

Face Recognition Door Lock System Using Raspberry –Pi

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ABSTRACT

In our daily life we are facing so many security issues in every aspect. By using updated technology, we have to resolve these issues. In this project, implemented a face recognition module for security purposes. By using face recognition, it will capture pictures of a person by utilizing the camera and that image is saved in the database of that. The picture is useful for unlocking the door. the lock on the door will be released when the person will stand ahead of the camera, the camera will verify the person's face if it matches the image already stored in the database then only the door will be unlocked. If the system cannot recognize the face, then that time the system will generate a warning message to the user as well as enter password with the help of keypad. Face recognition is one of the most Secured Systems in biometric verification. At this time, going to implement a new technological environment, by seeing the worldwide basis, can see the increasing count of theft and fraud are significantly going on day by day in recent years. So, in this project, implemented new technology and develop the Face recognition Door Lock System using Raspberry pi. Raspberry Pi is smaller and lighter and it uses less power than a computer or a standard-PC for face recognition. So, project can be implemented with the Raspberry Pi module. Raspberry pi is a secured system once data given, cannot modify that data.

Keywords: Raspberry pi, Web Camera, Keypad, Facial Recognition, Solenoid lock.

INTRODUCTION

In this present world many incidents occur like robbery, stealing unwanted entrance happens abruptly. Hence, the security became an important aspect in this lifestyle. People always remain busy in their day- to-day work and also wants to make sure about the safety of their beloved things. Sometimes they seem to forget after their necessary things like keys, wallet, credit cards etc. Without these, they're unable to access their home or anywhere they need. This paper is structured in sections as introduction, background, methodology, testing, results and conclusion. Traditional security system requires the user a key, a security password, an RFID card, or ID card to possess access to the system. However, these security systems have deficiencies; for instance, they will be forgotten or stolen from unauthorized people. As a result, there is a need to develop a better system for higher security. For many years, people are using non-living thing (Like smart cards, plastic cards, PINS, tokens, keys) for authentication and to urge grant access in restricted areas. So, there are chances that one might forget the pins, keys, cards, etc. but in case face recognition is used for the door operating system then there is a hope of providing higher security. Face has many features (like eyes, nose, etc.) which are unique and it can reflect many emotions of a person. There are two sorts of biometric as physiological characteristics (face, fingerprint, finger geometry, hand geometry, palm, iris, ear and voice) and behavioral characteristics (gait, signature and keystroke dynamics). Sometimes your behavioral traits may change due to illness, fear, hunger etc. Face recognition system is secured than the other biometrics. The system has four phases which can be named as face detection, feature extraction, face recognition and door operation. In the face detection, the system must classify between face versus non face region, in feature extraction the features of the face are studied using Local binary pattern (LBP), while in recognition process single face image must be matched with multiple images from the input image. The door operation includes locking and unlocking the door based on the signals from the raspberry pi.

LITERATURE REVIEW

We uncovered a number of publications related to the security framework. [1] introduced a unique face recognition strategy based on Gabor filtering and supervised categorization by the author. The 2D filter bank is utilized to create a 3D robust face for vector average distance in supervised classifier and threshold-based face verification method. This methodology

results in a high facial recognition rate. The author of [2] suggested a face detection technique that is both efficient and effective. The author of [3] presented a mechanism to ensure automotive security. The Arduino-based device captures the image of the individual attempting to start the vehicle. PCA is the face recognition method employed. In [4], the authors employed an Embedded platform that was both innovative and simple to build. They presented an image capturing methodology for a Raspberry Pi -based embedded device. The author's project in [5] was "Raspberry Pi Face Recognition in Treasure Box," which is a wonderful example of how to combine the Raspberry Pi and Pi camera with Open CV's computer vision techniques

SYSTEM ARCHITECTURE

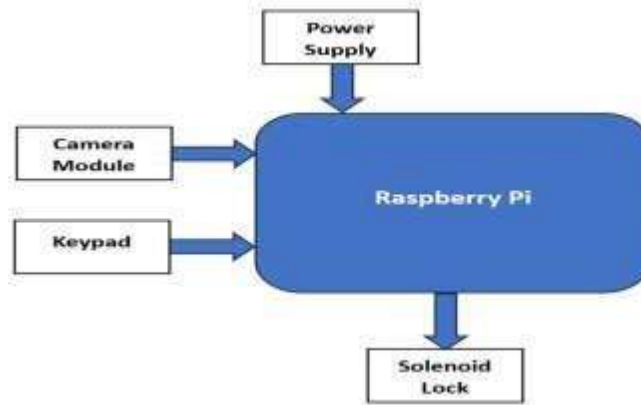


Fig1.Block Diagram of Model

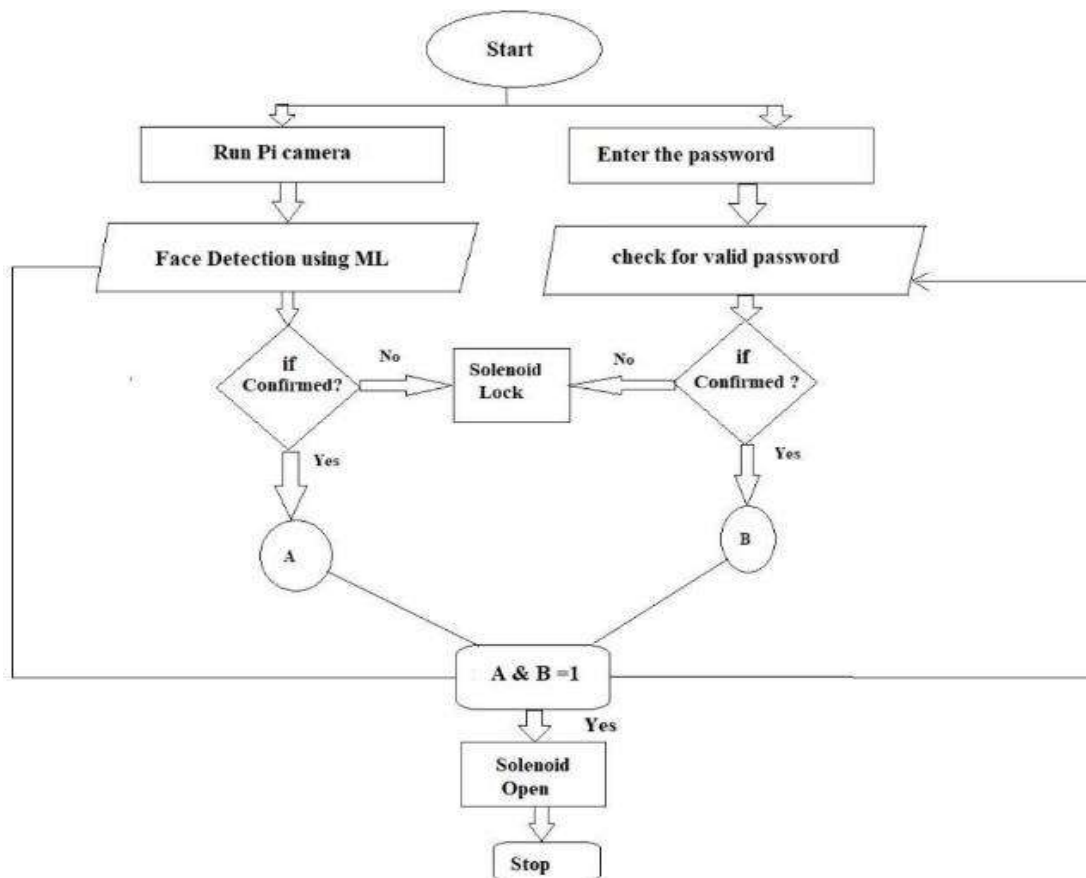


Fig2.Flow Chart

HARDWARE REQUIRMENTS AND IT'S SPECIFICATIONS

S/N	NAME	FIGURE	SPECIFICATIONS
1.	Raspberry-pi 3b+		<ul style="list-style-type: none"> • 1.4GHz 64-bit quad-core ARM Cortex-A53CPU • 1GB RAM (LPDDR2 SDRAM) • 4 x USB 2.0 ports • 300 Mbit/s ethernet • 40 GPIO pins • 5V/2.5A DC via micro-USB or PoE support
2.	Web Camera		<ul style="list-style-type: none"> • Brand Name: Zebion • Frame Rate :30 fps • Still Image Resolution :10 MP • Type of Product: Webcam • Colour: Black & Silver • Digital Zoom :10 X
3.	Matrix Keypad		<ul style="list-style-type: none"> • Function: Momentary action • Contact arrangement: SPST, N.O. • Electrical rating: 50mA, 12VDC • Contact resistance: 100mΩ max • Operating temperature: -25°C to 70°C • 8 pin connectors • Adhesive mounting • Dimensions: 7cm X 7.5cm
4.	Solenoid Lock		<ul style="list-style-type: none"> • Holding force: 0.25 kg • Energized forms: intermittent • Unlocking time: 1s • Dimensions: 54 x 42 x 28 mm (LxWxH) • High quality ultra-compact electric lock
5.	Relay Module		<ul style="list-style-type: none"> • Input/Trigger voltage: 5V • Current consumption: 20mA maximum • AC load voltage: up to 250V • DC load voltage: up to 30V • Load current: up to 10A • Status Indicator LEDs

SOFTWARE DISCRPTION

PYTHON be an interpreter, object-oriented, high- level programming language with active semantics. Its high-level build in data structures, collective with dynamic typing and dynamic binding, make it very prominent for Rapid Application

Development, in addition to for use as a scripting or glue language to connect existing components mutually Python's simple, easy to learn syntax emphasize readability and consequently reduces the cost of program maintenance. Debugging Python programs be easy: a bug or bad input will never cause a segmentation mistake. In its place, while the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a heap trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping from side to side the code a line at a time, and so on. The debugger is written in python itself, testify to Python's introspective power. On the other hand, often the quickest way to clear up a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple move towards very effective. Python is uncomplicated to learn.

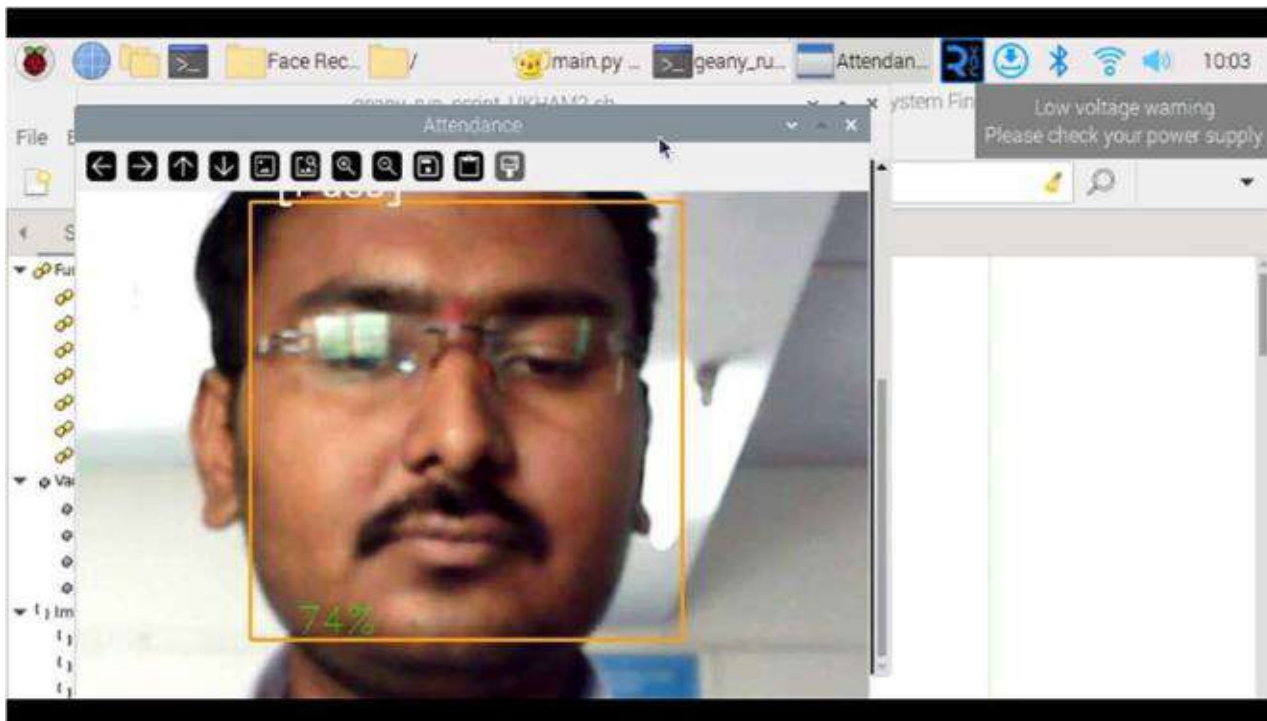
WORKING

In order to overcome from the existing system, we are providing the standard security level face recognition is used in this project along with buzzer. Face recognition is biometric device. And all the process will be carried out by the raspberry pi 3b+. The secret knocking pattern comprises of Raspberry pi, camera, buzzer and uses a secret knocking pattern which can be viewed only by owner for security purpose. The secret knocking pattern is observed by piezo-electric and at same person face is also detected through camera if knocking pattern and face detection matches the door will unlock and if any misread pattern or unknown person tries to enter a buzzer will alarm to indicate alert sound as well as enter password and open door.

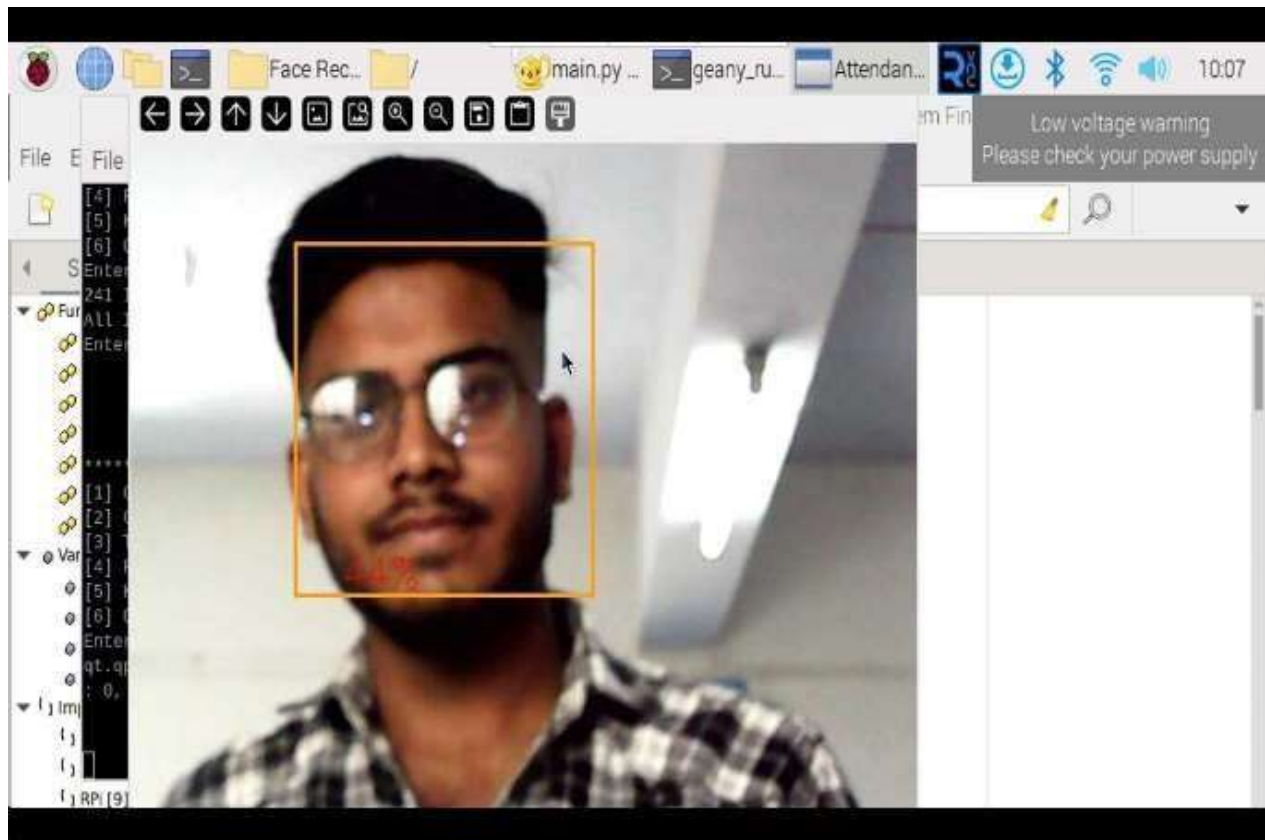
FUTURE SCOPE

1. The Face Recognition Lock Door Lock System using Raspberry Pi is a cutting-edge security solution designed to enhance access control in residential or commercial settings.
2. This system combines two secure authentication methods for door entry. First, it utilizes facial recognition technology to grant access to authorized individuals, ensuring seamless and convenient entry.
3. Additionally, a keypad lock is integrated for those who prefer or require a traditional PIN-based entry method. Users can easily switch between these two methods based on their preference or security needs.
4. The Raspberry Pi serves as the central processing unit, managing access permissions and logging entry data. This system offers flexibility, convenience, and heightened security for any environment

RESULT



A.Face Recognition Output- Authorized Access



B. Face Recognition Output- Unauthorized Access

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