# introduction

## Purpose of this Document

The purpose of this SRS document is to provide a detailed overview of our software product, its parameters and goals. This document describes the project's target audience and its user interface, hardware and software requirements. **It defines how our client, team and audience see the product and its functionality.**

## Scope of the Development Project

The goal is to design software for attendance system using Facial Recognition. First, look at a picture and find all the faces in it. Second, focus on each face and be able to understand that even if a face is turned in a weird direction or in bad lighting, it is still the same person. Third, be able to pick out unique features of the face that you can use to tell it apart from other people— like how big the eyes are, how long the face is, etc. Finally, compare the unique features of that face to all the people you already know to determine the person’s name. The scope of this system is not just limited to the TU campus only as the same mechanism can be reused in other campuses as well. This system can also be implemented in the industrial sector as well.

## Definitions

**Definitions**

Table 1 gives explanation of the most commonly used terms in this SRS document.

**Table 1: Definitions for most commonly used terms**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Term** | **Definition** |
| 1 | Face Localization | Seeks to determine the position of a single face within |
| an image; the detection problem is simplified since the |
| input image contains only one face. |
| 2 | Facial feature | Seeks to detect the presence and location of features, |
| detection | such as the mouth, nose, eyes, lips, ears, etc.; the |
|  | detection problem is simplified since the input image |
|  | contains only one face. |
| 3 | Facial expression | Identifies the emotional states of humans, e.g. happy, |
| recognition | sad, anger. |
| 4 | Face tracking | Face tracking methods estimates the location and |
| possibly the orientation of a face in an image on a |
| continuous basis within real time. |

## Overview

Determine whether or not there are any faces in the camera output and, if present, return the face locations of the images. The biggest face detected, being the user closest to the camera are scaled to a recognizable scale. This detection window is then passed to the face recognition system for recognition.

The first and foremost expectation for a face recognition system is that it must have a high degree of accuracy when recognizing people. The next highest expectation from a system is that people should be indicated who they are when the system recognized them. It must also be possible to add and remove people from the system that should be recognized.

**INTRODUCTION**

Human face plays an important role in our day to day life mostly for identification of a person. Face recognition is a part of biometric identification that extracts the facial features of a face, and then stores it as a unique face print to uniquely recognize a person. Biometric face recognition technology has gained the attention of many researchers because of its wide application. Face recognition technology is better than other biometric based recognition techniques like finger-print, palm-print, iris because of its non-contact process. Recognition techniques using face recognition can also recognize a person from a distance, without any contact or interaction with person. The face recognition techniques are currently implemented in social media websites like Facebook, at the airports, railway stations. The, at crime investigations. Face recognition technique can also be used in crime reports, the captured photo can be stored in a database, and can be used to identify a person. Facebook uses the facial recognition technique for automating the process of tagging people. For face recognition we require large dataset and complex features to identify a person in all conditions like change of illumination, age, pose, etc. Recent researches show there is a betterment in facial recognition systems. In the last ten years there is huge development in recognition techniques.

But currently most of the facial recognition techniques is able to work fine only if the number of people in one frame is very few and under controlled illumination, proper

position of faces and clear images. For face recognition purpose, there is a need for large data sets and complex features to uniquely identify the different subjects by manipulating different obstacles like illumination, pose and aging. During the recent few years, a good improvement has been made in facial recognition systems. In comparison to the last decade, one can observe an enormous development in the world of face recognition. Currently, most of the facial recognition systems perform well with limited faces in the frame. Moreover, these methodologies have been tested under controlled lighting conditions, proper face poses and non- blurry images. The system that is proposed for face recognition in this paper for the attendance system is able to recognize multiple faces in a frame without any control on illumination, position of face.

This is a project for educational institutions on a facial recognition-based attendance system. The traditional way of marking commute to work can be a tedious task in many skills and colleges. It is also an additional responsibility for schools to mark an attendance by naming Individuals which may take up to 5 minutes for a full session. This can be time consuming. There are certain chances of a representative. Therefore, many institutions began using many other recording methods such as the use of Frequency Identification (RFID) , Iris recognition , fingerprint recognition, and more. However, these online based systems can be time consuming and disruptive in nature. Face recognition has set a very important biometric feature, which is easily accessible and unobtrusive. Face-based systems that ignore a lot of facial expressions. The face recognition program consists of two stages: verification and facial recognition. Face verification is a 1: 1 matching process, comparing face-to-face image processing and there is a 1: N comparing face query image. The purpose of this approach is to create a travel plan based on face recognition strategies. Here a personal face is considered a mark of presence. Today, facial recognition is gaining popularity and has been widely used. In the middle of this page, we suggested a face recognition system in the live video class and attendees will be marked when the found face is found within the website. In comparison to existing procedures, this new technology will take less time.

**II. LITERATURE REVIEW**

*A. Attendance System Using NFC Technology with Embedded Camera on Mobile Device*

"NFC (Near Field Communication) Technology with a camera incorporated in a mobile device," according to a study publication (Bhise, Khichi, Korde, Lokare, 2015). NFC technology and a mobile application are used to improve the attendance system. At the time of enrolment in the faculty, each student is issued an NFC tag with a unique ID, according to the research article. The travelling instructor will then take attendance at each lesson by touching or distributing these tags. The integrated camera will then take a picture of the student's face before sending all of the data to the college server for verification. The benefits of this technology include the ease of use of NFC and the fast connection speed. It greatly facilitates the process of being in the present moment. However, if the NFC tag was not tagged by the user, the system would not be able to identify infringement automatically. Aside from that, the usage of a mobile app was necessary since the NFC student was interrupting the teacher. Would it be a support system to record everyone present if a pastor failed to bring his mobile phone to work? Furthermore, because of a confidential topic, most professors would not want their iPhones to be used in this manner. As a result, instead of the NFC marker, unique student information such as biometrics or face recognition, guanine to the student should be employed. This ensures that a specific student will be the first to take attendance.

*B. Face Recognition Based Attendance Marking System*

Face recognition is used in the second research publication, "Face Recognition System Based on Face Recognition" (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014), to overcome prior system challenges.

This method involves taking images of the employee using a camera in order to capture their faces and visions. When the result is located on the face website, the taken image is compared individually with the face mask to display the employee's face, where presence is noted. The key benefit of this method is that the presence is recorded on a highly secure server that no one else can access. Furthermore, the face detection algorithm in this suggested system is built employing a skin-splitting approach to improve the accuracy of the detection process. Despite ongoing efforts to improve the accuracy of the face detection algorithm, the system remains unaffected at this time. This application needs a stand-alone computer with a constant power source that is not portable. This sort of system is prepared to mark staff attendance since they only need to submit attendance once a day, unlike students who must indicate that they are present in each class on a certain day. If marking is present, it will be tough. The system is out of control. To address this issue, the whole old system management system is converted to a portable module, which is then used to operate a Python system.

*C. RFID based Student Attendance System*

According to the fourth research journal “RFID based Student Attendance System” (Hussain, Dugar, Deka, Hannan, 2014), the proposed solution is almost identical to the first research journal in which RFID technology was used to enhance the adult attendance program. during this process, the tag and the student are also used as a way to track the presence of students. The difference between the original journals and that is where the information for the participants will be available through the web site. Provides very easy to retrieve information. Also, this method is not perfect in the sense that, first of all, it is not portable, because the RFID reader can only work if it is connected to a PC. Second, the RFID tag is not guanine information that can specifically identify the reader, thus, leading to inaccuracies in the data collected by attendees.

**III. PROPOSED SYSTEM**

The function of the proposed system is to capture the face of every student and keep it on the website for them to attend. The face of the expert must be taken in such a way that everyone can see what the student's face is like, even the seating area and the way the students stand. There is no need for the teacher to be physically present in the classroom because the system records the video and then with continuous face processing steps is monitored and therefore the attendance website is updated. All Individuals in the category must register themselves by entering the information they require so that their photos can be taken and stored within the database. During each session, a face is found in the live streaming video of the class. The recovered faces are compared with the existing images in the database. Once a match is found, attendees are marked on the appropriate reader. At the top of each session, a list of absentees will be sent to the appropriate faculty in charge of the session.

A. *Existing Recognition Systems*

1. *Fingerprint Based Recognition System:* For a fingerprint-based departure system, the portable fingerprint device should be pre-configured with Individual fingerprints ahead of time. Later in the teaching hours or before, the coed should record fingerprints on the suspended device to ensure their daily presence. The point is that during the study it should be distracting to the eyes of individuals.
2. *RFID (Radio Frequency Identification) Based Recognition System*: In an existing RFID-based system, Co-ed should always carry good identification and place an ID with a cardboard reader to record their daily presence. The system is able to connect to RS232 and record attendees on a saved website. There is a possibility of fraudulent access that may occur. Some students may use another student's ID to verify their presence in the absence of the real student or themselves try to misuse it sometimes.
3. *Iris Based Recognition System:* In an Iris-based student travel program, the scholar should rotate in front of the camera, so that the camera will scan the Iris code. The scanned iris is compared with the individual data stored on the website and their presence should be updated. This reduces the paper and pen function of the college members of the institution. This also reduces the chances of being represented within the classroom, and helps maintain secure code records. it is a wireless biometric method that solves the issue of false existence and therefore the problem of setting up a compatible network.
4. *Face Based Recognition System:* Biometric detection technology will be used to record attendees with a high-definition camera that detects individual faces so the machine compares known faces with student faces stored within the website. When the face of the code is matched to a saved image, attendees are marked with the current website for further calculation. If the captured image does not match the existing student face on the website, this image is saved as a new image on the website. During this process, there is a chance that the camera will not take the correct picture or will miss the number of individuals in the picture.
5. Existing Attendance System extra info: Currently manual student attendance marking technique is often facing a lot issues and a very slow process. Teacher’sor faculty calling names of student from their data sheet and student responding to them. But this existing process becomes very complex in large classes that consists so many students. Many times, students also mark proxies by responding to fake name. This makes disturbance in class and distracts the students during the exam times. Also, verifying the total students present by counting them after attendance, which takes a lot of time consuming. Apart from calling names attendance sheet is passed around classroom during lectures especially the classes consisting large number of students might find it hard to have attendance sheet being passed around the class. Douglas Ahlers, Bernie DiDario, Michael Dobson, in 2006 gave the concept of attendance tracking system. This framework consists of identity tags, with wireless communication capabilities, for each attendee and the scanners for detecting the attendee's tags as they enter in that allocated room. O.A. Idowu and O. Shoewu: Development of AttendanceManagement System by using Biometrics. Attendance is taken with the help of a finger print device and the recordsof attendance are stored in the database. Attendance is marked after successful identification.

**Advantages of Facial Recognition System:**

**Easy to manage.**

Since the AI based attendance system is completely automatic, dealing with the records and monitoring everyday activities will turn out to be a lot simpler than the manual system. Everything will be done by the system. Numerous products are customized so that it shows the specific time of how many hours or minutes an individual worked at his/her work area in the day. All activities can be easily monitored to maintain a record.

**Time and cost saving.**

This framework can be advantageous in saving lots of time and cash for organizations. Since the face recognition framework monitors employees or students working hours and access to different zonesin the premise, organizations will not need to utilize an extra labour force to do this work. The automated framework likewise helps in preventing human mistake and monitors exact hours.

**Easily monitor and detect students.**

Schools, universities and colleges have adapted face recognition both to record attendance and prevent any mischievous activity in premises. Strengthens security measures. This framework also helps to improve security and safety measures. Facial recognition has become a regular part of Airport security evaluating since a long time, helping to identify lawbreakers and possible dangers to carriers and travellers. Banks and different foundations additionally utilize facial recognition to prevent fraud, as the innovation can identify individuals who've been recently accused of wrongdoings and alert the bank or the institution.

**Automatic and seamless verification process.**

It's not important to wait for your turn like checking fingerprint scanner or other safety efforts, facial recognition for attendance framework offers aspeedy, programmed, and consistent verification experience.

**Reduces interaction or touching of devices during pandemic situations.**

The entire world is experiencing COVID-19 and it's about time that we should offer regard to social distancing. Having a safe distance with others has become a need these days. Conditions such as this can be hazardous if you have manual attendance system, having a Face recognition-based attendance system won't just permit you to register the attendance of an individual but also keep you at a safedistance from them as you can work distantly and still see who all are coming and going. This requires the point that, this entire framework is a lot more secure, efficient, and faster method to record attendance.

**AIMS AND OBJECTIVES:**

The objective of this project is to design an automated attendance system based on face recognition. Some expected steps in order to fulfill the objectives are as follows: To identify the face segment from the video frame. To extract the useful features from the identified face. To classify the features in order to recognize the identified face. To record the attendance of the identified students.

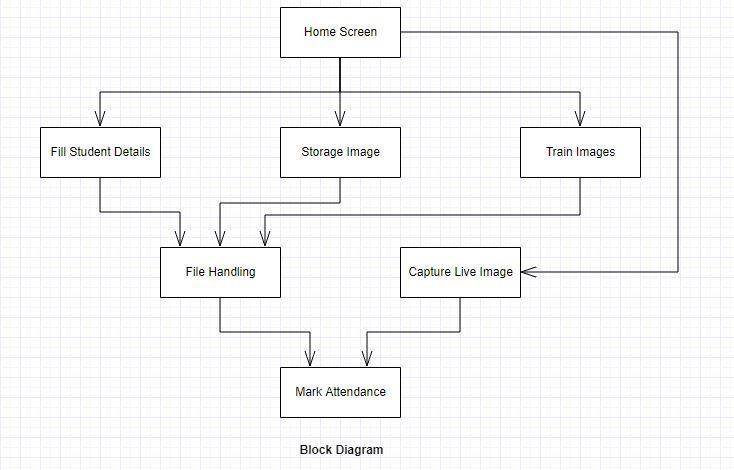
**IV. RESULTS AND Discussions**

The main rule of the project is that the video captured by the video is converted into an image for viewing and viewing. In addition, a known code image is also provided, otherwise the system will mark the site as non-existent.

1. *Take a Video:* The camera is positioned at a selected distance within the classroom to capture pre-video videos of perfect students of the class.
2. *Divide as Frames in Video:* The captured video must be converted to self-contained every second so that it can be easily accessed and seen by the students' faces in order to present the audience.
3. *Face Recognition:* Face detection is a process by which an image, provided as input (image) is searched to investigate any face, after finding the face processing image cleans the face image so that the face can easily be seen.
4. *Facial Recognition:* After completing the face detection and analysis, it is compared with the existing face on the student website to review the Individual presence.
5. *After Processing:* Post-processing process includes the process of updating expert names on an excel sheet. An excel sheet is usually kept weekly or monthly to record student attendance.
6. upright, frontal face
7. minor variations in lighting conditions
8. and minor variations in facial expression.
9. minor variation in illumination
10. big enough scale in order to perform face recognition.

# Overall Description

* 1. **Product Perspective**



# Block Diagram For The Entire System

## How facial recognition works

Facial recognition is the process of identifying or verifying the identity of a person using their face. It captures, analyzes, and compares patterns based on the person's facial details.

1. The face detection process is an essential step in detecting and locating human faces in images and videos.
2. The face capture process transforms analog information (a face) into a set of digital information (data or vectors) based on the person's facial features.
3. The face match process verifies if two faces belong to the same person.

**DISCUSSION AND EXPLANATION:**

Under this topic we would see how this project works, requirements of modules, how the data set is created, face being recognised and how the marking of attendance takesplace. As our project is still on going so there can be various issues and bugs. So, keeping that aside let’s see what are the process going on in this project. Hoping that python being installed on the system, first you have to import all the required modules like “cv2” from OpenCV, face recognition module, “os” module, NumPy and Datetime module, let me explain a little bit about thesemodules.

**OpenCV**: It stands for Open-Source Computer Vision library, which was developed by intel. This library is cross platform and is free for use under the open-source Apache 2 license. This library mainly focuses at real time computer vision and features GPU acceleration for the real time operations.

**CV2**: It was the old interface in old OpenCV versions named as “cv”. The OpenCV developers had chosen the name “cv2” when they had createdthe binding generators.

**Face Recognition Module:** This module recognizes and manipulate faces through Python or through the command line. It was build using dlib’s state of the art face recognition build with deep learning. This model has an accuracy of 99.38% on the “labeled faces in the wild” benchmark. Where the “Labeled Faces in the Wild” is a public benchmark for face verification, also called as pairmatching.

**“Dlib” library**: It is a general-purpose crossplatform software library developed in C++. It's a cutting-edge toolbox in C++ that incorporates different AI algorithms and tools for creating complex software programs to solve real world problem. “OS” Module: The OS module in python provides the facilities to establish a link between the user and the operating system. It has various useful OS functions that are used to perform OS- based tasks and get all the related information about the operating system.

**NumPy Module:** It’s a python package that stands for “Numerical Python”. NumPy is a library that contains multidimensional array/cluster objects and the records for processing of arrays. Using NumPy a developer can also performs logical and mathematical operations on arrays and many more operations. Datetime Module: This module supply classes for manipulating dates and time or through this module a user can include current date and time intheir program.

**PyQt5 Module**: This is a complete set of Python bindings for Qt v5. Because of the tools and simplicity provided by this library anyone can design an interactive desktop application with so much ease.

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## Conclusion

To conclude, An automated classroom attendance system can save time, increase the productivity of teachers, increase student’s punctuality, and also generate attendance reports and its analysis result easily. And Unlike fingerprinted based attendance system, a face recognition based attendance system doesn’t it required a direct human or students’ interactions with the system to mark attendance

Thus, the aim of this paper is to capture the video of the students, convert it into frames, relate it with the database to ensure their presence or absence, mark attendance to the particular student to maintain the record. The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation.

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