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Smart Attendance System for Schools and Organizations Using Image Processing of Live Video

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Abstract--- *It is mandatory to know about presence of a person/students in an school or organization to have an idea on number of persons attending /not attending the session before starting. This can Achieved by managing a proper attendance. Attendance can also be used find no of days worked by an employee in a month for calculating their wages/salary. Even now many schools, colleges and organization practices process of manual attendance. This manual attendance consumes time and papers. To overcome this, we can use smart attendance system which can take attendance using real time image. To develop a smart attendance management system which can manage attendance automatically using live video via web camera. A web camera is placed in front board which records a live video. Which is then processed to find identity of a person using image processing technique then it is checked with registered dataset/data base. It can reduce time. Consumption of paper can be minimized. This system gives info about their ward to parents. This system also help in evaluating attendance eligibility criteria of students.*

Keywords--- *Frames, Image Processing, Matching, SMS.*

I. INTRODUCTION

Keeping proper students attendance record in a schools, the school staffs should have to do lots of works. As They have to maintain or manage that attendance record regularly. This becomes more difficult for the classes having huge number of students. The manual system also needs time longer for reporting the average attendance of each enrolled student. In today's world applying the automated attendance system might reduce the work of staffs. There are many biometrics methods available in which the basis concept is same. One of them is the fingerprint identification. In this method first we have to collect the fingerprint of each students are collected and stored in the database through fingerprint sensor. This done only when a new entry has to be added in the database. Then the fingerprints are compared with the fingerprint stored in database. If the two finger prints are similar the attendance is marked as present. But this system has some of the disadvantages. To mark attendance students have to wait in long

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queue which consumes time. But these drawbacks can be solved by using face detection instead of fingerprint recognition

Therefore, this paper describes on how we can manage student's attendance in class using face recognition technique automatically from the live video captured in classroom setting. The presence of the student can be determined by capturing their faces on high-definition monitor cameras, so that it will be highly reliable for computer to understand the presence of students as these videos has high details. The two common Human Face Recognition techniques are, 1.Feature-based approach 2.Brightness-based approach. The feature- based approach is also know as local face recognition system, which is used in pointing the key features of the face like eyes, nose, mouth, edges, etc.,

This system setup contains web cameras are placed in front board and also walls of the class room which records a live video. Which is then processed to find identity of a person using image processing technique then it is checked with registered dataset/data base. The video captured by the webcam is divided into frames using which faces of students are identified then attendance is marked and saved in database. Then the report is sent to class in charge and also parents of respective.

II. RELATED WORKS

P.n.G arad et.al [1] describes about system based on client-server. Here the server is tomcat and client is JSP. This system automatically sends information to parents of absentees. It maintains a database for attendance and SMS. Later in future from which record of leaves taken and attendance of an individual person can be extracted. The Drawback of the system is it only sends SMS automatically it can't take attendance automatically. It requires manual attendance method and then data need to be entered in database. This system requires internet which cannot be given assured that everyone has an internet connection in home. Doing a wrong entry can arise an problem or it make panic to parents about their wards. Aditya Rama MITRA et.al [2] proposes a project on automated student attendance management system. This system is based on radial basis function neural network. This system sends a report on students who are attending the lecture to faculty through email. In this they use two cameras which can rotate in both directions. They are placed such way that they will be able to capture clear images of all students. Later faces in these images are detected and by matching it with training image person are recognized. It uses image to detect faces in which assurance of finding all students is not given. This system meant only for faculty purpose not for parents.

Ektachhatbar et.al [3]talks about survey on student attendance management system. This system uses DBMS. This paper is on an app which through which attendance can be fetched from database. Unique USERID and user type (i.e. teachers, admin, students) will be given each individual person. User need to enter their respective USERID and password if it is an new entry it need to be verified and registered or else it will login your account based on your user type. Teacher will be able to take, view attendance whereas student can only view their attendance record. Admin id is for management uses like verification. The major feedback is it requires manual filling of attendance. Rasikanaik et.al [4] speaks about an smart attendance system(SAMS) based on fingerprint recognition. In this system fingerprint is scanned by fingerprint scanner then it is used to recognize a person. This

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system has LCD display displaying data monitoring software with GUI in PC. This system along with allotted servers forms system for managing attendance in schools and college. It is user friendly, consume low power. They will not work on rainy days as students hand might be wet due to rain, wet hands cannot be scanned properly by scanner.

Arulogun O.T et.al [5] describes about an system to manage attendance of students. This system uses [13]RFID(Radio Frequency Identification) method. it is an wireless system to detect and maintain the attendance of a student and locate a student. In this system an item is tagged with tiny silicon chip plus an antenna collectively called a tag. This tag is read by RFID reader and sends information to computer system and sends email to respective persons. This system takes attendance automatically. This system also reduces time and paper consumption. It is hard to tag the RFID tag in students as there are not objects. In 2010 [6] Mohamad Smaili and Seifedine Kadry proposed one paper, in which a Wireless iris recognition attendance management system is designed. This system is based on Daugman's algorithm(Daugman,2003).this system based biometrics and wireless technique solves the problem of spurious attendance and the trouble of laying the corresponding network. It can make users attendances more easily and effectively. In this paper, RF wireless technique is being used for employee identification. It is too expensive. Major drawback of this system is the components are costly and it has shorter range. Hence students will be needed to stand in long queue to give attendance this takes time.

Vishal et.al [7], have described the attendance system which can take attendance using Bluetooth [12]. In this project, attendance is being taken using instructor's mobile phone. Application software is installed in instructor's mobile phone enables it to query student's mobile telephone via Bluetooth connection and though transfer student's mobile Media Access Control(MAC) addresses to the instructor's mobile phone. Presence of the student can be confirmed. This system requires student's mobile so it cannot be used in school as schools does not allow phones. In case if a absentee gives his mobile to his friend who will present then mistakenly present will be given to that absentee. Hence, malpractice may occur. Unnati A, Patel and Dr.Swaminarayan Priya R, [8] have proposed an attendance system which works on both RIFD and Face recognition The proposed system is a generic application design to automate and enhance the manual work of recording and reporting in real-time, the Time and Attendance System in universities. A Log is maintained in the Database. Log contains RFID Tag Id and Captured Image by Camera. If both Student Id fetched from RFID Tag and Captured Image is matched, presence is marked as "Present" else it is marked as "Absent". This cannot be used in crowded areas where sometimes a person's tag can be hidden from reader then the system will mark absent for him.

Mrs. Dhanashree Amit Gupta [9] have talked about a software which will act as user interface. This software can be used for daily student attendance in schools, colleges and institutes, If facilities to access the attendance information. Language used to write this program is ASP.NET and Backend is SQL. First module is admin which has right for creating space for a new batch. Second module is handled by the user which can be a faculty. On the basis of subject and month attendance can be sorted or fetched. Main drawbacks are it requires manual attendance method and manual data entry into the server, Manual data entry in large numbers takes lots of time.

Dhiman Kumar Sarker et.al [10] proposed a design and implementation of Smart Attendance Management System Using Multiple Step Authentication. In this system along with fingerprint recognition and RFID tag,

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Password is also used for verification. The system marks present to a student only if all the three verification is passed. Otherwise absent is marked for respective persons. This system gives high verification process. As it does 3 verification process time consumption is more. This process can be done only nearer to the system hence it may lead huge line of waiting students to put attendance. As RFID tag and its reader are costly the system is slightly costlier than to others.

III. PROPOSED SYSTEM

This system has cameras installed in the classroom which captures live video. These videos can be divided into various frames using some algorithm. Later these frames can be processed to recognize student's face using image processing. After recognizing all student the system checks it with the database of registered students. If a face in database does not found/matches with the processed face then absent is marked (or) if it is found/matches with any one in processed images then present is marked. Once the students status been updated the system send an info to parents of respective students. As shown in the fig.(1)

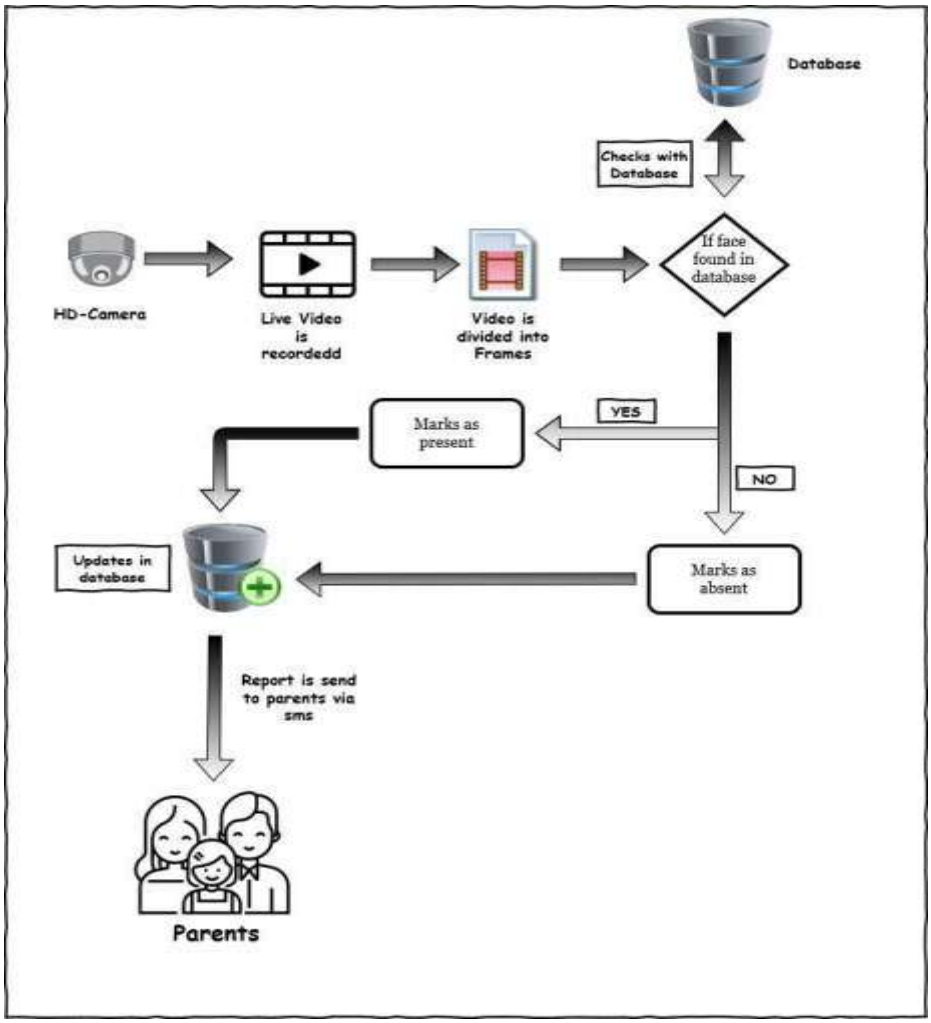

Fig. 1: Architecture of proposed system

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The above system is clasified into various modules:

- Cameras
- Videos and Frames
- Face recognition
- Updating the database
- Report vis SMS

3.1 Camera

In this system three High definition cameras is used. So that it captures high resolution photo and covers all students. As shown in fig.(1) One camera is placed over the board(cam_1) and other two are placed side walls(cam_2,cam_3) so that they can capture the students who are not visible or hidden fromcam_1.

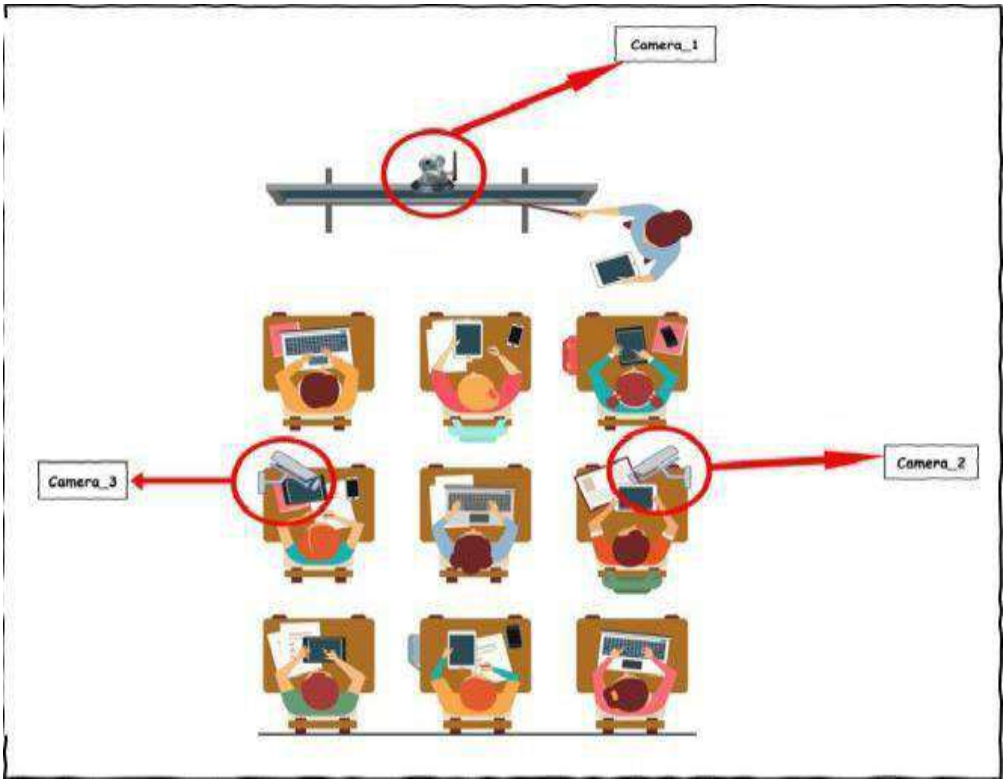

Fig. 2: Class room top view

3.2 Videos & Frames

Once the live video has been recorded They have to be divided into frames (i.e video is sent as input and the output will be in the form of image.jpeg). This can be done using following algorithm[11]:

STEP 1: Start

STEP 2: Create the object to read video file.

STEP 3: This reads the current time, tag(To find which class and period)

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STEP 4: Get the size of the video frame i.e by using image object and the time seconds.

STEP 5: Create the "for loop".

STEP 6.1: Initiate the variable and the limit.

STEP 6.2: The first frame is read and the color data of image is obtained.

STEP 6.3: The image is acquired and also with the title of the frames.

STEP 7: End.

Now videos from cameras are converted into frames.

3.3 Face recognition and matching

With the help of SURF features and descriptors, scale-invariant matching can be achieved. This can done by first detecting features on each image, and then extracting the descriptors of those features. Each feature descriptor vector within the first image is then compared to all feature descriptors in the second image. The pair that obtains the simplest score is then kept as the best match for that feature. This is repeated for all features in the first image. Once the best image has been processed it checked with the registered students' images in database. If one of the images in database and one of the processed images matches then present is marked for the corresponding student. On the other case i.e., if any of the registered images does not matches with processed images that means the student is missing then the system updates his status as absent.

3.4 Updating the database

Once all the images been checked, System updates status of all students in the database. Later in future, attendance can be fetched from database without any maintenance of log book, entry book. By maintaining a database we can reduce time consumed and paper wasted. It will also be see to search data from digital database than searching in traditional attendance register. For this we are using database in this system we can even use cloud instead database.

3.5 Report via SMS

After updating all the Data in database, our system does not stop here It can even send message to the parents of the students regarding their ward's attendance status. We can even send a automatic alert to the parents if the overall attendance criteria is not met or not up to level.

IV. COMPARISON THE PROPOSED METHOD AND EXISTING METHOD

Table 1: Comparison between various methods

Authors	Technique used
Arulgun O.T et.al	RFID Tag (Offline system)
Mohamad Smaili and Seifedinekardry	Iris recognition (Offline System)
Rasikanaik et.al	Fingerprint recognition (Online system)
Vishal et.al	Bluetooth (Online system)
Proposed System	Face recognition with SMS (Online system)

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From table(1), While comparing this proposed system with some of existing method, First with the system proposed by Arul O.T et.al This system provides unique RFID tags to each student by scanning which students can recognized. Even though this system is offline but it still reduce paper consumption and reduce works of an teacher.

Then with another offline system proposed by Mohamad Smaili and Seifedinekardry this system is similar to all other biometric recognition system This system recognizes students present using their Iris which is unique for every individual. Iris scanner should be placed in every class but this makes students to wait in long queue as only one student can be scanned at a time which is now solved in our system. 3rd rasikaniaik et.al's system is more similar to previous method but there are some difference as this system use fingerprint recognition instead of Iris recognition and this system is online whereas previous one is offline system. At last a system proposed by Vishal et.al this system is different from others as this system uses Bluetooth from student's mobile. If student's mobile is within the range then present is marked. This can be fooled easily if a absent student gives his mobile to his friend who is present this cannot be don't in our system as we use face recognition and this system is hard to implement in our country as most of schools in our country don't allow usage of phones in the campus.

V. CONCLUSIONS

As we all know attendance in schools and colleges is must as they take part a role almost everything in from knowing student presence to awarding internal marks. As far now we still use manual attendance system in which sperate note book / log book is maintained for attendance record and a staff or class in-charge takes and enter attendance manually in it. This traditional system has lots of drawbacks in this modern era like as we maintain a notebook for each class it consumes papers and it takes more time for taking attendance as staff need to read every student name. This even adds lots of things staff's works as they will be need to find student's attendance percentage and need to give them marks or permit them to appear in examination if required criteria is met and also, they will be need to inform parents of respecting students about their presence which is now informed to the parents daily through SMS service in most of schools/colleges although they are entered manually which now consumes more time and human power. To overcome this, we have proposed a system in which enables us to maintain a perfect attendance management record without any physical work/ Man work. This system even reduces paper consumption so we can save tress and also, we can save lots of time as it reduces time and work. This system also informs parents about their ward so they don't need to be in any worries about their child.

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