



# IoT based Smart Security Lock Access Control System using Raspberry Pi

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**Abstract:** This project deals with the idea of secure locking automation utilizing IOT for door unlocking system to provide essential security to our homes, bank lockers and related control operations and security caution through the Raspberry Pi. It uses an image capturing technique in an embedded system based on raspberry pi server system. RPi (Raspberry pi) controls the video camera for catching it for turning on motor for door unlocking. The module contains a secured face recognizer for automatic door unlocking. The camera catches the facial picture and compares it with the image which is stored in the database. If the picture is found in the database then the door lock opens otherwise it will produce a SMS that an unknown person is trying to gain access. Along with SMS an email with unknown person image will be send to the registered email address. If the person know the owner, the owner can control the door by sending email to the system.

**Keywords:** Raspberry Pi, Internet of Things (IoT), Pi camera

## I. Introduction

The Face is regularly utilized biometric to identify individuals. Face recognition has gotten significant consideration from security guard because of human activities found in different uses of security like face tracking, forensic, criminal detection, airport and so on. This was compared with other biometric attributes like, finger print, palm print and so on. They can be taken even without guest information and further can be utilized for security based applications like criminal recognition, airport security, face tracking, forensic and so on. Face recognition consists of capturing the face picture from a from a Pi camera. It will capture the picture of guest and it will compare the picture with stored database pictures. Face biometrics is a difficult field for scientists with different limitations imposed for machine face recognition like varieties in change in light, head presents, look, impediment, maturing and so on. Different aspects were recommended by scientist in defeating. Programmed face recognition algorithms feature extraction and face recognition, face detection. Face recognition algorithms are ordered into two classes as geometric feature based and picture template based. The template based methods compute correlation between one or more model templates and face to find the face identity. Principal component analysis, kernel methods, linear discriminate analysis etc. are used to create face templates. The geometric feature based strategies are utilized to analyze explicit local features and their geometric relations. Multi resolution tools such as ridge lets were found to be useful for analyzing information content of images and found its application in pattern recognition, and computer vision, image processing.

## II. Introduction to IoT

Internet of Things (IoT): It is ordinarily characterized as an organization of actual items. Obviously, that internet is an organization of PCs, yet rather than that internet has advanced into an organization of gadget of all kind and sizes, vehicles, smart phones, home machines, toys, cameras, clinical instruments and industrial systems, animals, individuals, structures, all associated, all conveying and sharing data in view of specified conventions to accomplish smart reorganizations, situating, tracing, safe and control and, surprisingly, individual constant web based checking, and so on. IoT overall gives a dream where things, for example, morning timer, wearable watch, home gadgets become brilliant and alive through communicating, detecting, figuring by installing little gadgets which collaborate remote items or people through network.

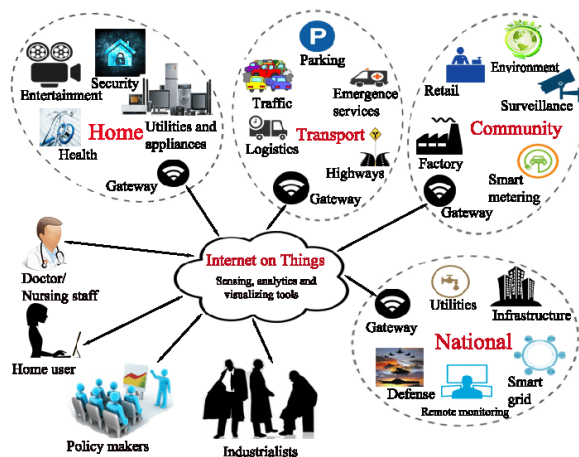


Fig-1: Vision of Internet of Things

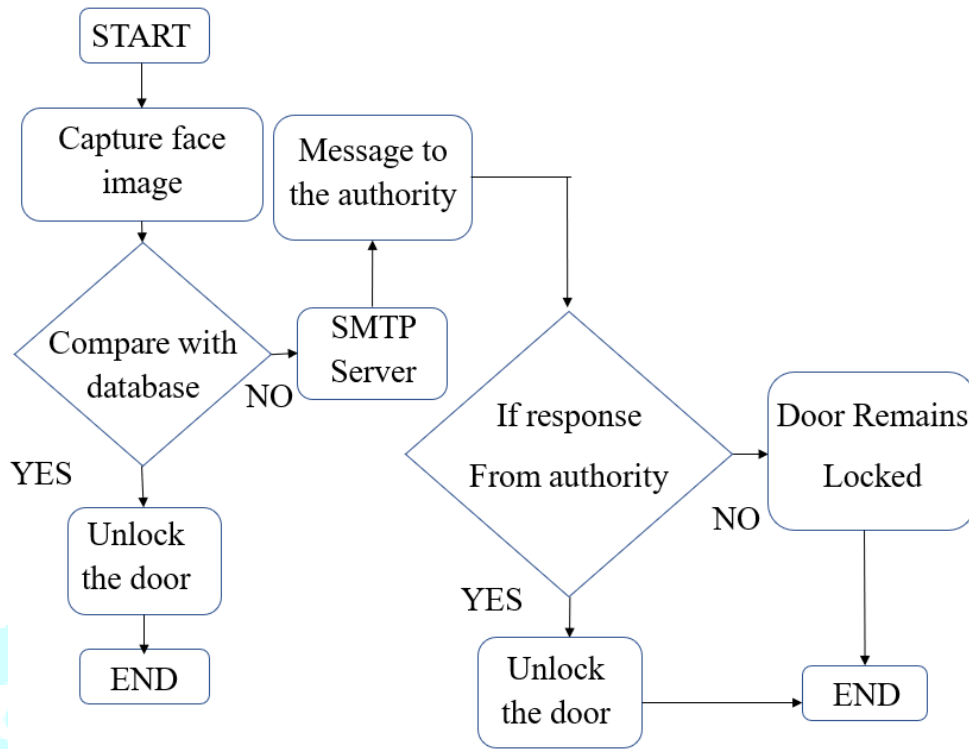
Raspberry Pi can give a web door as it has a quad-center ARM Cortex A7 CPU with a recurrence of 900 MHz and 1 GB LPDDR2 SDRAM. It very well may be made to work as the Internet Gateway Device. Integrating a RPi with other off-the-rack sensors can make an IoT project a lot simpler undertaking. As the web of things requires a microcontroller to handle the information, Wi-Fi joining to pass that information on to the cloud and actuators to control tasks, numerous creative personalities all around the world pick Raspberry Pi for creating IoT projects.



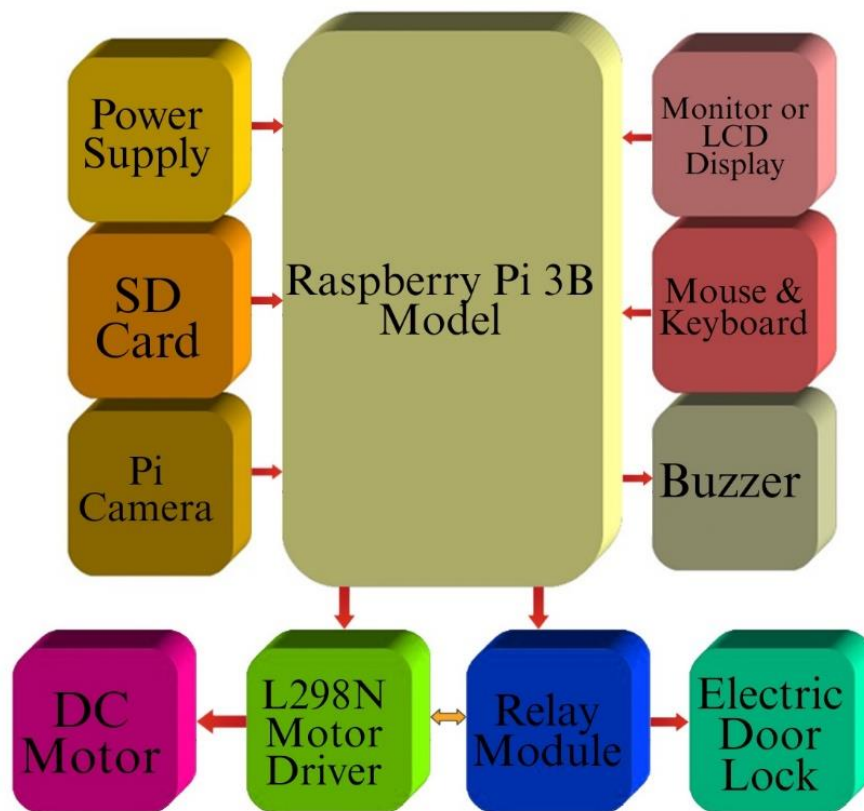
Fig-2: Vision of Internet of Things

Being associated through the Internet of Things - to send, get and frequently follow up on information - brings about many shrewd IoT things that we can use to assemble a safer, advantageous, useful and canny world. As of now, Internet of Things capacities assume a critical part in organizations' advanced change endeavors. Whenever we join IoT information with cutting edge examination and AI - prompting the "Computerized reasoning of Things" - the potential outcomes appear to be inestimable. Get familiar with the essential terms that characterize the Internet of Things and perceive how IoT functions in reality. By utilizing Internet of Things, the communication is stretched out by means of Internet to everything that surround us. In basic words, the Internet of Things is significantly more than machine to machine correspondence, remote sensor organizations, 2G/3G/4G, GSM, GPRS, GPS, Wi-Fi, microcontroller, microchip and so on. The previously mentioned are considered as the empowering innovations that make the "Web of Things" applications conceivable.

### III. MEHODOLOGY



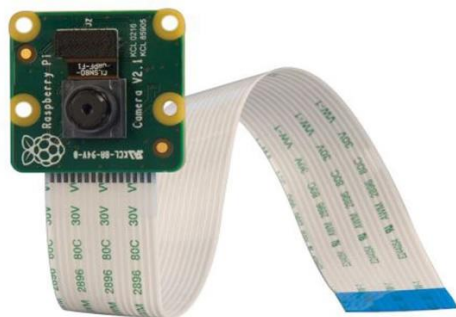
### IV. BLOCK DIAGRAM



- First of all, we have to run the python program named the face\_recognize.py and gmailautomation.py
- Whenever the person stands in front of the Pi camera.
- The Pi camera start recognizing the face of the person then it captures the face of the person that captured image is compared with the

database images.

- If the person's image is already present in the database images, then the comparison is matched the door gets unlocked otherwise the buzzer starts beeping and the captured image is named as helmet.png is sent to the registered email address by SMTP server now the buzzer stops beeping.
- If the person is known by the owner he sends OPEN message to the raspberry Pi, then the door gets open.
- In comparison of pictures, at first it changes color pictures to gray scale pictures and afterward it changes over into pixels for identifying this will partitions the picture into different pieces then it stores the values of every pixel.
- On the off chance that pixels are less, it will be addressed as 0 and pixels which are high will be 1 then it will be organized in 3 x 3 matrix format design for perceiving the new pictures on screen compared to database put away pictures.
- Here are a few distinct varieties of faces that is capture.



**Fig-3: pi camera sensor**

## V. CONCLUSION

In this work, programmed door access system by utilizing face recognition and detected is presented. Programmed face recognition is done by Neural Networks. Raspberry Pi controller controls the door access after successful result from the PC. Prompt reactions from the door and monitor are noticed. The door stays open for endless time and this isn't appropriate for real time. So proper time has to be set in real time environment. This system can be utilized in many spots where need of more security and security can't be compromised.

## VI. REFERENCES

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