RESEARCH

Smart Door Locking System Using Fingerprint and Face Detection

Kunal Patil, Aditya Jadhav, Avin D'souza
Department of Information Technology, Don Bosco Institute of Technology, Mumbai - 400070

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Abstract

The Smart Door System with Face Recognition and Fingerprint Authentication combines cutting-edge biometric technologies to provide a secure and user-friendly access control solution for both residential and commercial settings. By utilizing advanced computer vision and deep learning algorithms, the system accurately identifies individuals based on their facial features, offering a touchless and rapid entry experience while resisting spoofing attempts. Additionally, the integration of fingerprint authentication enhances security by employing a well-established biometric method known for its precision and reliability. The system can be seamlessly integrated into existing security infrastructure and remotely managed via a web-based interface, allowing users to grant access permissions, monitor entry logs, and receive real-time alerts for unauthorized attempts. Overall, the Smart Door System offers a convenient, secure, and adaptable solution for access management in various environments.

Algorithm

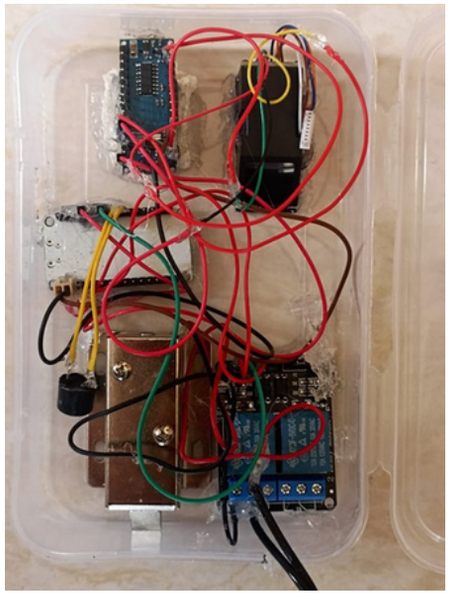
1.Haar Cascade:
Haar Cascade classifiers are an effective way for object detection. This method was proposed by Paul Viola and Michael Jones in their paper Rapid Object Detection using a Boosted Cascade of Simple Features. Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier.

• Positive images – These images contain the images which we want our classifier to identify.

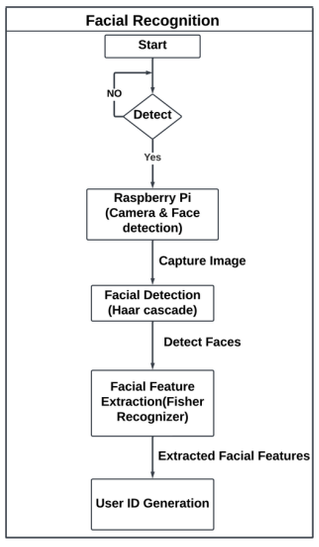
• Negative Images – Images of everything else, which do not contain the object we want to detect.

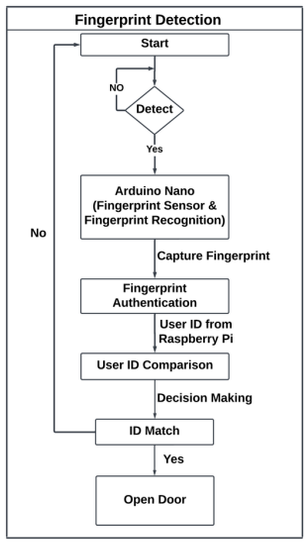
2.FisherFaces:
FisherFaces is an improvement over EigenFaces and uses Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA).
The general steps involved in face recognition are:
Capturing
Feature extraction
Comparison
Match/non-match

Prototype Model

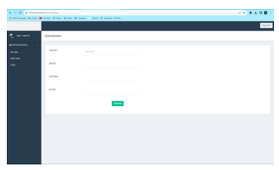


Architecture

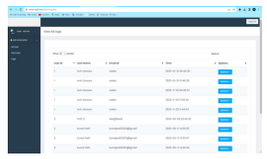




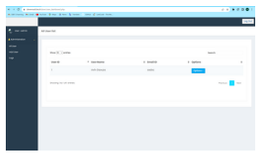
Results



Add user Page:
To add a new user to unlock the lock the door, the admin has to create a new user ID and add user details. After assigning the user ID the face and finger can be scanned and stored.



Logs Page:
This page displays the users which have opened the lock at the given time and date so the admin can keep a track about the users and the lockers.



User List Page:
This page displays all the user who have registered and can open the lock. The admin can delete the registered user ID from this page and then he can create a new user on the same User ID.

References

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