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Automation of Attendance and Student Tracking with Face Recognition and Ultrasonic Sensor.

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ABSTRACT

Attendance has a huge role in every university, schools and even in big organizations. In the paper, students monitoring is focused as a major issue. There are several systems existing to update and monitor the attendance. Radio Frequency Identification (RFID) is an existence for attendance update. The motivation of our paper is to make attendance marking and capturing misbehaviour students efficiently by giving accurate details on attendance and misbehaviour issue's. The paper is developed mainly for institution's that has high population where it's difficult to maintain up to date record on students. By using ultrasonic sensor, student tracking is easier. Android application helps to transfer messages from server to officials. Mock-up attendance is gradually decreased.

Keywords: Attendance marking, Misbehavior issues, student tracking.

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INTRODUCTION

Attendance plays a vital role in schools and universities as a prior record of a student. Fake attendance is happening to be common nowadays due to which problems on misbehaving arise. Universities face a lot of problems due to mock-up attendance. Face recognition has an important part in this attendance system. As a well-developed technology, face recognition has been implemented with illumination, hair, aging, glasses and facial expression. It is been applied with a person's authentication. RFID card is a [4] traditional way of marking a person's individuality. This card is based on a person's own identification to represent themselves as an original card holder. Considering only the RFID system, anyone can authenticate with another person's card. To avoid this complex, face recognition is combined with RFID card. Ultrasonic is a sensor, which is used to detect a person's movement. This sensor detects the action of any object or person within a fraction of second. The student tracking methodology is done by this ultrasonic sensor with the help of camera used for attendance. These actions are done with [6] MATLAB software application. It is advance software where face recognition completely takes place. Android is upgrading software nowadays used by every single person in mobile phones, tabloids etc. This application is used here to pass the message of misbehaving students and all students attendance details also. This whole system is implemented with Image Processing and java server.

Related works

Previous researches have shown many advanced methods with similar work to this paper. Each section has a different method of handling the system. [1] Arulogun system explains the attendance marking with RFID which shows the record of every individual class. [2] wijaya describes the usage of RFID technology in companies that is specially designed with IOT for employees; however there is no need for tracking in the system still it is to be developed for a more efficient database. [3] Author Hussain defines the RFID working with the backend python and the attendance can be browsed from anywhere through web portal.[4] Albarhamtoshy system says this paper works on the principle of radio wave communication; it is widely used in libraries and is not that efficient for tracking system.[5] Alia et al., system presents the attendance system using the biometrics, wherein this particular paper has only the system for tracking the students only during the class system using biometrics. However this system has tracking system this system doesn't work efficiently and it fails in some extend. In reference to the author here author [6] Patel et al., system define this paper has only the student attendance marking system and it has no face recognition and so in this system fake attendance may take place. [7] Author Seema Rao et al., explains this biometric system is fully based on the finger prints, now it is widely used in many colleges only for staff. The great drawback in the system it fails to recognize the finger print even if there is a minute cut in the finger.[8] Shashank Shukla's system explains the working of attendance system and how it is stored in the database efficiently. [9] Author Syed Md. Shahid's paper presents this system works on the principle of radio wave communication; it is widely used in libraries and is not that efficient for tracking system. [10] Vaishnavi C. Mankar 's paper also uses the same RFID but a small feature object counter is used to track the students around the campus and it does not avoids any fake attendance.

AM System

In this suggested system, the staff can monitor the student's presence by using ultrasonic sensor and RFID technologies. Ultrasonic sensor and RFID reader are placed in the entrance door of the class room. Each student and staffs are given a RFID Tag. Before the class hours, [6] the student has to show the tag, and their face will be recognized. It is sent to the PC where the attendance is marked automatically. During class hours, Ultrasonic sensor is used to monitor that some person has crossed the door since transmit and receive distance of the ultrasonic sensor changes when a person enter or leave without swiping the tag. The microcontroller checks for the tag whenever a person leaves the class room. If the student tries to go out of the class, the image of the particular student is captured using a web camera, then an alert message is sent to the server. The Department staff can view the list through an android app and also intimate the parents about it. The microcontroller checks for the tag whenever a person leaves the class room. If the student tries to go out of the class, then an alert message is sent and stored in the monitoring PC since he does not have a RFID tag to swipe on the reader. Also, the image of the class room is stored in the PC using a web camera. By using this technique, student tracking can be improved. It is also displayed on a LCD.

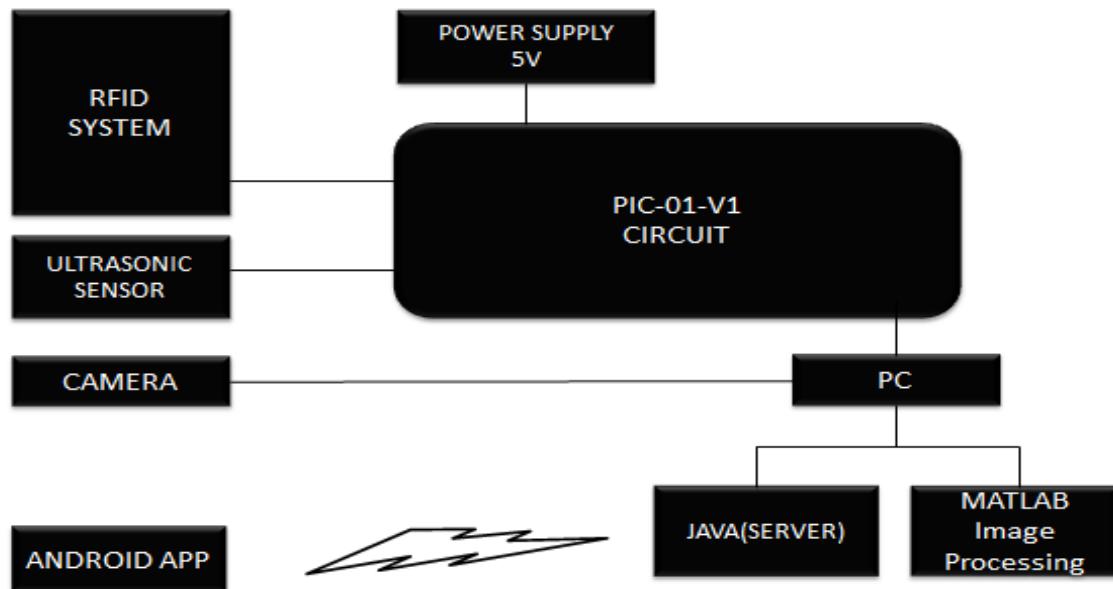


Figure 1

Role of RFID

The paper includes a RFID card and a RFID reader. Each student in the class is provided an RFID card [8] which has the unique id. The card has the coil inside it. Now coming to the RFID reader, here we use the passive reader where it signals passes around only 10meters. This avoids the student who escapes after marking the attendance. Coming to the working part when the reader is ready to read the value, it has a running time in the display to show that it is attendance time. Now when the student shows his card to the reader the reader reads the value from the card which provides the magnetic flux around the reader and at the same time the magnetic flux initiates the card, reads the unique id and marks present.

Process of face recognition

The face recognition, where this system is suggested to avoid fake attendance i.e. there is a possibility of marking fake attendance just by showing the card for even bunking students by their friends. Since we are using this method when the student shows their card the camera fixed above the RFID is initiated and it captures the photo and it checks, compares the photo that is already stored along with the student information in the database. And then the attendance is marked.

Ultrasonic sensor

The ultra-sonic sensor which is used in detecting the misbehaving student in the class time. As the ultrasonic sensor is placed above the door step which continuously produces waves and measures the way and so if any student passes the door with showing the id the ultrasonic sensor's waves hits the object and it automatically initiates the camera and captures the particular student and the image is sent to the respective department's staff or HOD.

Android application

As the ultra-sensor detects and after the above procedures this method is used when the HOD checks for the misbehaving student list he sees a list of students in the database if the respective HOD wishes to inform and complain about the particular student's misbehavior he sends a Message to their parent and automatically the message will be sent to the parents. The parent's number is also available in the student's database.

PCA mechanisms

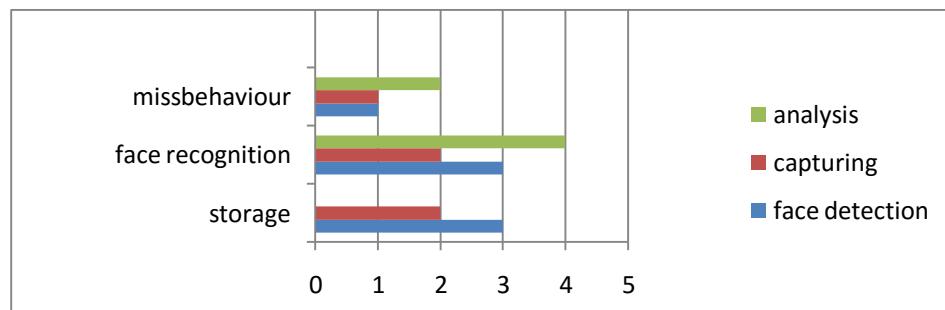
The Principal component analysis uses equidistance method which is used in detecting the face. PCA detects a person by measuring various dimensional face bones like cheek bones, fore head to chin etc., it measures and stores the calculation of each student and retrieves from the database whenever the face is recognized.

Findings

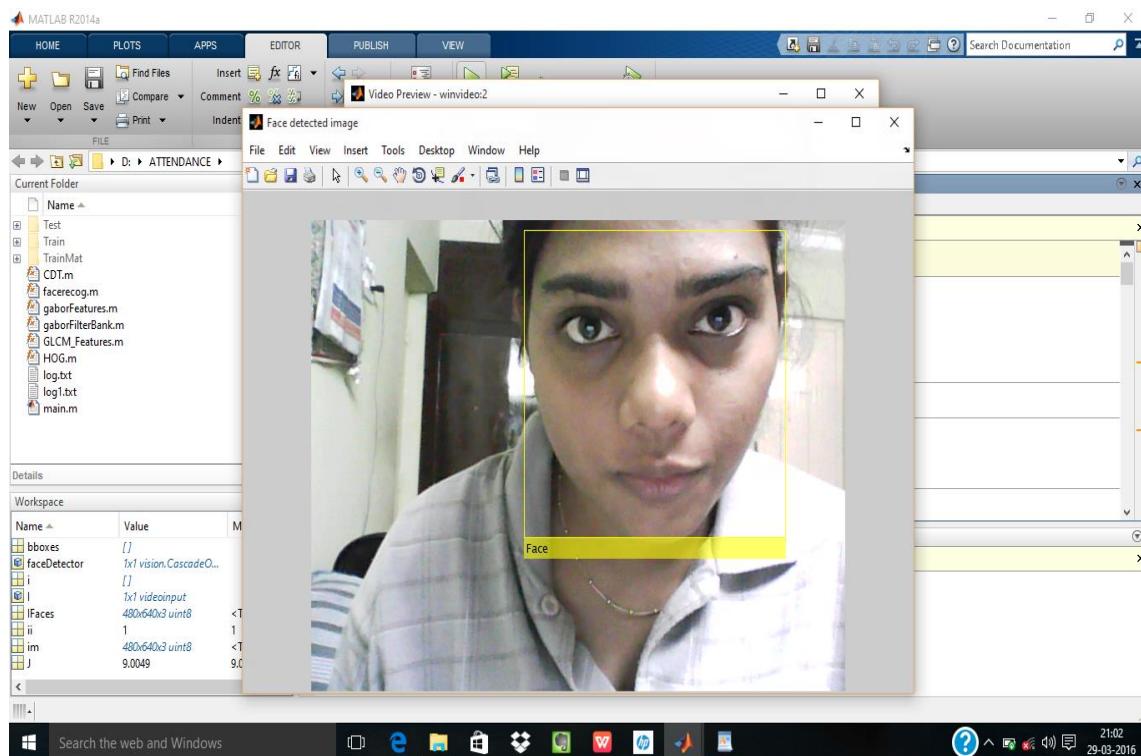
Time taken in seconds per student

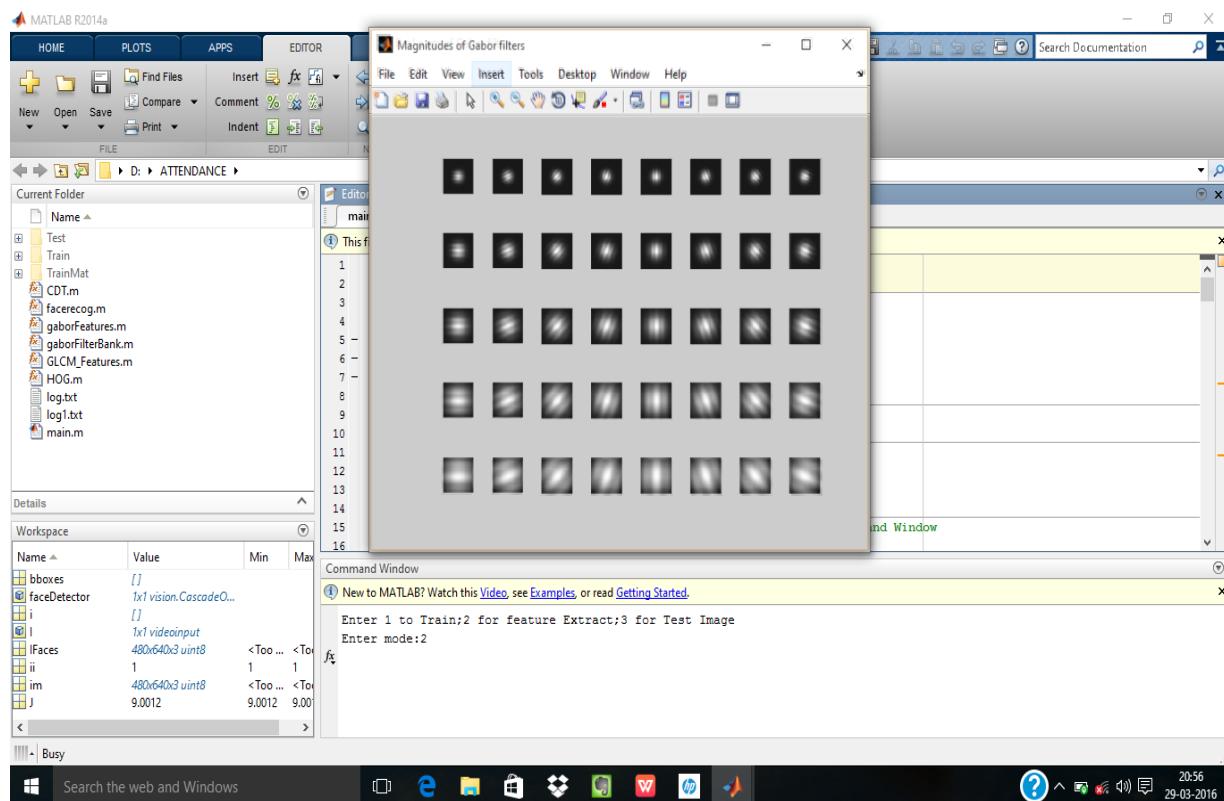
PROCESS	FACE DETECTION	CAPTURING	ANALYSIS	TOTAL TIME TAKEN
storage	3	2	nil	5
face recognition	3	2	4	9
misunderstanding	1	1	2	4

A simple bar graph to show the time used



Results during recognition process:





The above images show the process of matching the captured picture with the pictures that are already stored in the database using PCA algorithm with equidistance method.

CONCLUSION

The output for the paper is obtained by using the PCA algorithm where the algorithm works on the principle of Equidistance method where the captured photo is recognized by matching it to the photo that is already stored in the database that has the student record and after the process of recognition the attendance database is automatically updated by marking the attendance, coming to the student tracking method the misbehaving student is captured by the camera and the pic is sent to the HOD. If the HOD wishes to send the detail about misbehaving then he sends the message to the student's parents.

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