Contactless Door Unlock System

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Abstract--- **By using internet of things(IoT),Digital image processing and smartphones, the proposed system provides an automatic system to control and secure home. The proposed system consists of three major modules namely the IoT based hardware components, the Server and the Mobile application. Image of person is captured by Camera interfaced to Raspberry Pi. The captured image is then processed by using Python. A notification is pop-up on Mobile app whenever camera captures image whether he is known or unknown. This allow user to accept or reject person on door.**

Index Terms— **Io, Digital image processing, Raspberry Pi, Ultrasonic sensor, Server**

I. INTRODUCTION

A global infrastructure which has infused smart and intelligent services with security and contributing to easy day to day activities of human can be described as Internet of things. It facilitates communication with things and human beings.Two or more things communicate with each other, the M2M communication is definitely different in Iot as no human interference is present.But they are ought to be controlled to some extent by humans.A wide range of communication technologies have been upgraded to get and offer details about different things. IoT has enabled to communicate by the different mix of appliances for the home and mobile devices. Recently, electronic door locks have been utilized in homes and offices. In many events, by breaking the lock, an intruder has attempted to break in an area.Inside this paper, we now design and impliment a door lock also to improve monitoring and the other security using IoT technologies and change the concept of traditional door locking system.

Now a days the security has become main issue in the society. Nobody's home is safe, and the technologies which are developed for security purpose till now can be easily tackled by the intruders. Therefore, we are trying to develop a home security system using IoT. Till date, Face recognition technology has not been developed using IoT and we will develop an IoT based automated door lock system using face recognition. Development of the system in IoT will make significant change in modern security technologies. The use of micro-controller board will establish simplicity and flexibility in the system. The use of IoT will aid in controlling and monitoring the system remotely. We will also develop a new face recognition algorithm which will take over the disadvantages of algorithms like PCA (principle component analysis) and LDA (linear discriminant analysis).

Security concerns are increasing every day, in every field

of living, be it vehicles, homes or the family members. Focusing on the home security, this paper proposes a system, called as HSDL System i.e. Smart Door Locking and Home Internet of Things i.e. IoT, due to its wide use in the development of new products.

II. LITERATURE SURVEY

Internet of Things is gaining vast focus in the field of technology wherein large numbers of devices are being connected to each other. These devices can communicate with each other over internet in order to transfer data and are finding great usefulness in providing home security too.

The IoT based components sense the motion of the person standing at the door which in turn leads to the capturing of the person's image [1]. This image is sent for processing by the face detection and face recognition sub-modules of the Server. If the face is recognized to be the one belonging to one of the resident of the home, the door gets automatically unlocked. Otherwise the facial image of the person is sent to the owner's Android application from where the owner can take three actions for authorizing the person standing at the door i.e. the owner can press the Accept button, the Reject button or the Buzzer button.

This system comprises of the internet to control the devices and appliances at home or office with the person controlling them from anywhere around the globe. In system proposed in [2], a Raspberry Pi board is used as the platform for monitoring and controlling the door lock. This system proposed consists of a switch for guest monitoring, camera for guest authentication, solenoid actuator for opening of the door and a speaker set for making the system respond. Speakers, switch and camera for interaction with the people are placed at appropriate places at the door In paper [3],AmanPathak and et al have a microcontroller board which is the core of the design, interfacing the smartphone with the door lock for locking or unlocking the same. Door lock is controlled by servo

motors, which is activated by the microcontroller on receiving the command from the communicating device (here smartphone). The opening and closing of the door depends on connection to the hosting server. If no hosting connection is found then it tries to connect to the hosting server. After this facial recognition is done through pie camera via scilab if the person is standing in front of the door. If the face matches with the image present in database, then, microcontroller commands to open the door and notify the user. A Wi-Fi/Bluetooth module is also provided for remotely controlling the door using an android application for this:

Data Sent over the application will be used to give command to microcontroller. In turn microcontroller activates the servo to lock/unlock the door lock.

In [4], three modules have been included namely: Human Detection Module, ZigBee Module and Door lock Module. Initially the visitor of the house is detected by the Human Detection module. Then ZigBee module checks if the visitor has a valid ZigBee tag (ID). If the tag is valid, the Door lock module operates a motor to open the door. If the tag is invalid, the door remains locked. With this system, no cabling is required as it is a wireless system. But ZigBee is short-ranged compared to most other wireless technologies like WiFi.

The suggested method in [5] supplies reinforced protection purposes which may move captured pictures to an individual's cellular apparatus when an invalid user tries that an illegal functioning; it may even send alert information to the mobile device whenever the doorway lock has been badly ruined. The platform empowers an individual lock to automatically increase advantage and liberally manage the door to examine the entry info. Just lately, electronic door locks are widely utilized as a member of their IoT (Web of Matters). Nevertheless, the press has reported doorway locks have been exposed to end users to invade offices and homes. Inside this study is suggested. It employed and is made to increase advantage and safety.

The paper [6] proposes an efficient implementation for IoT (Internet of Things) used for monitoring and controlling the home appliances via World Wide Web. Home automation system uses the portable devices as a user interface. They can communicate with home automation network through an Internet gateway, by means of low power communication protocols like Zigbee, Wi-Fi etc. This project aims at controlling home appliances via Smartphone using Wi-Fi as communication protocol and raspberry pi as server system. The user here will move directly with the system through a web-based interface over the web, whereas home appliances like lights, fan and door lock are remotely controlled through easy website. An extra feature that enhances the facet of protection from fireplace accidents is its capability of sleuthing the smoke in order that within the event of any fireplace, associates an alerting message and an image is sent to Smartphone.

The system proposed in [7] lets the user control his door lock either via Bluetooth or a message over the internet. The proposed security functions allow the user to keep a track of who visited his home and when along with controlling the cases of possible intrusion.

The work proposed in [8] is to send a signal to door from a Tablet or mobile devices by using wireless system. This allows the user to lock and unlock a door from inside or outside a house with a Wi-Fi range available. The ideal purpose of the work is, if the door is not locked in First floor or in any other floor, the user from ground floor they can open the door or unlock the door from mobile phone or Laptop, which makes a person to reduce its energy or save time.

Home security is growing field. To provide security to home, face recognition system can be implemented. A standard UBS camera captures the image to identify the person. It's a prototype that identifies the visitor. If the door recognizes the visitor, it will greet them by name, and the door will be unlocked named opened. If they aren't identified the door will be firmly locked. The system will perform the detection and recognition rapidly in real time. The project [9] utilizes the basic web cam, and the internet connection to create a door that unlocks itself via facial recognition. If the visitor at the door is recognized, the door will be unlocked.

In paper [10] a system is being developed to connect any door with the internet, so that the access control system can be controlled from anywhere in the world. In a case that one is not at home and a vistor is at his door steps then the authorized person will be notified about the visitor via twitter and the person can see the visitor from the web through the camera from anywhere and the system will take a picture of the visitor and keep a record by sending an attachment through E-mail or tweet in twitter. If the authorized person wants to give a message the visitor it can be sent easily through the internet and it will appear in a screen on the front face of the door. The door lock can be controlled through the internet. With the help of this system an evidence of the visitor can be kept as a record if any emergency case or situation occurs.

III. PROPOSED SYSTEM

Camera is interfaced to raspberry Pi module which captures image of person stands in front of door. Ultrasonic sensor detects person's presence in front of door, if person is present then only camera captures image, otherwise camera will be OFF. Image of person is captured by Camera interfaced to Raspberry Pi. Raspberry pi is main controlling unit which controls all activities like

processing of image captured by camera to detect face of person and send this face image on android app via Wi-Fi. Android app is used to display image of intruder and to wirelessly control door of house from far place.
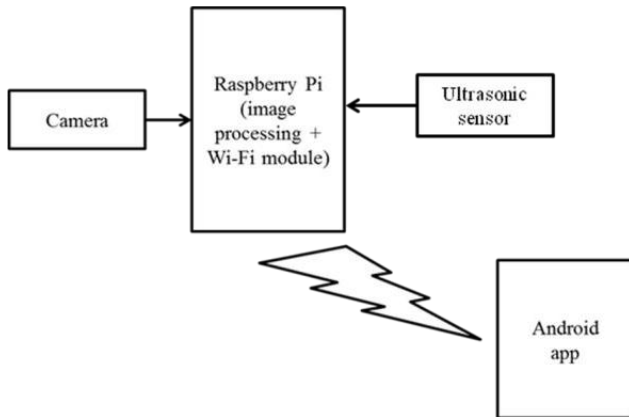

Fig. 1 block diagram of proposed system

A. Face detection:

The captured image is sent to Raspberry Pi in the proposed system which in turn sends it to the based Python. The captured image is processed by the face detection sub-module. Once the face in the captured image is detected, it is cropped and the processed facial image is sent to the Android app.

B. Android App:

The facial image is sent to the Android application. The owner of the house receives a pop-up message on the smart phone. Using the Android application, the owner can see the facial image of the person standing at the door. Android application, along with image viewing capability, also provides two options:

1) *Accept Button:* Owner can press the Accept Button to authorize the person standing at the door to enter the house. This leads to the automatic unlocking of the door.

2) *Reject Button:* Owner can press the Reject Button to unauthorized the person standing at the door. This leads to the door remaining locked.

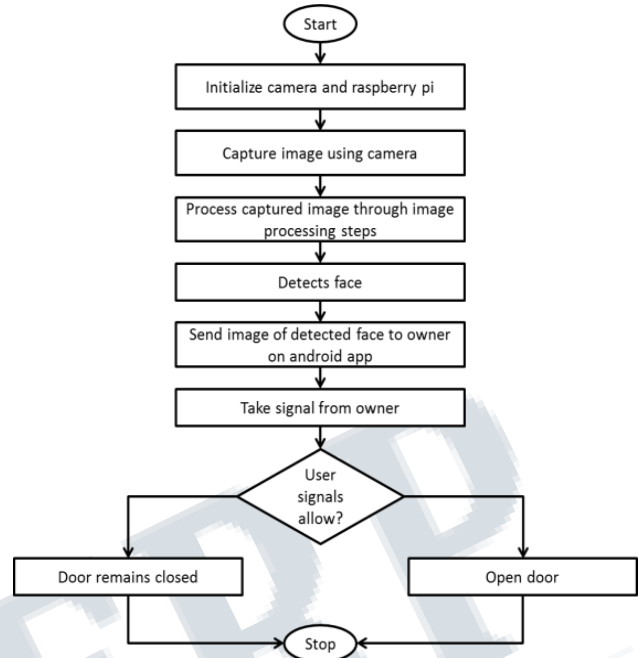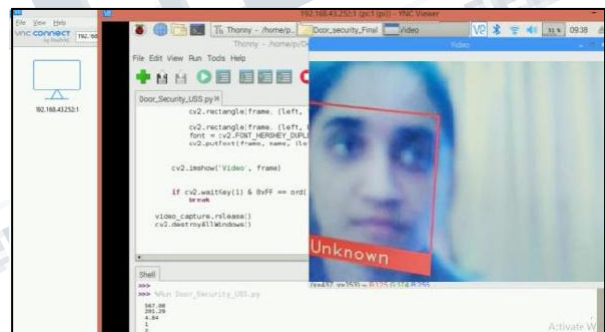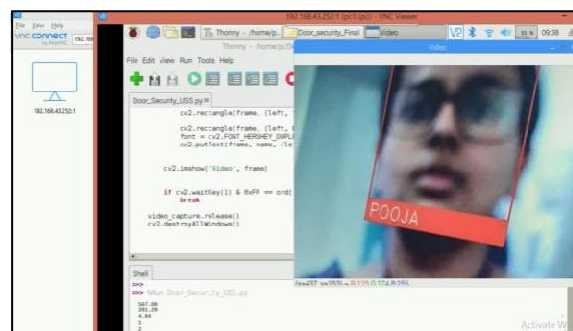Fig 2 shows complete flow of proposed system
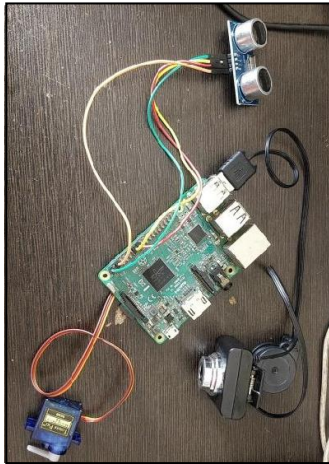

Fig 2 image processing algorithm
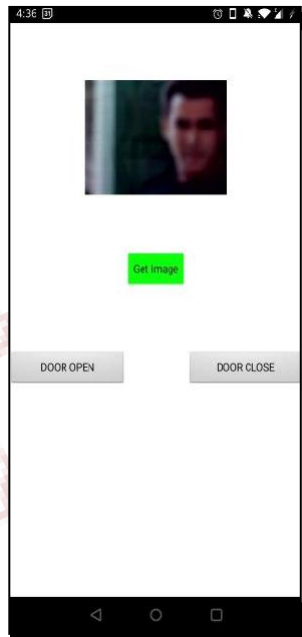
IV. RESULTS

1. The unknown persons face detected.

2. The known persons face detected.

3. The Circuit assembled

4. App screen

V. CONCLUSION

Internet of Things is gaining vast focus in the field of technology wherein large numbers of devices are being connected to each other. These devices can communicate with each other over internet in order to transfer data and are finding great usefulness in providing home security too. Image captured by camera is sent for processing by the face detection and face recognition sub-modules of the Server. The facial image of the person is sent to the owner's Android application from where the owner can take three actions for authorizing the person standing at the door i.e. the owner can press the Accept button or the Reject button. The three domains namely IoT, Digital

Image Processing and Android Platform have been efficiently used to provide Home Security because home is a praised possession in one's life and it is one's prime responsibility to protect it.

It has the ability to leverage existing image acquisition equipment. It can search against static images such as driver's license photographs. It is the only biometric able to operate without user cooperation. A system with combination of face recognition system and IoT should be built to make system more users friendly and secure. In future we can add extra Features like counting the persons inside the specific room, displaying name of person entered. In every light combination, the system is able recognize object face accurately.

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