# FACIAL RECOGNITION BASED ATTENDANCE SYSTEM

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**ABSTRACT:**

The aim of this project is to build a facial recognition-based attendance system, which is based Python OpenCV with Tkinter GUI and Mysql Database.Face detection and face recognition are very important technologies these days, furthermore we noticed that they got have a variety of uses such as cellphones, army uses, and some high risk information offices. We decided to make a device that detects and recognize the face as a student attendance system and can be a substitute for the regular paper attendance system and finger print attendance system. The main function in our project is going to be done using Lab VIEW because, Lab VIEW is a very helpful programming tool in regards of facial uses and very helpful in other uses. Our project is based on a main program in Lab VIEW that detects and recognize faces with giving scores and parameters, furthermore the subsystems are an Excel sheet that is integrated with the program, and a messaging dev.

Components of our project are Lab VIEW program as the main system and subsystems, Office Excel sheet to include students names, and a computer (or laptop) to integrate the programs together.

## INTRODUCTION

Traditionally attendance is marked manually by teachers and they must make sure correct attendance is marked for respective student. This whole process wastes some of lecture time and part of correct information is missed due to fraudulent and proxy cases.

In order to determine classroom attendance, face detection and face recognition are performed. Face detection is used to determine the location of the faces in the classroom image and extract sub images for each face.Then, in face recognition, the face images detected will be compared with the

data base consisting of images of students in the class, and attendance will be recorded accordingly. Then there is no requirement of the faculty effort to make the attendance of the students and it is a time saving technology. The faculty are facing a lot problem while marking the attendance of the students and they are suffering for time saving to lecture the classes. So, it helps the faculty by taking the attendance without any effort of them. Face Recognition is a system that can recognize or confirm a person's face from an image or video using digital masking. There are so many facial recognition methods. Face recognition maps facial traits from an image or video using biometrics.



**Fig 1**: Manual Attendance

One of the computer vision technologies that has undergone the most in-depth research is face recognition. New methods and positive results are published every year.

The two types of face recognition methods are typically categorized as feature-based and holistic methods. Faces are detected using local features from faces in feature-based approaches, whereas holistic based approaches use global features from faces.

The ideal solution to these issues is a facial recognition system. Students won't be aware that their faces are being captured in real time while they are learning in class thanks to face detection, which will facilitate learning. Students can pay attention without being distracted when they sign for their attendance and risk forgetting some of the lecturer's knowledge.

**Theoretical Framework:**

Taking attendance of students in schools and universities is a very important responsibility for the faculty in today's environment. Physical attendance taking by the faculty is time-consuming. Therefore, we have been using technology. This will be crucial in demonstrating the superiority of the educational system. Physically taking attendance requires a lot of time and work. It takes time away from the lectures for the faculty to handle and maintain the attendance sheet.Automated attendance systems are more reliable, rigid, and efficient than the traditional attendance systems and other biometric attendance systems, leading to better productivity and output of both the teachers and students, as well as better consumption of time. The computerised and intelligent attendance system can assist with managing attendance. It will be beneficial to start using various biometric techniques. Today's most

distinctive and well-known technology is face recognition. The old conventional sheets are being replaced with this new technology.

The process of taking attendance manually can be troublesome and time consuming. However taking attendance is mandatory in most of the educational institutions in India. The usual process of taking attendance involves the faculty manually calling out the names of the students in an order and marking his/her presence in a sheet of paper. The existing method of marking attendance is slow and students may fool the faculties in marking proxies if the classroom strength is large enough.

Facial Recognition Based Attendance System is a process to automatically estimate the presence or the absence of the student in the classroom by using face recognition technology. It is also possible to recognize whether the student is sleeping or awake during the lecture and it can also be implemented in the exam sessions to ensure the presence of the student.
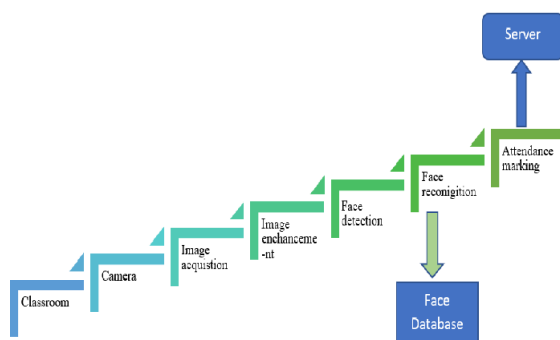


**Figure 2**

**Existing System:**

**1.RFID Attendance Management System:**

The most popular technology in automating attendance is Radio Frequency Identification (RFID). This student attendance management system uses the following simple mechanism and marks attendance of the entire class within seconds:

*Each student is given a smart RFID card having a unique identification number.

*The RFID can be installed at the entrance of the school, classroom, library or any other important location.

*Students carrying their smart cards simply have to pass through the reader and the reader scans their unique identification number and hence the attendance is marked automatically.

*Since the RFID reader is capable of reading several cards at once, the attendance of multiple students is marked simultaneously.

*The data from the RFID reader is automatically fetched by the integrated school ERP software. Hence, the schools get the access to student attendance details of every class and section at once.

## 2.System for fingerprint-based recognition:

The Fingerprint Attendance monitoring system designed in this research work for student is a more secure platform where students mark their attendance with their fingerprint. The aim of the study is to design and develop a reliable and cost effective. With the use of fingerprint scans in your biometric system, you can keep track of your attendance. Students attendance tracking becomes easy and smooth with such a system.

The fingerprint attendance management system seeks to record your unique finger pattern, which is something that each and every individual has. As a result, the gadget processes the information scanned and registers it on the file to track the time.

A portable fingerprint device needs to be set up with the students' fingerprints in advance for the existing fingerprint-based attendance system.

The student must record their fingerprint on the set-up device later, either before or during lecture hours, to confirm their attendance for the day. This method has a flaw in that it could divert students' attention during the lecture portion.

## 3.Iris Based Recognition System:

Iris Recognition is regarded as the most reliable and accurate biometric identification system available.In Iris Recognition a person is identified by the iris which is the part of eye using pattern matching or image processing using concepts of neural networks. The aim is to identify a person in real time, with high efficiency and accuracy by analyzing the random patters visible within the iris if an eye from some distance, by implementing modified Canny edge detector algorithm.



**Figure 3**

## 4.Face Based Recognition

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. Facial recognition is a way of identifying or confirming an individual's identity using their face. Facial recognition systems can be used to identify people in photos, videos, or in real-time. Facial recognition is a category of biometric security . Due to its non-contact procedure, face recognition technology is superior to other biometric based recognition methods including finger, palm, and iris prints. Without making eye contact or engaging with the

subject, recognition techniques that use face recognition can also identify someone from a distance.

**Proposed System:**

This software project uses some basic Dot net API's to interact and get the output of local camera. It maybe a webcam or any other attached camera. We use these API's to get the captured face picture input to our system. Our system works as follows:

->The user needs to start the system in visual studio.

->Now the system accepts camera input with the help of Dot net API's.

->Next step is to store these face based on a matrix form.

□Once faces are recognized and stored we can now detect them.Whenever the face reappears it is recognized by name in a real time video and an attendance is marked for that particular person in the database. A facial recognition system involves the following phases:Face detection, feature extraction, and face recognition.

**Face Recognition Techniques and Methods:**

Face recognition is influenced by a variety of characteristics, including shape, size, position, occlusion, and illumination. There are two types of facial recognition applications: basic and advanced. Major facial recognition can identify objects with or without faces, including balls and animals. The system looks for eyes, a nose, and a mouth if it is a face. A single face's question is handled via sophisticated facial recognition. The distance between the eyes, the width of the nose, the width of the eyes, the depth and angle of the jaw, the height of the cheekbones, and other distinctive characteristics combine to create a singular numerical code.

The system is created for employing a simple and a secure way of recording attendance. First of all, the software takes a picture of all the authorized individuals and stores the information into the system's database. Then, the system stores pictures by mapping it into a face match structure. The system will recognize the registered person and mark his/her attendance along with the arrival time whenever he/she enters the locations again.

Face recognition systems with time attendance provide multi-biometric and multi-authentication modes. Attached with high resolution infra-red camera works in low light, best face recognition algorithms and identification methods.
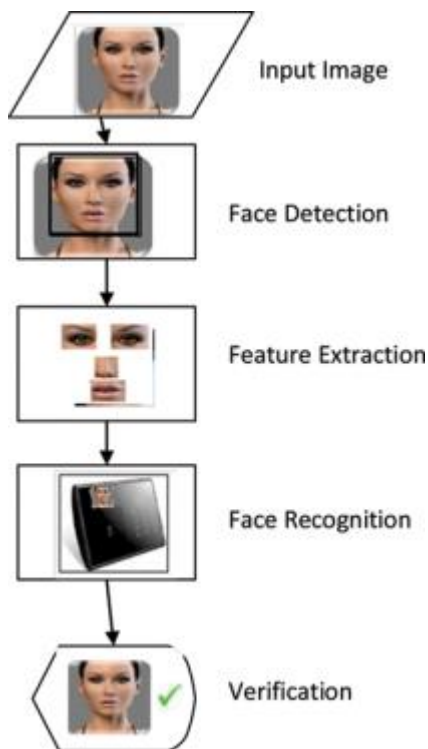
**Fig4**: **Recognizing the face**

**Development Methodology:**

In following part, we describe how our system will work step by step along with the system requirement (equipment, software and tools), the methods of collecting data and our project constraints.

First, here is how our system works:

-->cameras that identify and recognise students' faces

-->Send the collected photographs to a system that compares them to images that have been retrieved from a database that holds data and images about the students.

-->Mark the attendance of the person whose image was recorded and later recovered.

-->The outcome will then be displayed on the display board connected to the camera.

The equipment we need are high definition camera to detect and recognize faces and electronic display board to show the result. For tools, we may need a strong and secure communication channel to send image and receive result. In addition, MS Visual Studio (VS) to develop our windows application and MS SQL Server Management Studio to build database are needed software. Finally, data collection methods and constraints:

We collect data through many ways, one of them is online survey which is Quantitative data collection method. The other is the observations which is Qualitative data collection method. The constraint imposed on our project that it may cannot be applied in the girls' section.

**Open CV:**

In order to build our Open CV face recognition pipeline, we'll be applying deep learning in two key steps:

1. To apply face detection, which detects the presence and location of a face in an image, but does not identify it.

2. To extract the 128-d feature vectors (called "embeddings") that quantify each face in an image

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3. Performing face alignment for Open CV facial recognition can dramatically improve face recognition performance. The face recognition model Open CV uses to compute the 128-d face embeddings comes from the Open Face project. The Open Face model will perform better on faces that have been aligned.

**Image Processing**

Image Processing is a method to convert an image into digital form and perform some operation on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually image processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is currently one of the technologies that is developing quickly, having applications in many areas of industry. Importing the image via an optical scanner or digital photography, analysing and modifying the image, which includes data compression and image manipulation, are the three main phases. The final stage in which a report or image that is based on image analysis can be adjusted involves enhancing and identifying patterns that are not visible to human eyes, such as those in satellite photographs and

output. A computer application that uses computer vision (CV) does not include a human in the visual loop.
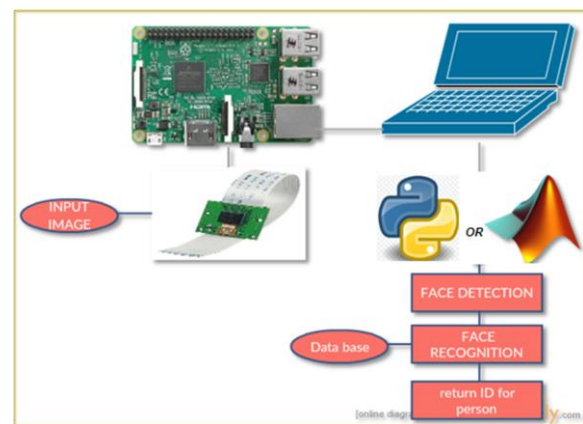
**ARCHITECTURE**



**Figure 5**

*\*Capturing Camera*:Camera is which is installed in laptop or through webcom capture the face of student of online class or in lab class.

\**Image to Grayscale*: This process is performed using IMAQ ExtractSingleColorPlane VI to convert a 32/16bit image to 8bit image. This is a requirement for our pattern matching algorithm to work completely.

\**Pattern Extraction*: This is included in Vision Assistant VI which deals with our face recognition algorithm. Pattern Extraction is feature in which the image inputted features are compared using Pattern Matching Algorithm.

***Feature Extraction**: This feature is used to extract important features out of image. It compares them with templates, saves in database and provides a score of comparison

***Find Match in database**: Our database has preserved templates or images of students which we aim to recognize and mark attendance. This database can be updated or appended according to requirement. This database is used for comparison with extracted feature of image to confirm a successful hit.

**Update Attendance Sheet.xlsx**: If match is found our algorithm updates the attendance of user corresponding to his/her name in excel file of format .xlsx. If not, the system marks absent in front of his/her name in the same excel file.
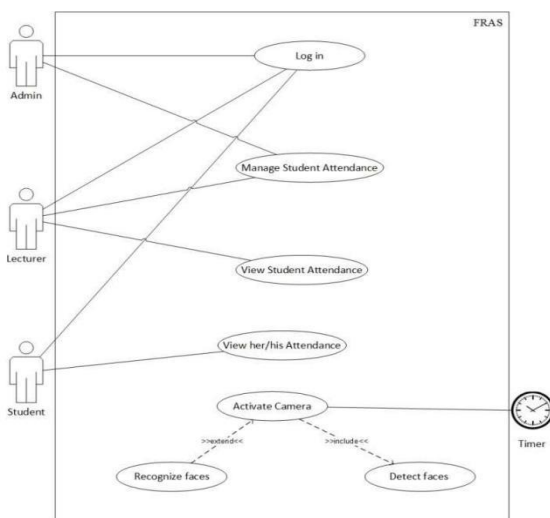
**UML DIAGRAMS:**



**Figure 6: Use case Diagram**

Use Case Diagram shows the processes included in Face Recognition Attendance System as well as its users. It serves as the blueprint or core of the said system that will be the basis for building it. The use-case diagram in UML represents the behavior of the face recognition system and aids in capturing its requirements.
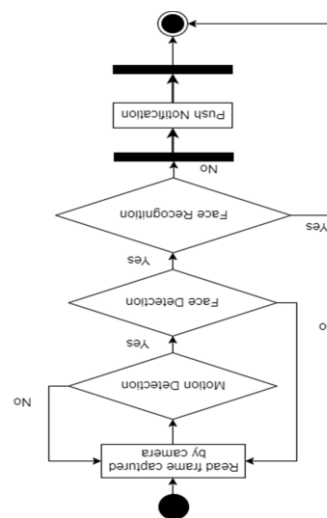


**Figure 7:Activity Diagram**

The activity diagram used to describe flow of activity through a series of actions. Activity diagram is a important diagram to describe the system. An activity diagram shows the overall flow of control.

**Soft ware Requirements:**

A computer vision and machine learning software library called OpenCV is available for free use. A standard infrastructure for computer vision applications was created with OpenCV in order to speed up the incorporation of artificial intelligence

into products. OpenCV's BSD licencing makes it simple for companies to use and change the source. More than 2500 optimized algorithms are available in the collection, including a wide range of both traditional and cutting-edge computer vision and machine learning methods [7]. These algorithms can be used to track camera movements, track moving objects, extract 3D models of objects, create 3D point clouds from stereo cameras, and stitch together images to create high-resolution images. They can also be used to detect and recognize faces, identify objects, classify human actions in videos, and identify faces. It has C++, C, and Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS. OpenCV leans mostly towards real-time vision applications and takes advantage of MMX and SSE instructions when available. A full-featured.

1) Windows 8 or above

2) Machine Learning packages

3) Chrome Driver

4) MySQL

**Hard ware Requirements**

In this project we have used Windows 10, Intel Core i7-9700 CPU of 3.00 GHz, 32.0 GB RAM, and NVIDIA GeForce RTX 2080 graphics card.

**Contributions of this study**

We have searched for a system that can take, monitor and manage students' attendance and absenteeism, send reminder messages, calculate absenteeism percentage, and produce weekly, monthly, and annual reports. Based on our searches, there is no integrated system can support our idea.

In this project, we are trying to develop such a system that can do all those tasks. Our project will serve students, lecturers, and the university as whole.

**RESULTS**

The person must first be entered into the database. To do this, we must provide a name and to save his or her registered number.

We can now take images of people using a webcam or any other available camera, like the Logitech webcam we used in this instance. Choose the camera you want to use to take the image, then turn it on. The camera is indicated on the axes, and we are able to take pictures and save them in the folder that is automatically created using the registered number that we have entered.
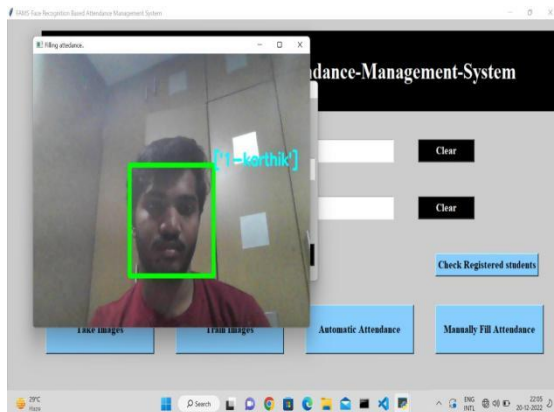
**Fig9: recognizing the matched data and**

**Filling attendance**

Every time the face emerges, it is identified by name in a live stream, and an attendance is noted in the database for that specific person. It will be saved in the excel sheet with time and date as according to the period of subject.
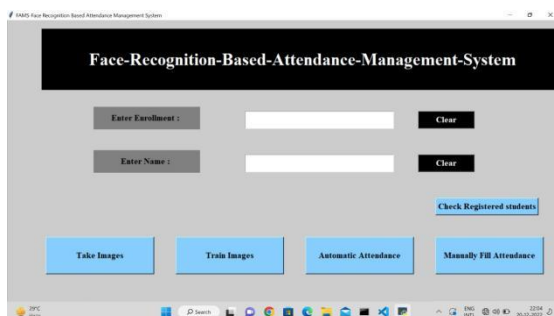


**Fig10:** enetering the dats of student

## MERITS

When it comes to merits, the higher accuracy of our project makes it more reliable for time saving of lecturer and reduce efforts. It makes the lecturers job easier in marking the attendance of students. patient's. As the attendance what the lecturer did manually is automatically marked.

## CONCLUSION

For a lecture, segment, or lab, we have created a system in this system that tracks attendance.

student attendance was verified by the teaching assistant. Particularly if there are many pupils in the lecture, it saves time and effort. This attendance system demonstrates the use of facial recognition technology for student attendance, and for further processing, this student record may be used in exam-related matters. This technology seeks to develop a powerful face recognition-based class attendance system. By using facial ID, the suggested system will be able to record attendance. It will use a webcam to detect faces and then identify them. Following acknowledgment, it will update the attendance record and reflect the acknowledged student's attendance.

## References

\* Study of Various Face Detection Methods , Ms.Varsha Gupta1 , Mr. Dipesh Sharma2,ijarcce volume

\* Face Recognition Based on HOG and Fast PCA Algorithm Xiang-Yu Li(&) and Zhen-Xian Lin.

## ACKNOWLEDGMENTS

We would like to express our special thanks to our mentor Dr. M.Rama Chandra sir who gave us a golden opportunity to do this wonderful project on this topic which also helped us in doing a lot of research and we came to know about so many new things. We are really thankful to them.

Secondly, We would also like to thank my friends who helped us a lot in finalizing this project within the limited time frame.