



Project Report on:

Enlightening Wisdom

Image Processing (Face Recognition) Based Door Lock

Submitted to: Prof. Pawan K Gupta

PROJECT PRESENTATION OUTLINE



•Abstract •Limitations and Conclusion

Introduction

Objective

Survey of Existing Systems

•Requirement Analysis

Solution Proposed

Models and Diagrams

ABSTRACT



Authentication is one of the significant issues in the era of the information system. Among other things, human face recognition (HFR) is one of the known techniques which can be used for user authentication. As an important branch of biometric verification, HFR has been widely used in many applications, such as video monitoring/surveillance system, human-computer interaction. This project proposes a method for automatic door access system using face recognition technique by using python programming and from OpenCV library Haar cascade method. Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones. Automatic notification has been achieved by sending security alert mail to the user app. This proposed system is more effective, reliable, and this system consumes very less data and power compared to the other existing systems.

INTRODUCTION



In today's world of connectivity and smart devices there is an urgent need to modify our existing day to day objects and make them smart, also it is not the era when we can blindly trust the old and conventional security measures, specifically speaking is our door locks.

To change and modernize any object we need to eliminate its existing drawbacks and add extra functionality.

Face detection is more challenging because of some unstable characteristics, for example, glasses and beard will impact the detecting effectiveness.

Moreover, different kinds and angles of lighting will make detecting face generate uneven brightness on the face, which will have an influence on the detection process.

An intensive study of OpenCV platform and its inbuilt libraries has been conducted to generate a code, which does correct and reliable facial recognition with new and efficient use of hardware.

This proposed system also acts as a home security system for both Person detection and provide security for door access control by using facial recognition for the home environment.

OBJECTIVE



- •To detect the face of an individual so that system could verify the identity.
- •To store a database of faces that can be identified by the system with the help of a camera.
- •To verify whether the face present on the camera actually matches the face that is already processed into the system.
- •To indicate a sign of negation or affirmation when the face readings are taken as an input by the computer.
- •To set up a camera in an angle such that the individual entering the premises can be clearly observed.
- •To implement a more reliable way in door lock system.
- •To eliminate intrusion threats by making the user aware about them.
- •To provide hassle-free and user-friendly way to access the door.

Survey of Existing Systems



- •Studies by Somjit Nath, Paramita Banerjee proposed "Arduino Based Door Unlocking System with Real Time Control". This approach implemented with RFID codes to scan for unlocking the door. So when a person wants to enter the door he needs to scan the card then he gains access to that door. If he misplaces that card he cannot access through that door and there is a chance of insecurity that anyone can access to the door.
- •Studies by Charoen Vongchumyen, Pakorn Watanachaturaporn, pattaya proposed "Door locking system via web application". In this approach, a web application is designed to monitor the door. There is a drawback in this system: when someone hacked and got security code then hackers can easily access to that room.
- •Study by Suchit Shavi proposed "Secured Room Access Module". In this approach a keyboard based door unlocking system is implemented with a micro controller. So the user needs to enter his password to unlock the door. In this approach is secured when compared to the previous models and well used in today's world. Even though this system is secured there might be a drawback: If someone observes your password, they can gain access to that door by using the same password you have entered.
- •Study by Muhammad Kashif Shaikh, Syedannas Bin Mazhar proposed "Comparative Analysis for a Real Time Face Recognition System Using Raspberry Pi". This approach did an analysis of various algorithms on the face recognition system. This analysis took LBPH (Local Binary Pattern Histogram), Fisher Faces, Eigen Faces Algorithms for comparison and checked with different processors to know time complexity and accuracy of various algorithms. This approach is most secured and without matching face no one can access that door.

REQUIREMENT ANALYSIS



Functional Requirements

The lines are mapped from the face which are a result of determination of pixels which would be a part of the right and left lines of the structure of eyes.

A way which would help to reduce security problems as lesser chances of robbery would take place.

A method which would combine for the concept of facial recognition through a hardware.

Software Requirements

- Jetbrains by Pycharm community edition 2019.2.1
- •Python 3.7.4
- OpenCV
- •Important packages such as Matplotlib
- Pillow
- •Pip
- Numpy
- Opency-python
- PyBundle
- •Kiwisolver and many more library packages.
- MQTT Dashboard



Hardware Requirements

- •Intel Core i3 or above
- •Windows 10
- •RAM 4 GB or above
- •Memory 500 GB or above
- Servo Motor
- Circuit Board
- •Wifi Aurdino
- Transformer

SOLUTION PROPOSED



- •There is plethora of methods for face detection and recognition, in this paper face detection is done based on haar features and face recognition is done based on local binary pattern histogram using OpenCV library.
 - A. Detecting Faces
 - B. Recognize Face
- •We will use MMOD (Deep Learning) algorithm to find face bounding boxes
- •We will find facial landmark points (like eyes, nose, etc.)
- •We will use the points to realign the face crops so that it is frontal.
- •We will use a Deep Learning model to calculate embeddings from the face crop.

These embeddings are 128-dimensional vectors. Their nature is such that the same faces will end up closer to each other while different faces will end up far apart.

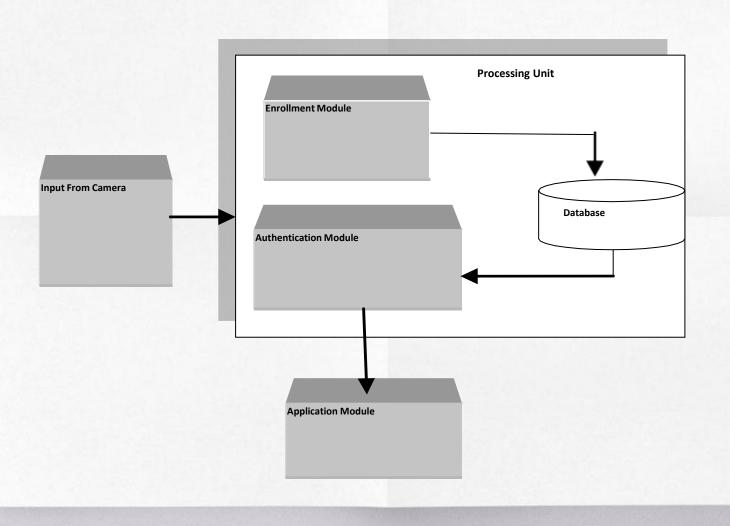
Also, we will use Dlib face detector in place of OpenCV.

Then we can use Pre-trained model like from Facenet, to extract the feature from the face and create embedding for each unique face and assign a name to it. Both Dlib and Facenet score well on accuracy meter.

MODELS & BOUNDARY OF THE PROPERTY OF THE PROPE

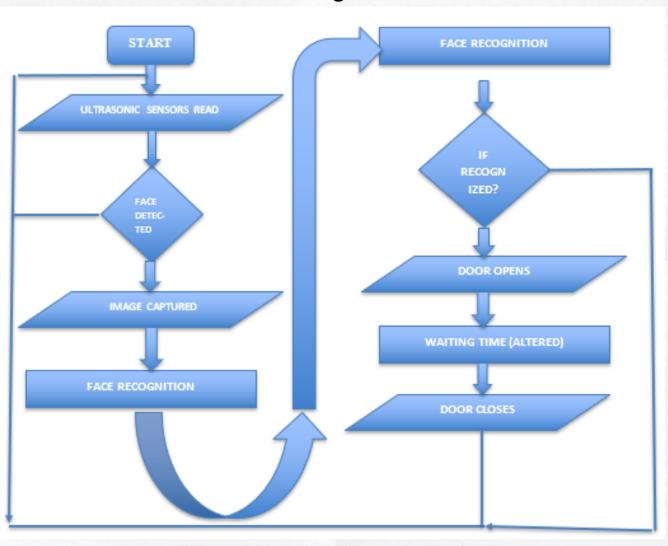


Block Diagram





Flow Diagram



LIMITATIONS & Conclusion



Limitations

- •It provides less security as there might be issue in recognizing similar faces.
- •Every time password entering required for unlocking Micro controller cannot interface high power devices directly.

Conclusion

- •In this proposed door access system by using face recognition the images are stored in a data base.
- •This system is used door lock access for Residential and Commercial Purposes. Here we have designed a highly secured door locking system by using Python, OpenCV.
- •This system has been used with home door lock access control based on face recognition method by verifying enrolled facial images. Concern persons will be informed successfully about the person detection via e-mail alert generations along with details attached.
- •Face recognition is one of the several techniques for recognizing people. There are several methods that can be used for that purpose. Some of the most common is using eigenfaces. Though there are other new techniques more simple to understand the use and implement but also with very good performance.

ACKNOWLEDGEMENT



We would like to thanks to our Professor, Mr. Pawan K Gupta under his support and guidance we are able to make our project "Image Processing (Face Recognition) Based Door Lock"

We hope that we have been able to fulfill the instructions expected from us and also special thanks for the group members

BIBLIOGRAPHY

- (2017) "Comparative Analysis for a Real Time Face Recognition System Using Raspberry Pi" Muhammad Kashif Shaikh, Syed Annas Bin Mazhar.
- (2017)"Secured Room Access Module" Suchit Shavi.
- (2017) "Automatic Semantic Face Recognition": Mark S. Nixon University of Southampton Southampton, United Kingdom
- (2017) "Real-Time Implementation of face recognition system" by Neel Ramakant Borkar and Sonia Kuwelkar,

India

- (2017) "IoT based Home security through Digital Image Process Algorithms" by A. Beatrice, Dr S. Britto Ramesh Kumar and J. Jerlin Sharmila, India
- (2017) "Secured Room Access Module" by Suchit and Shanvi, India
- (2017) "Door locking system via web application" Charoen Vongchumyen, Watjanapong Kasemsiri, Kiatnarong Tongprasert, Aranya Walairacht, Pattaya.
- (2016) "Arduino Based Door Unlocking System with RealTime Control" Somjit Nath, Paramita Banerjee, Rathindra Nath, Biswas, Swarup Kumar, Mitra
- (2014) K.Gopalakrishnan, V.Sathish Kumar "embedded image capturing system using the raspberry pi system" international Journal.
- (2014) "Development of Intelligent Automatic Door System" Daiki Nishida, Kumiko Tsuzura1, Shunsuke Kudoh1, Kazuo Takai, Tatsuhiro Momodori.
- (2012) "Face Recognition Based on Magnetic Door Lock System Using Microcontroller" Harnani Hassan, Raudah, Abu Bakar Ahmad Faculty of Electrical Engineering.
- (2005) "Real-time Embedded Face Recognition for Smart Home" by F. Zuo and P. H. N. de.
- (2000) "Automatic Door Opener" Pik-Yiu Chan, John D. Enderle.

PRESENTATION BY





Raksha Sankhala (0827IT161086)

Saquib Qureshi (0827IT161098)

Saiel Wadwekar (0827IT161094)

Yashasvi Sharma (0827IT161121)

Yashraj Sharma (0827IT161122)

Yuvraj Singh Panwar (0827IT161123)

