# Robust Attendance Management Using Face and QR Recognition

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***Abstract-*** ***In higher education institutions, student participation in the classroom is directly related to their academic performance. However, the majority of student attendance registration is still conventionally done, which is tedious and time-consuming, especially for those courses that involve large numbers of students. Over the years, attendance management has been conducted manually at most of the universities. To overcome the manual attendance issues, we proposed and implemented a smart and Robust attendance system with the aim to encourage the potential use of the Face Recognition and Quick Response (QR) code as a future attendance management system, to track and record student attendance in lectures and exercises for all relevant courses, and should be easy to apply and quick in recording attendance during a class session; by focusing on creating a simple student attendance tracking system that can be used to take attendance which is both fast and affordable in comparison to the other methods as an aim of this project.***

## I. INTRODUCTION

Nowadays, it is very important to finish the job fast, learn something new, and get higher results as easy and efficiently as you can. Every sector, especially in the education process and in the business world, needs management systems that will enable them to have adequate control and management in the development of learning or work. Considering all these advantages and benefits, we thought that the process of education at the university, in particular, needs an online system to manage student attendance. Among others, regular attendance is a basic and most important criterion throughout the education system. Consequently, the student might lose the right to sit an exam if attendance criterion is not met. Moreover, if students exceed the number of allowed absences, they might also lose the right to sit final exams. Given that, the manual method which is currently used, givespace for more calculation errors.

## II. PROBLEM STATEMENT

"Developing a system that acquires individual attendance by means of facial recognition or QR code to secure data accuracy of the attendance and reduce the total time needed to do attendance recording."

## III. RELATED WORK

Bhise, Khichi, Korde,Lokare, 2015 Attendance System Using NFC Technology with Embedded Camera on Mobile Device

According to research journal “Attendance System Using NFC (Near Field Communication) Technology with Embedded Camera on Mobile Device” (Bhise, Khichi, Korde,Lokare, 2015). The attendance system is improved by using NFCtechnology and mobile application. According to the research paper, each student is given a NFC tag that has a unique ID during their enrolment into the college. Attendance of each class will then be taken by touching or moving these tags on the lecturer mobile phone. The embedded camera on the phone will then capture the student‟s face to send all the data to the college server to do validation and verification. The advantages of this method is where the NFC is simple to use, and the speed of connection establishment is very high. It indeed speeds up the attendance taking process a lot. However, this system couldn‟t automatically spot the violation when the NFC tag is not personally tagged by the original owner. Apart from that, the convenience of the system which uses the mobile phone as the NFC reader was actually an inconvenience to the lecturer. Imagine if the lecturer had forgotten to bring their mobile phones to work, what would be the backup procedure for the

attendance to be recorded? Moreover, most of the lecturer will not likely to prefer their personal smart phones to be used in this way due to privacy matter. Hence, unique information about the student like biometrics or face recognition, which is guanine for a student should be used in replacement of the NFC tag. This will ensure attendance to be taken originally by the actual student.

SenthamilSelvi, Chitrakala, Antony Jenitha, 2014,Face Recognition Based Attendance Marking System

The second research journals "Face Recognition Based Attendance Marking System" (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014) is based on the identification of face recognition to solve the previous attendance system‟s issues. This system uses camera to capture the images of the employee to do face detection and recognition. The captured image is compared one by one with the face database to search for the worker‟s face where attendance will be marked when a result is found in the face database. The main advantage of this system is where attendance is marked on the server which is highly secure where no one can mark the attendance of other. Moreover, in this proposed system, the face detection algorithm is improved by using the skin classification technique to increase the accuracy of the detection process. Although more efforts are invested in the accuracy of the face detection algorithm, the system is yet not portable. This system requires a standalone computer which will need a constant power supply that makes it not portable. This type of system is only suitable for marking staff‟s attendance as they only need to report their presence once a day, unlike students which require to report their attendance at every class on a particular day, it will be inconvenient if the attendance marking system is not portable. Thus, to solve this issue, the whole attendance management system can be developed on an portable module so that it can be work just by executing the python program.

Kumar Yadav, Singh, Pujari, Mishra, 2015,Fingerprint Based Attendance System Using Microcontroller and LabView

The third research journal "Fingerprint Based Attendance System Using Microcontroller and LabView" (Kumar Yadav, Singh, Pujari, Mishra, 2015) proposed a solution of using fingerprint to mark the attendance. This system is using 2 microcontrollers to deal with the fingerprint recognition process. Firstly, the fingerprint pattern will be obtained through a fingerprint sensor, then the information will be transmitted to microcontroller 1. Next microcontroller 1 will pass the information to microcontroller 2 to do the checking with the database that resides in it. After finding a student‟s match, the details are sent to the PC through serial communication to be displayed. This design is good as it accelerates development while maintaining design flexibility and simplifies testing. But again, this system is attached to a PC which make it not portable. Other than that, the database information cannot be accessible easily. Meaning that, for the parents whom are interested in knowing their child‟s attendance cannot easily or conveniently access the information. Therefore, to provide accessibility of the student‟s information to the legitimate concerned party, the information can be uploaded to a web server for easy access. While the authentication for the appropriate access can be enforced through a login screen.

Hussain, Dugar, Deka, Hannan, 2014,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 similar to the first research journal where RFID technology is used to improve the older attendance system. In this system, a tag and a reader is again used as a method of tracking the attendance of the students. The difference between the first journals with this is where attendance‟s information can be accessed through a web portal. It provides more convenient for information retrieval. Again, this system is imperfect in the sense that, firstly, it is not portable, as the RFID reader can only work when it is connected to a PC. Secondly, the RFID tag is not a guanine information that can uniquely identify a student, thus, resulting in the inaccuracy of the collected attendance information.

In conclusion, a better attendance monitoring system should be developed based on its portability, accessibility and the accuracy of the collected attendance information.

N. Khan and Balcoh: "Algorithm for efficient attendance management: Face recognition based approach"
Overview: There are many automatic methods available for this purpose i.e. biometric attendance. All the other methods waste time because students have to make a queue to touch their thumb on the scanning device. This work describes the efficient algorithm that automatically marks the attendance without human intervention. This attendance is recorded by using a camera attached in front of classroom that is continuously capturing images of students, detect the faces in images and compare the detected faces with the database and mark the attendance.

S. Lucas, A. R. Mitra, R. I. Desanti and D. Krisnadi: Student Attendance System in Classroom Using Face Recognition Technique
Fingerprint recognition is a mature field today, but using face recognition technique is still better to be applied in capturing the presence of the student in the class. Other advantages using face recognition are knowing the attitude of students in class such as students readiness or interest in lecture.

From the experiments conducted by involving 19 students situated in classroom setting, it results in 174 out of 205 successful faces recognition. Recognition rate is about 85%.

K. Goyal, K. Agarwal and R. Kumar: Face Detection and tracking using Open CV
An application for tracking and detecting faces in videos and in cameras which can be used for multipurpose activities. The intention of the work is deep study of face detection using open CV. A tabular comparison is performed in order to understand the algorithms in an easier manner.

Conclusion It talks about various algorithms like Adaboost, Haar cascades. This work aims to help in understanding the best prerequisites for face detection.

Muthu Kalyani. K: Smart Application For AMS using Face Recognition
Attendance Management System (AMS) can be made into smarter way by using face recognition technique, where we use a CCTV camera to be fixed at the entry point of a classroom. Automatically captures the image of the person and checks the observed image with the face database using android enhanced smart phone.

Recognition of human who are strange to the environment i.e. an unauthorized person for verification of image, a newly emerging trend 3D Face Recognition is used which claims to provide more accuracy in matching the image databases and has an ability to recognize a subject at different view angles.

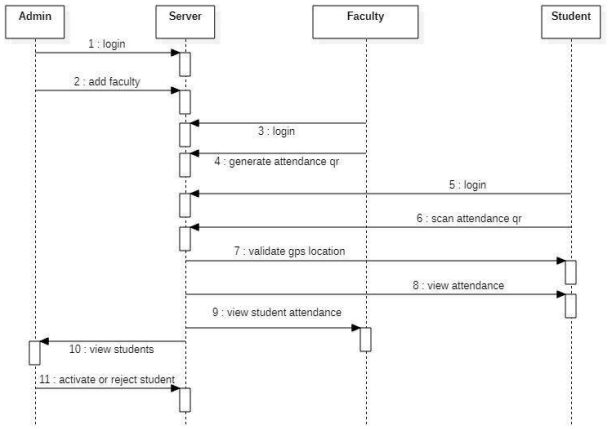
P. Wagh, S. patil. J. Chaudhari and R. Thakare: Attendance System based on Face Recognition using Eigen face and PCA Algorithm
The objective of this project is to automate the attendance system by integrating the face recognition technology using Eigen Face database and PCA algorithm with Matlab GUI. There are many limitations in implementing face recognition technologies like Image Quality, Image Size, Face angle, varying intensity of light. In order to overcome these issues various techniques like Illumination Invariant, Histogram equalization, PCA are used. By using this system attendance is updated automatically after comparing the detected face with original Eigen database in Excel sheet integrated with Matlab GUI.

Viola, M. J. Jones and Pau: Robust real-time face detection
This project describes a face detection framework that is capable of processing images extremely rapidly while achieving high detection rates. There are three key contributions. The first is the introduction of a new image representation called the "Integral Image" which allows the features used by detector to be computed very quickly. The second is a simple and efficient classifier which is built using the AdaBoost learning algorithm to select a small number of critical visual features from a very large set of potential features. The third contribution is a method for combining classifiers in a "cascade" which allows background regions of the image. Implemented on a conventional desktop, face detection proceeds at 15 frames per second.

Dr.A.Babu Karuppiah: Online Attendance management using QR code.
Proposes a system that is based on a QR code, which is being displayed for students during or at the beginning of each lecture. The students will need to scan the code in order to confirm their attendance. It emphasizes on the provision of QR code to the students to mark the attendance. The purpose of the project is to computerize the traditional way of recording attendance and a smart way of tracking attendance in the institutions.

It requires a high level implementation of the proposed system and discussion of student identity to eliminate false registrations.

## IV. SEQUENCE DIAGRAM




## V. SOFTWARE AND HARDWARE REQUIREMENTS

HARDWARE REQUIREMENTS:
Processor : Intel i3 and above
RAM : 4GB and Higher
Hard Disk : 500GB: Minimum

SOFTWARE REQUIREMENT For Web Application:
Programming Language : Python
IDE : Py Charm
UML Design : Start UML
Tools : PIP
Web Server : Tomcat
Framework : DJango

SOFTWARE REQUIREMENTS For Mobile Application:
Database Server : Google Firebase
Platform: Java
IDE : Android Studio
Framework : Android
Uml Design/E-R Modeling Tools :Rational Rose, SqlDeveloper
Testing : Junit

## VI. OBJECTIVES OF STUDY

- To develop a portable smart attendance system which is handy and self powered.
- To ensure the speed of the attendance recording process is faster than the previous
- system which can go as fast as approximately 3 seconds for each student .
- have enough memory space store the database.
- Able to recognize the QR of an individual accurately based on the QR database Allow parents to track their child's attendance.
- Develop a database for the attendance management system
- Allow new students or staff to store their faces in the database by using a GUI
- Able to show an indication to the user whether the QR recognition process is successful or not

## VII. ADVANTAGES

1. QR codes can be used for anything and everything can be done.
2. It can be scanned anytime, anywhere with using mobile phones.
3. It reduces paper ad material consumption. In addition, it externally fast scanning.
4. No need to type out a long Universal resource locator (URL) could help serve students who are visually impaired.
5. There is no need to write vital details down we can simply scan captures the desired information.
6. Almost free and inexpensive. In addition, it can embed any type of media and easy to use.
7. It does not require an understanding of writing code.
8. It stores a large amount of information and multiple uses of these codes.

9. Another main advantage is a quick response through QR codes. In addition, no license required to create or use.

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