1. **Project Group ID:** `T.Y CSE_2019_20_TBMP_07`

2. **Title of Project:**Iot Based Smart Door System

3. **Domain:**"Internet of Things"

4. **Whether working in multidisciplinary stream?**NO

5. **Sponsored/Supported By:**NO

6. **Details Guide/Instructor:**

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7. **Name and Designation of external guide:** NO

8. **Details of Team Leader:**

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9. **Abstract (short description):**

This project is about an IOT based smart door security system using face recognition based on Raspberry pi. This security system has been launched for many years but most of them are just a CCTV or door sensor alert system. It could be more efficient with uses of face recognition. The design of security system is based on human face recognition. It will verify the person identity that goes near to the camera within certain distance. Only the people who match the identity with database have the right to entry. Face recognition will only start to function when someone goes near the door within certain distance.

10. **Introduction:**

   In todays world of connectivity and smart devices, there is an urgent need to modify our existing day to day objects and make them smart. To change and modernize any object we need to eliminate its existing drawbacks and add extra functionality. The major drawbacks in a common door lock are that anyone can open a door lock by duplicating the key. So, to simply convert this normal door lock into a smart lock, which can open the door whenever we comes in front of the door. For face recognition, an image will be captured by a camera and processed by Raspberry pi. Then face detection and recognition are performed. Once the face is recognized by the classifier based on a stored image database, the image will be sent to the owner if the image is stored in the database is match then door is open.

Advantages :

1. No need of door keys.

2. Automatic door opening.

3. An indication for unauthorized entry.

4. For handicapped people.

5. Fast and accurate.

Dis-advantages :

1. May not work in power failure.

2. High implementation cost.

11. **Problem statement :**

    Nowadays, the security applications like key lockers, password lockers etc are not enough to protect different areas like homes, hospitals, banks, industries etc. However the smart door security system on market still not popular for household uses because of the high price tag. Besides that, the smart door lock system in market still can be improved to higher security level.

12. **Brief Literature Review :**

    1. **"Smart door for the home automation" written by L.K.Hwang and J.Y.Pyun, in TENCON 2009-2009 IEEE Transactionson Consumer Electronics,Vol.5.**

       This paper deals with the secure automation utilizing IOT for door unlocking system to provide essential security to places and related control operations and security through GSM module. It uses image capturing system technique in embedded system based on raspberry pi server system. From these papers we understand the actual flow of system and after reading this paper we were come to know about flowchart and Architecture of our system.

    2. **http://youtube.be/jqSRzuCAwhY**

       This link consist of video lecture regarding to face recognition. In this video there are some codes are available according to phases. From this site we refer the code of face recognition. Also we understand connectivity of opencv with python.

13. **Objectives :**

The objectives of our system are as follows :

1. To capture image of authorized faces and stores in the database.
2. To authenticate the face with respect to database.
3. To unlock the door on successful authentication.
4. To send notification to owner about unsuccessful authentication.

14. **Methodology :**

The figure.(2) shows the flowchart of our system based on face recognition using raspberry pi. The system can work in different sections, i.e.capturing the image of authorized person and create a database for storing those images and the other section is to capture the image of visitor at the door and use that image for identify and compare the images in the database.

1. Camera module is web camera interfacing to the raspberry pi module. It is capturing an image of the visitor at the door and compare image with the database.
2. When image is taken by the raspberry pi then, it compares this image with images of the database.
3. After comparing two images output is Yes/No then it gives commands to GSM module. GSM module is used to send a message to the authorities after comparison output is Yes or No. If output is Yes then "face will recognizeand door will open" message is sent to the authority person.

The figure.(1) shows the architecture of our system. The actual working of the system starts by capturing the image of the visitor at the door by the camera.

In this the process, the image is detected with the help of some algorithmic process. And that algorithm will check where the detected image is True or False,then on the basis of result raspberry pi starting a process to either lock/open the door.

Architecture consists of three components :

1. Face detection: The face detection is used to find the locations and sizes of all objects. Face-detection algorithms focus on the detection of human faces. The camera will capture the image and then image matches with the image stores in database. Any facial feature changes in the database will invalidate the matching process.
2. Feature extraction : Feature extraction is consisting of segmentation, image rendering and scaling of face are prepared for identification. In this process it will perform some mathematical algorithm on image.
3. Face recognition : Mathematical techniques are used for face identification on the features in the facial area of an image.

The system Structures consists of three phase mainly:

1. **Input phase**

   In this phase when the person comes in front of camera, then the camera will capture the image of that person.

2. **processing phase**

   In this phase the system will check the captured image is of authorized person or not i.e it checks the captured image is present in database or not, accordingly it will gives the instruction to raspberry pi.

3. **output phase**

   output phase according to response raspberry pi kit process the system. If response is TRUE then only system will give door access to that person else it will don't give access to him/her.
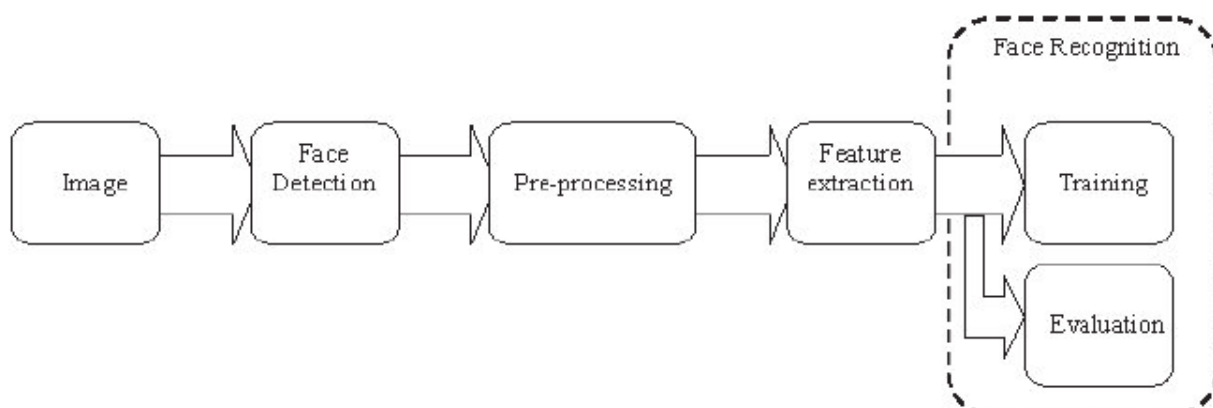
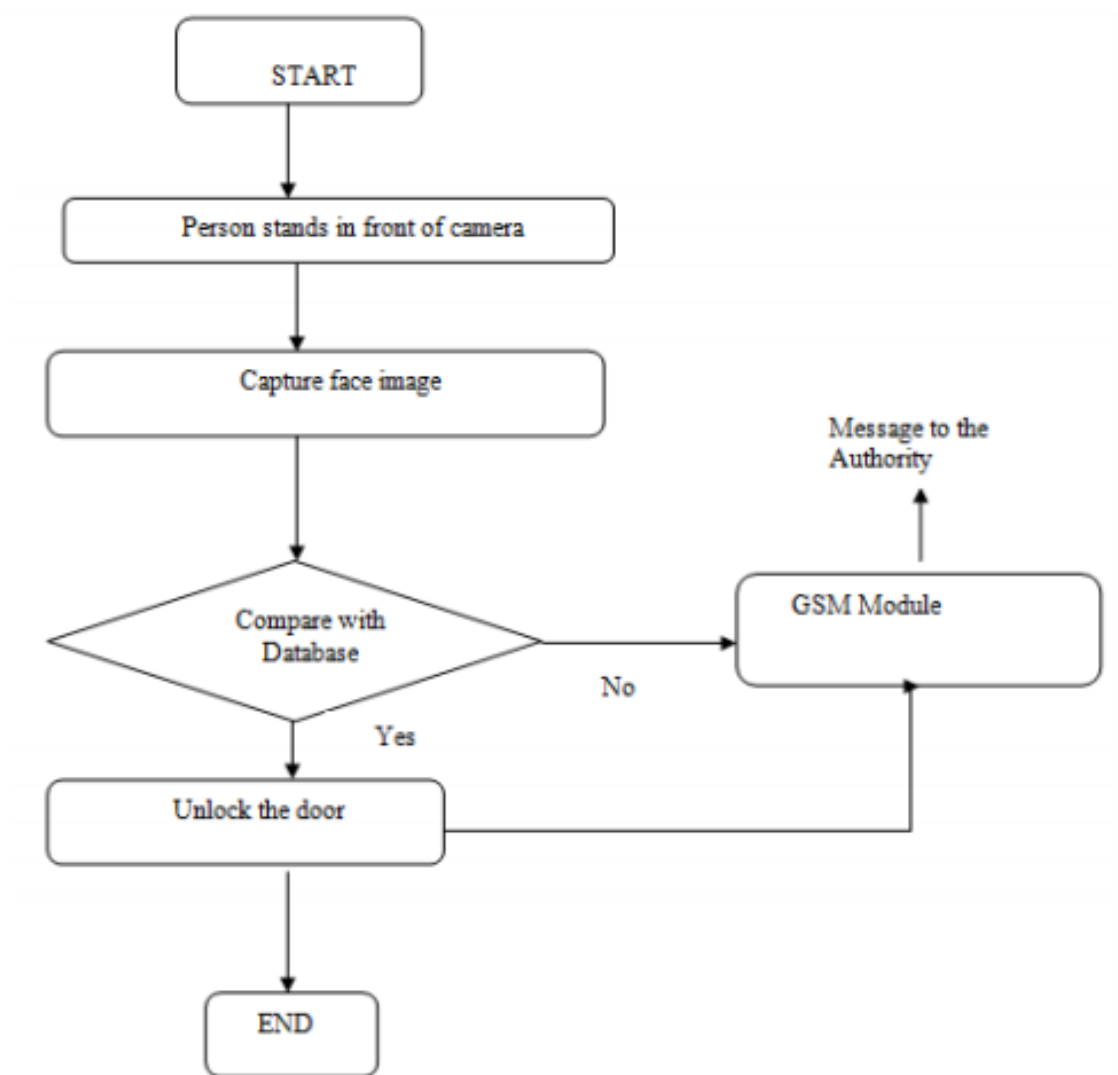**Architecture :**

Figure 1: architecture

Flowchart :

Fig 4: Flowchart of Image capturing and database comparison

Figure 2: flowchart

15. **Requirements :**

15.1 **Hardware requirements :**

1. Raspberry pi3
2. DC motor
3. Jumpers
4. Pi camera
5. connectors

15.2 **Software requirements :**

1. programming language - python
2. visual studio
3. Operating System - windows, linux
4. Putty
5. vnc viewer
5. Advance IP scanner

15.3 **Other requirements :**

1. Internet etc.

16. **References :**

1. L.K.Hwang and J.Y.Pyun,"Smart door for the home automation",in TENCON 2009-2009 IEEE Transactionson Consumer Electronics,Vol.53,2007.

3. http://youtube.be/jqSRzuCAwhY

15. **Project Plan :**

Gannt chart for Project plan

Table 1: Schedule

Month	Project work/Plan
JULY 2019	Planning and Requirement Analysis
AUGUST 2019	Designing
SEPT 2019	Coding
OCT 2019	Project Report

16. **Group Members :**

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Date: 23-10-2019

Place: Ashta

Mr. S .G. Sutar   **Mr. T. S. Ruprah**
GUIDE   **Project Coordinator**

Dr.S. H. Bhandari
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