IoT Contactless Doorbell Security System

PDPM IIITDM JABALPUR

Design and Fabrication Project
End Semester Report

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Problem Statement

We live in the 21st century where everything is preferred to be fast, contactless, and automated. COVID has increased the need for contactless systems even more.

Problems with Traditional Doorbells

- Simple doorbells use push buttons or switches which are not contactless.
- Face detection fails to distinguish between visitors and household members
- Owner cannot control the door lock remotely

User survey:

User	Problems faced	Solution suggested
Beena Sharma Age - 50 Resides with joint family and several people used to visit their house	Family consists of 8 house memberswho often do several ups and downsdue to family business, so she being the housewife has to several times leave her work to open the door.	If any family member arrives, the door should automatically open else Sujata can see via cameraand opens the door fromwherever she is.
Mayank Gohil Age - 25 Just started living alone and mostlystays out of his house	Mayank finds it difficult to keep watch on his house, CCTVs implemented in public areas rarely work therefore he could not rely much on them for security purposes.	24 hrs surveillance feature should be available in his mobile phone, also recording should be available
Ramakant Chaurasia Age - 62 He is albino and lives alone at house	Ramakant needs proper hygiene dueto his disease. Also he needs to keep himself safe from Coronavirus as hisrisk of getting infected is quite high as compared to normal people of hisage.	Contactless doorbell and smart door lock so that he has to touch these things aslittle as possible.

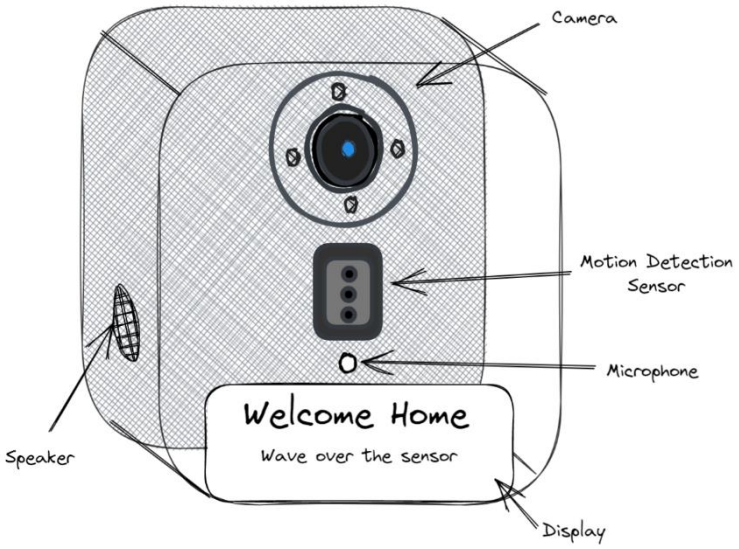
Introduction

We present a contactless doorbell which ensures security, health safety and avoids transmission of corona viruses along with automation in door unlocking without compromising safety of the house and personal belongings

Features of our contactless doorbell security system:

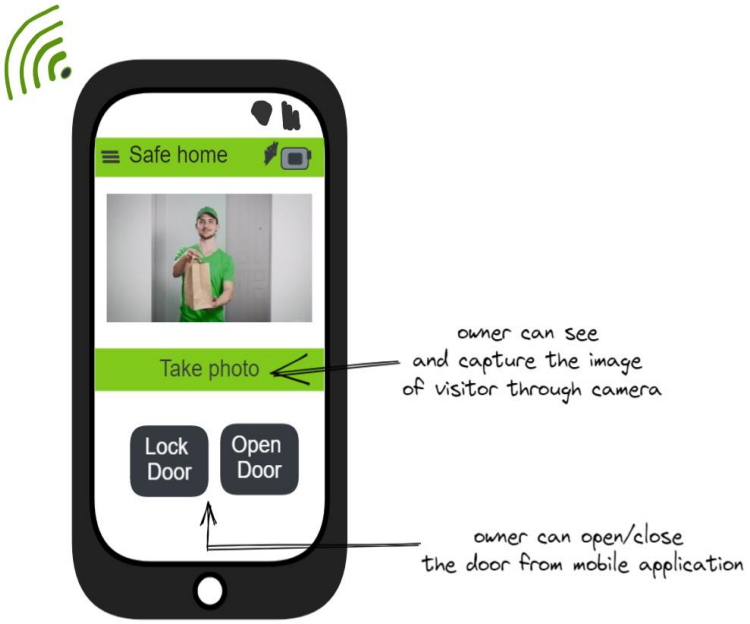
Basic Features:

- Wide Angle view HD camera
- Communication using LCD screen
- Notification and alerts



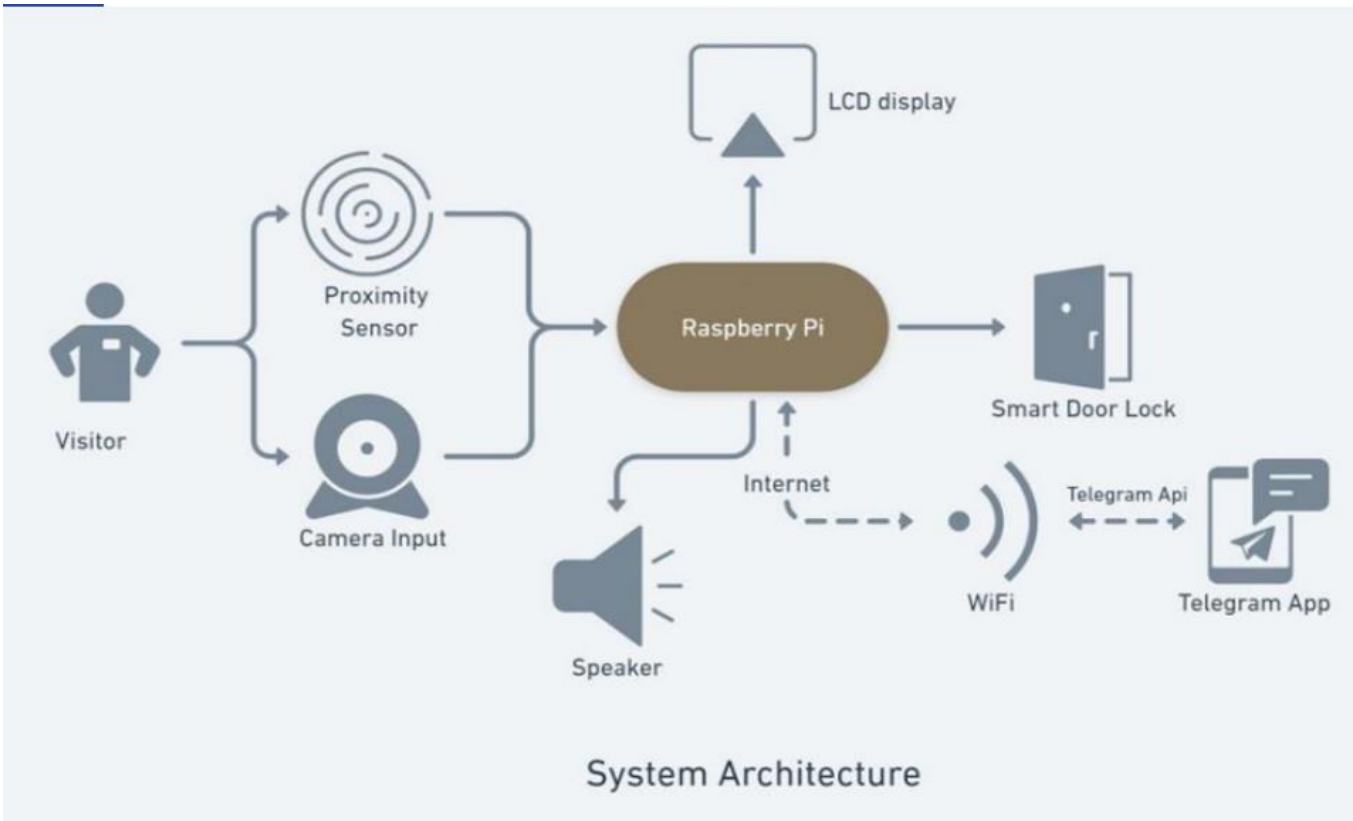
Advanced Features:

- IR-Sensor enabled contactless doorbell
- Face Recognition
- Remote locking and unlocking of door lock
- Storage of logs and files



Flow of events:

System Architecture:

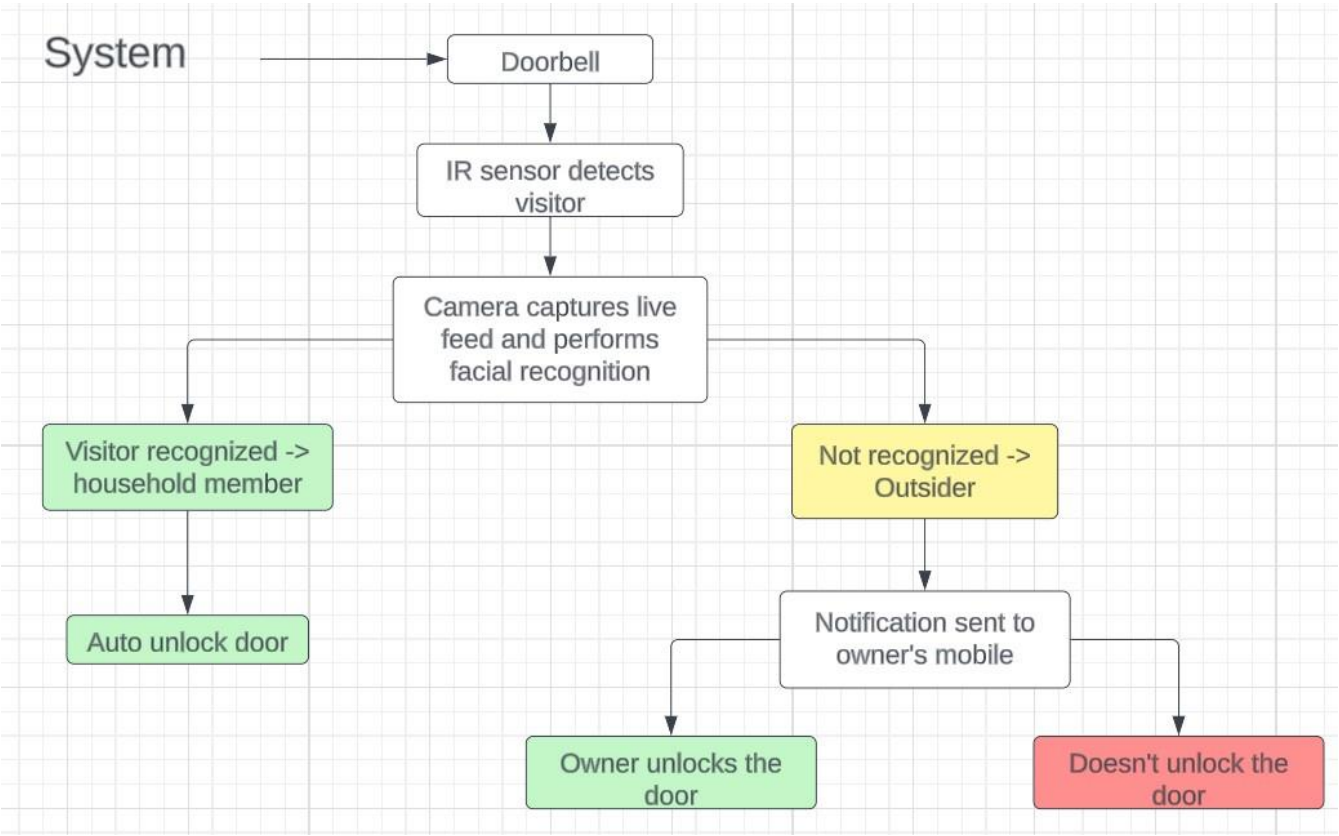


Design Details:

Proposed system

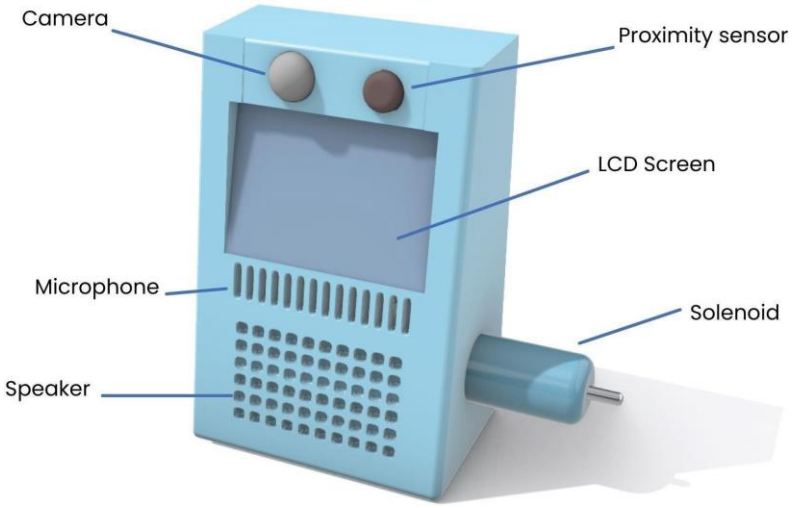
- The system makes use of a Raspberry pi microprocessor to manage the entire working.
- Once the visitor waves in front of the IR-sensor, the camera will be activated.
- The system will perform face recognition, and if recognized the door will unlock automatically. Otherwise, the captured image will be sent to owner's mobile via telegram API.
- The owner has the option whether or not to open the door, and the decision will be shown on the LCD monitor for the visitor to view.

System workflow:



Final Results

1. Product Design



2. Main.py file – the controller:

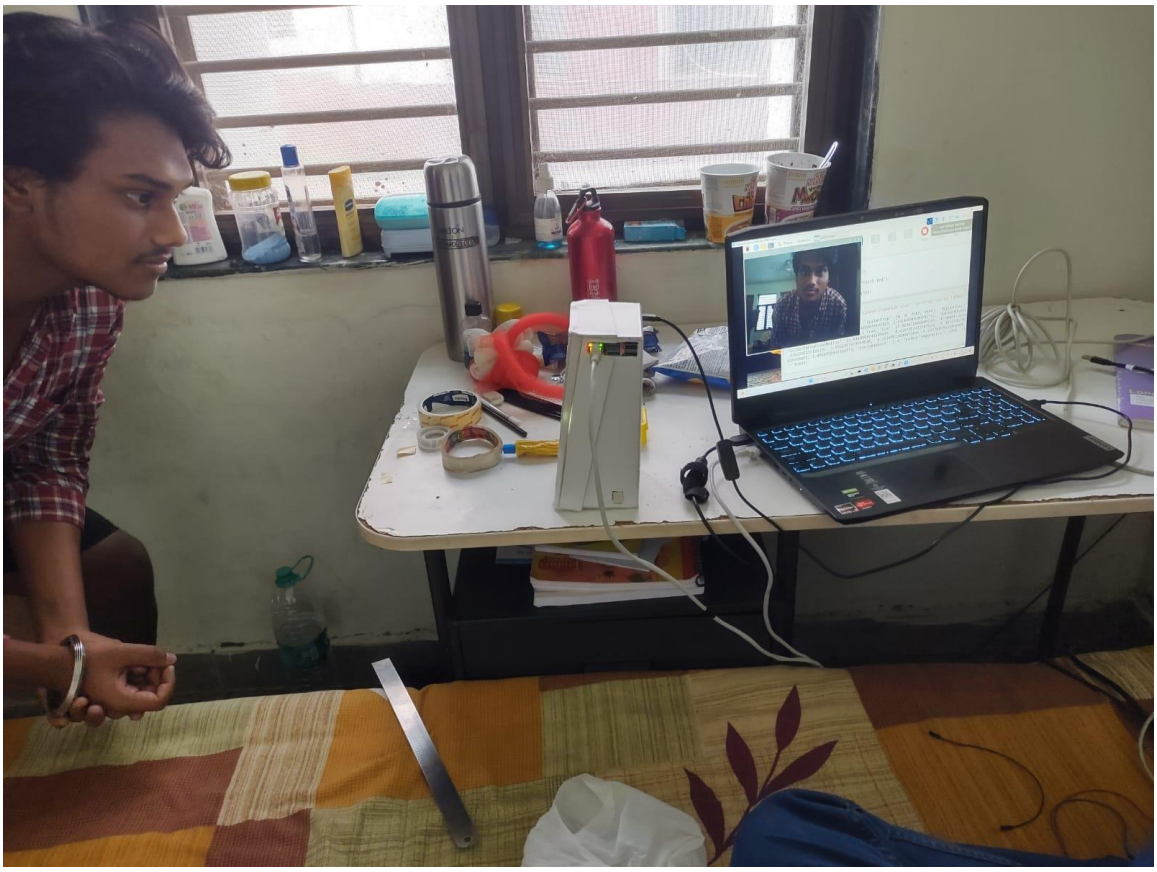
```
import camera  # to import the camera file that we have
import working_telegramBot as T_B
import facerecog as fg
import RPi.GPIO as GPIO
import time
import solenoid as SL
sensor = 16
#Led = 18
GPIO.setmode(GPIO.BOARD)
GPIO.setup(sensor, GPIO.IN)
#GPIO.setup(Led, GPIO.OUT)
#GPIO.output(Led,False)
while True:
    if(GPIO.input(sensor)==True):
        #GPIO.output(Led,True)

        print("Someone is at the Door")

        camera.new_camera()
        time.sleep(1)
        camera.video_function()
        time.sleep(1)
        found = fg.face_rec("test0.jpg")
        if not found:
            T_B.telegram_notify()
        else:
            SL.unlock_solenoid()

        time.sleep(1)

        GPIO.setmode(GPIO.BOARD)
        GPIO.setup(sensor, GPIO.IN)
        #GPIO.setup(Led, GPIO.OUT)
        #GPIO.output(Led,False)


    else:

        #GPIO.output(Led,False)
        print("No One is at the Door")
        time.sleep(1)
```

3. IR sensor - working

When someone comes at the door, they must wave in front of the IR sensor. This will activate the Camera module to take picture and record a video of the Visitor.

4. Camera – working

After capturing the picture of the visitor, the program activates the facial recognition module.

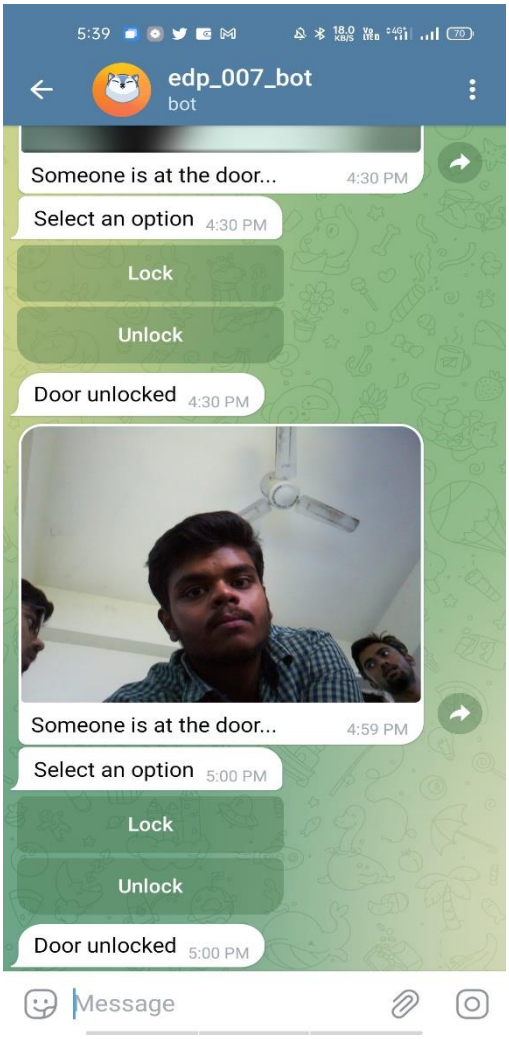


5. Face Recognition – working

When facial recognition module is activated, it checks whether the visitor is a household member or not. If

i. He/She is a household member:- then the door will open automatically.

ii. Not a household member:- it will trigger a notification on the owner's mobile via Telegram API.



6. Telegram Bot – working

After notifying the owner that someone is at the door along with the visitor's captured image, the owner will have the option to choose whether or not to open the door.

7. Solenoid – working

If the owner decides to open the door, it will trigger the solenoid to unlock, and the door will open. After a few seconds the door will close automatically.

8. LCD monitor – working

This module is meant for the visitor. Depending the on the decision the owner makes, whether to unlock the door or not, the LCD monitor will display a message.

iii. Unlocked: **Welcome..!**

iv. Locked: **Access not allowed.**

Novelty

Smart Doorbell systems already exists in today's market with comparable performance as our system. So how do we stand out?

- We have decided of including an AI based model to recognize household members to remove the hassle of opening the door for them. The decision to unlock the door will only be applicable for the people that are not household members.
- The doorbell is completely contactless, hence better.

Completeness

To visualize a bigger picture of our project

Our smart contactless doorbell security system that runs on Raspberry pi provides all functions from basic to advance required for your home safety. From image capturing, contactless doorbell, remote operation to advanced functions like recognition of household members for auto unlocking.

Conclusion

In conclusion, the IoT contactless doorbell security system using Raspberry Pi is an innovative solution that addresses the need for secure and convenient access control. The system's use of IR sensors to detect motion and facial recognition technology to identify authorized users ensures that only authorized individuals are granted access to the premises. The system also sends notifications to the owner when an unauthorized individual attempts to gain entry.

The project's successful implementation proves the viability of using IoT and facial recognition technology for secure access control. The system's ability to recognize faces accurately and quickly open the door for authorized users while providing notifications to the owner when an unauthorized person attempts entry, provides a secure and convenient solution.

Recommendation:

Based on the successful implementation of the IoT contactless doorbell security system using Raspberry Pi, we recommend the following:

Further research and development should be done to improve the system's accuracy and speed of facial recognition.

The system should be integrated with other security measures such as CCTV cameras to enhance the overall security of the premises.

The system's software should be regularly updated to ensure that it remains secure and up-to-date with the latest technologies.

The system should be made accessible to a broader range of users by improving its user interface and making it easier to use.

The system should be tested in different environments to ensure that it can operate efficiently and accurately under different conditions.

Thank You