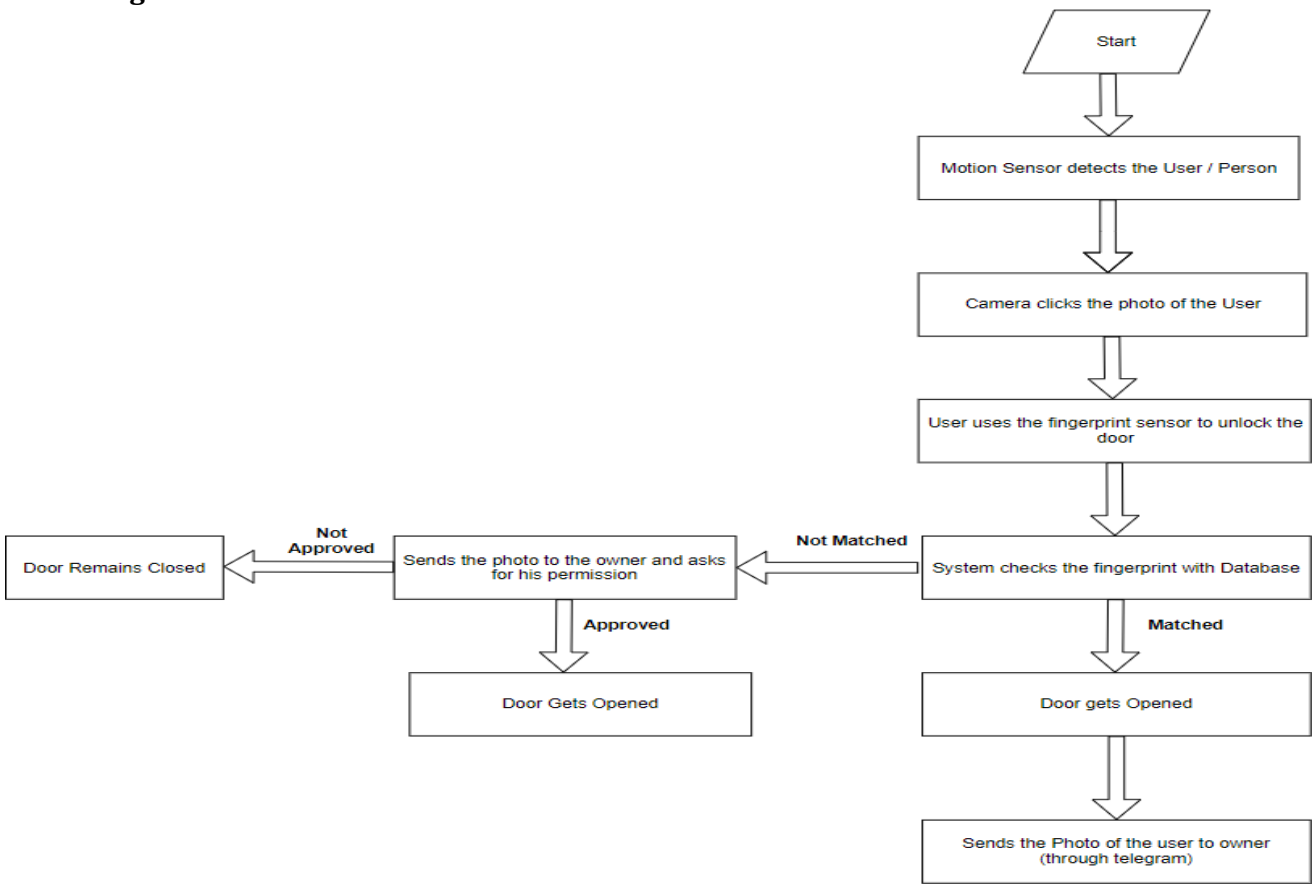

Fig-4.1: Flowchart of the proposed work

5. Result:

So, in this project System consists of mainly two things fingerprint recognition and face capturing.

If anyone tries to open the door using a fingerprint sensor, the system will check whether the fingerprint matches the database. If the fingerprint is matched with the database the door gets open (shown in fig 5.1).

If the fingerprint is not matched with the database, then the system captures theimage and sends the image as a message or notification to the owner (shown in fig 5.2). After the owner checked the message or notification received in the telegram thenthe owner decides whether to give access ornot. If the owner gives access the door gets open otherwise door remains closed.

Figure - 5.1:

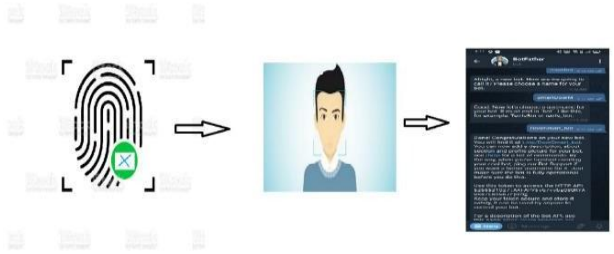

Figure- 5.2:

6. CONCLUSION

Automation is the need of the hour and people look for comfort in their daily lives through different automation and IoT techniques and products. In this paper, we implemented a door unlocking system using fingerprints and Raspberry pi have been used. This Smart Door Unlocking system is designed in such a manner that it is cost- efficient and everyone can afford it. Several issues of common security cameras can be solved using this dual mechanism of automatically closing the door and securing the area. Since this system is small and integrated into the door itself it occupies very less space. When a user/person comes in front of the door the motion sensor detects the user/person and the camera clicks the photo of the user/person. The user/person then uses a fingerprint to unlock the door if the fingerprint used ispresent in the database the door is opened and a picture is sent to the user via telegramand if it does not match with the database thesystem sends a photo to the owner through telegram and ask for permission to open the door. If permission is granted by the owner the door opens and if not it remains closed. This system could help people make their lifeeasier and safer at the same time from intruders.

7. FUTURE WORKS

This project has a lot of scope in the future asit focuses on security and safety and can be installed in all the homes around the world as it is cost-efficient so that everyone can afford it. Over the coming time, AI can also beimplemented with this system to know how many times the door was accessed at what time of the day, and how a user behaves can be recorded with help of AI. This type of technology can further smartly secure our homes and business. If further developed this technology can be used as a mic and a speaker installed at the door and the owner can talk to the user from his place. These aresome of the uses and future works of the smart door unlocking system.

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