

Introduction

Due to the ongoing global pandemic crisis biometric attendance systems have been prohibited as they are considered as critical transmitter of virus/bacteria and Common surface (fingerprint reader) is touched by all employees; leading to ban on its usage by Corporates, including Government. Hence, most organizations have moved back to manual attendance, which is error prone and difficult to manage specially for medium and large sized organizations.

So there was need for reform in the existing authentication system where contact free authentication can take place. So we came with an innovative idea which was actually not new but a revolutionary idea for the reform of authentication.

This authentication system is the perfect example for the touchless authentication without using manual entries. This system is automated attendance system based on facial recognition which uses AI based computer vision to capture and recognize the face of an employee.

Features

There are various benefits of the authentication system but the basic and the foremost feature is that it follows the rules of social distancing and it is completely contactless

In this authentication system the entries of the persons are backed up at 3 different places firstly in the machine itself where it is implemented second on the mail id from where the record is sent and lastly the mail where the data is send so the data recovery is possible and easy if any one of the three crashes.

It is one time installation where a Raspberry Pi 3 or Pi 4 is installed in the premises or similar device can be used to implement the program

The facial recognition model is completely trained and training images are saved in the machine itself so for recording attendance it does not requires internet connection every time it can record the attendance without it

Tools Used

The following tools are used for developing the system

Python: To develop an application for any sort of machine there is always need for a programming language. In this project we used the python programming language as the language because of its versatile nature and easy for implementation and support to various modules.

Haar Cascade: Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, “Rapid Object Detection using a Boosted Cascade of Simple Features” in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.

SMTP: SMTP stands for Simple Mail Transfer Protocol. It is a program used for sending messages to other computer users based on e-mail addresses. The main purpose of SMTP is

used to set up communication rules between servers. The servers have a way of identifying themselves and announcing what kind of communication they are trying to perform. They also have a way of handling the errors such as incorrect email address

Uses of Application

This system is basically designed to train itself for the faces of the employees which are working in an organization then it uses that training to detect the faces of the employees to register their attendance and then store them in database as well as CSV files and one more functionality is added to the system to mail the data to admin panel of the organization so that they have a digital record of their presence.

Advantages

This system comes with various packed advantages like it is easy to install and use the biggest advantage is that it uses a contactless way to register the attendance of the employees and it deprecate the primitive way of registering attendance.

Second advantage is that it does not requires any internet connection every aspect is done on machine like training of faces and detecting of faces and registering of attendance with date and time

It creates a tri backup of the records so that if by any chance or by mistake if one end has been compromised there are two places where data are still present

The efficiency of the system is 97% so the chances of error is less

Drawback

The major drawback of this system is that as it is an electronic device it requires power to run. And it is not inevitable to weather or forces of nature. Surplus it requires a net connection for mailing the CSV files.

Future Scope

In the near future we can further increase or we can enhance the way of detection like instead of Haar Cascade and LBPH algorithm we can use 3d face sketching or we can use Infra-Red or Face ID to do the same so that we can detect the face comparatively faster

Hardware

For the implementation of the project we require the following hardware.

A raspberry PI 3 or higher version

A camera module

A display Module

A body case