

# Smart Door Unlock System Using Face Recognition and machine learning

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*Abstract:- The conventional security system needs an individual to utilize a key, identification (ID) card or password to get to an area like home and work environment. Notwithstanding, the current security system has numerous shortcomings any place it is essentially projected and taken. Most doors are constrained by people with the work of keys, security cards, catchword or example to open the door. The face is one of the simplest method for separating the individual identity of one another. The course of face detection essentially includes two significant cycle detection and acknowledgment. We planned a robotized locking system by execution this component to 12 v solenoid electronic lock and a request to accomplish a higher exactness and effectiveness Face Acknowledgment upheld openCV is raised on the grounds that it utilizes Eigen faces and lessens the size of face images without losing fundamental highlights, facial images for some people can be put away in the database*

*Index Terms— Raspberry pi, Database*

## I. Introduction

Individuals are perceived by their particular facial qualities. In the face recognition approach, a given face is contrasted and the faces put away in the database to identify the individual. The point is to look through out a face in the database, which has the most elevated comparability with the given face. In the field of biological science, face recognition technology is one among the quickest developing fields[1]. The need of face recognition in security systems is credited to the ascent of business interest and thusly the advancement of achievable advancements to help the improvement of face recognition. This is the reason we can't diminish these issues. So change this typical door locking system into a facial recognition empowered brilliant door lock, which we can open the door at whatever point we need, so this execution has come where gadgets can collaborate with the clients and simultaneously confirm the security and keeping them shrewd. To avoid robberies and identity misrepresentation, a face recognition system ought to be laid out. The target of the task is to foster a security the board application upheld by face recognition. Face recognition has

become one of the main client identification methods. To conquer these issues, the system fundamentally involved openCV based face recognition system involving Here classifiers for face. The principal handling component is Raspberry pi[2]. The pi camera is utilized to catch the picture and send it to the approved individual for security purposes. The approved individual can remotely control the lock and open instrument of the door utilizing Wire android application which is unreservedly accessible on Google play store[3].

## II. Literature survey

### 1.Smart Home Automation using Machine Learning Algorithms

This system is associated with the current home wireless networks that contain feeling recognition mode where the system will utilize the associated camera to recognize the client facial appearance and likewise will robotize the fan and light, here various sensors and gadgets are interfaced with input/yield ports on the raspberry Pi. The disadvantage of this system is

that expansion in number of cases (articulations) the precision decline [4].

## 2. IOT Based Door Access Control utilizing Face Recognition

This model contains PIR sensors to identify human and Pi camera that catches picture and ship off distant clients [5]. It clients haar calculation on caught picture involving openCV in raspberry on bases of picture saved in the system. Assuming that the caught face is perceived the door opens and in the other case the caught picture is shipped off the distant client. The client can permit or prevent the entrance from getting door through internet based application [6]. The primary downside of this plan idea is the system doesn't have the foggiest idea how to tackle a contention where more than one individual stands before the door.

## 3. Implementation of Image Processing On Raspberry Pi

This work was simply founded on picture handling with the assistance of a raspberry pi and pi camera. The pi camera module utilized here returned dim and low partition images which made troubles center around a specific district of the got picture[7].

## 4. Face Recognition with GSM Technology and E-Mail Facility

This system contains features that capture Facial expressions and angles are varied along with lighting conditions during enrollment, the system goes inefficient with the person with less lighting conditions or mask encounter in front of camera [8].

## 5. IRIS Scanner Vein Detection Unique Code

This system contains the most accurate and secures technology in the field of biometrics and reliable but the only disadvantage is it has less memory [9].

## 6. Digital Code Lock

This system has highest security and it is more precise, but it has a major drawback of it can't change the password, during power failure system gets off .

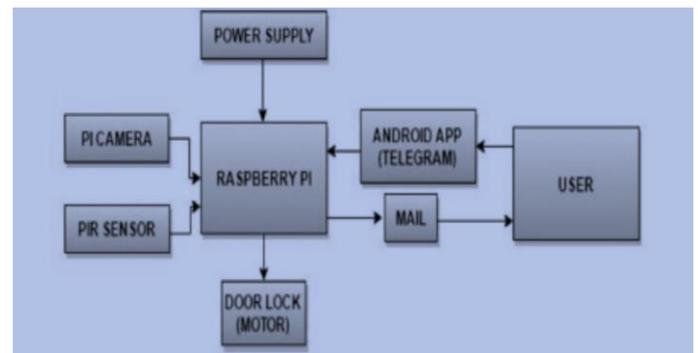
## 7. Implementation of Image Processing On Raspberry Pi

This work was purely based on image processing with the help of a raspberry pi and pi camera. The pi camera module used here returned dark and low separation images which caused

difficulties to focus on a particular region of the obtained image [9].

## III. Proposed Methodology

Raspberry Pi model which runs on a Debian based Linux Operating system called Raspbian. At first, the PIR sensor detects the presence of human at the door. As and when a human is recognized, the Pi camera catches the picture of the individual and sends the picture to the distant client through mail. Haar face recognition calculation is run on the caught picture involving OpenCV in the Raspbian based on the images saved in the system Block Graph will be fundamentally a proof of idea (POC), in this way prerequisite of registering stage and picture catching gadget will be a PC, for comfort. Notwithstanding it, PC provide ongoing client criticism over screen and Graphical UI (GUI). The System's essential information will be picture caught by a PC Camera. This picture information will be handled by a Python based programming application [10]. For preparing the system, we want pre-caught face images and facial component information in the preparation database [11]. This will be coordinated in the product application. The microcontroller board control the computerized solenoid lock. Since the microcontroller board doesn't have on-board USB supporting equipment, we want to utilize a Virtual Sequential Correspondence Port over USB association. Through this Virtual COM port, the product application will provide out order to microcontroller board. Assuming the face is remembered it suggests that an approved individual is pursuing for the door access and thus, the door lock is opened.



**Figure 1:** Block Diagram

If the face isn't perceived, then, at that point, the far off client can check the mail for the picture of the individual attempting

to get to the door and permit or keep the entrance from getting the door through an android application-Telegram. Assuming the client sends "permit" from the Telegram application, the door is opened and assuming the client sends "deny" from the Telegram application, the individual attempting to get to the door is denied from getting to it[12].

## Hardware Requirements

### 1. Microcontroller Board (STM32):

This is STM32F103C8T6 Least System STM32 ARM Center Board. This is a minimal expense Least System Improvement Board for ARM Microcontroller STM32F103C8T6. The microcontroller board control the robotized solenoid lock. Through this Virtual COM port, the product application will provide out order to microcontroller board. With Broadly useful I/O (GPIO) pin, Hand-off driver board will drive solenoid lock, at last permitting or denying access in the confined region to the individual subject to confirmation.

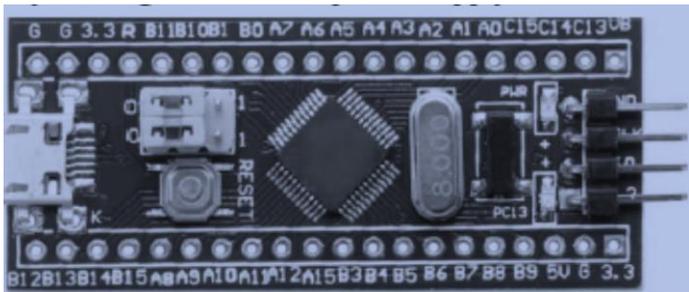


Figure 1: Microcontroller Board

### 2. Relay Driver Board

It is a 5V 1 Channel Transfer. The transfer typically open interface greatest burden: AC 250V/10A, DC 30V/10A. It has a trigger current of 5mA, and working voltage of DC 5V. Each channel of the transfer can be set off by a jumper to set a high or low level. Shortcoming open minded plan, regardless of whether the control line isn't associated, the hand-off won't move. With status marker: power (green), 1-channel hand-off status pointer (red). All module size interfaces can be straightforwardly associated through the terminal block, which is advantageous and viable.



Figure 2: Relay

### 3. DC 12 V Solenoid Lock:

Transfer driver board will drive solenoid lock, in the end permitting or denying access in the confined region to the individual subject to validation. It is consistent, strong, and energy-saving and had a long life expectancy. In the counter robbery and shockproof plan, the lock is superior to different sorts of locks. Subsequent to interfacing the wires and when the flow is free, the electric lock have some control over the door's opening and shutting.

## IV. Experimental Results

The individual with perceived face will gain admittance to the limited region. The exploratory outcomes show two unique cases like in the event that it is a confirmed individual, the door will be opened consequently and on account of unauthenticated individual the door will stay shut. The depiction of the confirmed individual is taken. The caught picture is contrasted and the picture in the database, by separating the eigen face and eigen values. With these highlights the picture is decided to be a confirmed one. When the picture is pronounced to be a verified one, then the door of the system will open naturally. Face recognition system has been created to read up the likely application for computerized door access control.



**Figure 3:** Face recognized output

## V. Conclusion

Smart door unlock system has a lot of uses. Uniquely in limited regions, in workplaces and universities or schools. Significance of Face Recognition System as a Security Arrangement Face is considered as the most preeminent piece of our body. If some other individual comes to the home whose picture isn't put away in the information base that time the picture of the individual will get caught and sends the picture to the approved email. In the event that the other individual known to the proprietor, the proprietor will send an order like "ON" through telegram application to unlock the door. The task is genuine illustration of Raspberry pi and pi camera with Open CV. A face recognition system utilizing Raspberry Pi was created. The system was customized by Python programming language. Both Genuine times face recognition from explicit images, for example put away images. The proficiency of the system was dissected as far as face recognition rate.

References:

1. L. Yang, G. Yang, K. Wang, H. Liu, X. Xi and Y. Yin, "Point Grouping Method for Finger Vein Recognition," in *IEEE Access*, vol. 7, pp. 28185-28195, 2019.

2. V. Poornachander and V. Dhanalaxmi, "Scalable, Opportunistic, Energy Efficient Routing (SOEER) - A Novel Clustering Approach for Wireless Sensor Networks," 2022 International Conference on Applied Artificial Intelligence and Computing (ICAAIC), Salem, India, 2022, pp. 1256-1264, doi: 10.1109/ICAAIC53929.2022.9792656.
3. Jie-Ci Yang et. all An Intelligent Automated Door Control System Based on a Smart Camera (2017) "Comparative Analysis for a Real Time Face Recognition System Using Raspberry Pi" Muhammad Kashif Shaikh, Syed Annas Bin Mazhar.
4. (2017) "Automatic Semantic Face Recognition": Mark S. Nixon University of Southampton Southampton, United Kingdom e-ISSN: 2582-5208
5. (2017) "Real-Time Implementation of face recognition system" by Neel Ramakant Borkar and Sonia Kuwelkar, India
6. Face Detection in Real Time Based on HOG. N. J. Wang, S. C. Chang and P. J. Chou. Taipei, Taiwan: IEEE, DOI:10.1109/ISPACS.2012.6473506, 2012. International
7. Face Detection and Tracking using OpenCV. S.V.Viraktamath, Mukund Katti, Aditya Khatawkar, Pavan Kulkarni. 3, s.l.: SIJ, July-August 2013, The Standard International Journals (The SIJ), Vol. 1, pp. 45-50. ISSN:2321-2403.
8. Vijay Reddy, Madireddy (2020), "A Review on architecture and security issues Cloud Computing Services", Journal For Innovative Development in Pharmaceutical and Technical Science (JIDPTS) Oct-2020, pp 1-4
9. S. Ramana, S. C. Ramu, N. Bhaskar, M. V. R. Murthy and R. K. Reddy, "A Three-Level Gateway protocol for secure M-Commerce Transactions using Encrypted OTP," 2022 International Conference on Applied Artificial Intelligence and Computing (ICAAIC), 2022, pp. 1408-1416, doi: 10.1109/ICAAIC53929.2022.9792908.
10. N.Bhaskar, S.Ramana, & M.V.Ramana Murthy. (2017). Security Tool for Mining Sensor Networks. International Journal of Advanced Research in Science and Engineering, BVC NS CS 2017, 06(01), 16-19. ISSN Number: 2319- 8346
11. Karunakar Pothuganti, (2018) 'A comparative study on position based routing over topology based routing

concerning the position of vehicles in VANET', AIRO International Research Journal Volume XV, ISSN: 2320-3714 April, 2018 UGC Approval Number 63012.

12. K. Pothuganti, B. Sridevi and P. Seshabattar, "IoT and Deep Learning based Smart Greenhouse Disease Prediction," 2021 International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT), 2021, pp. 793-799, doi: 10.1109/RTEICT52294.2021.9573794.

13. I. Ahmad and K. Pothuganti, "Smart Field Monitoring using ToxTrac: A Cyber-Physical System Approach in Agriculture," 2020 International Conference on Smart Electronics and Communication (ICOSEC), 2020, pp. 723-727, doi: 10.1109/ICOSEC49089.2020.9215282.

14. Poornachander Vadicherla, Dhanalakshmi Vadlakonda,"Study on energy efficient routing protocols scheme in heterogeneous wireless sensor networks (network & mobility)", Materials Today: Proceedings, Volume 47, Part 15, 2021, Pages 4955-4958, ISSN 2214-7853, <https://doi.org/10.1016/j.matpr.2021.04.173>.