

Divergent Techniques of Attendance Management

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ABSTRACT

In order to keep record of students or employees, tracking their presence and absence is important. This is done by attendance management system. Maintaining attendance record manually is not at all a feasible task and this also leads to human errors, consumes more time, increases administrative burden, it is also insecure, etc. To overcome with these issues various Attendance Management Systems are developed based on recent technological advancements. This paper gives a brief overview of diverse methods for tracking attendance.

Keywords: Attendance Management System, Fingerprint, Iris, Face Recognition, RFID, Cloud

I. INTRODUCTION

In day to day life, schools, colleges and organizations have to maintain the records of students and employees respectively. Whether the student or an employee is present or absent is known by the attendance record. This attendance records are conventionally managed on sheets or non-digital methods for years due to which it causes human errors, administrative burden, less efficient, lack of real time updates, chances of proxy attendance, limited accessibility, privacy concerns, difficulty in analyzing data, maintenance is costly, environmental impact due to wastage of paper, susceptible to loss,

damage or theft, scalability issues, etc. These are the limitations caused in manual attendance tracking methodology which makes it unreliable to use.

Making use of recent technologies for creating advance attendance management systems is on boom nowadays. Features required for an attendance system to make it a reliable one includes: higher security, time efficient, free of human errors, consisting of real time information, scalable, etc. There are various methods to tackle with the attendance management problem. In the next sections, we will discuss about the diverse methodologies that have been used to track attendance.

II. METHODS

In order to beat the challenges faced in conventional attendance system, other methods have been equipped. Some of the major ones are: Fingerprint Based Attendance System, Iris Based Attendance System, Face Recognition Based Attendance System, RFID Based Attendance System, Cloud Based Attendance System.

A. Fingerprint Based Attendance System

This method of tracking attendance is by identifying individuals through their fingerprint[10]. During the initial phase of setup, individuals need to register their fingerprints into the system. These fingerprints are then stored in the database. Whenever an individual wants to mark his/her attendance, then he/she has to place the finger on fingerprint scanner or reader. Then this scanned fingerprint is compared with the existing fingerprint in the database in order to authenticate the identifying process and then finally marks the attendance if it gets matched. This system is not only highly accurate and secure as each person has unique fingerprint but also quick and convenient to use. Now advancement to this system is supposed to be done by using aadhar information so that there is no requirement of storing data (i.e fingerprints) as it is directly accessed from UIDAI and this also adds next level of security to the system.



Fig. 1: Fingerprint Based Attendance System

B. Iris Based Attendance System

In Iris based attendance system[8], initially individuals have to register their iris patterns. This is done by capturing high resolution images of their irises and which are then converted into digital templates and stored in database. The individuals have to stand in front of iris scanner which will then capture image of their iris and compare it with the stored templates in database. The attendance will be marked if the iris patterns are matched. This system is highly accurate as iris patterns are unique, it is considered as non-contact biometric technology as there is no need to touch any surface, resistant to spoofing and also highly secure.



Fig. 2: Iris Based Attendance System

C. Face Recognition Based Attendance System

In this system[4][6][7][9], during the registration phase an image of an individual is captured and the facial data is saved. Multiple images from different angles are captured so that a digital template is created. This is then stored in the database. In order to track attendance an individual needs to stand in front of camera or facial recognition device. Then the system captures an image of the person and compares it with the template present in database. This process is done to identify an individual in order to record the attendance. This system uses contactless authentication, it is fast and highly scalable. This system is now not bounded for a single person but captures an image and identifies multiple people

present in it and marks their attendance. Even android apps[6] are made to make this system more flexible for the employees whose job is not bounded only to office.



Fig. 3: Face Recognition Based Attendance System

D. RFID Based Attendance System

RFID(Radio Frequency Identification)[5] is based on radio frequency technology which identifies and tracks individual when he/she enters or exits from the premises.

In this type of attendance systems individuals are issued RFID tags or cards containing a unique identifier. These tags or cards emit radio-frequency signals that can be detected by RFID readers which are placed at entry points or designated locations within premises. Whenever individuals pass through these readers, their RFID tags or cards are scanned, and the system records their presence, thereby marking their attendance. It allows fast and seamless identification, enables real-time tracking of attendance data, and can be easily integrated making them convenient to use. In order to make this system more secure face recognition is used alongwith RFID.



Fig. 4: RFID Based Attendance System

E. Cloud Based Attendance System

In Cloud based attendance system[1][2][3], cloud computing technology is used to manage and store attendance data. This system captures attendance data through various means such as biometric scanners[3], RFID readers[5], mobile apps, or manual entry. This data is then transmitted to a cloud-based server, where it is stored and processed. Administrators and authorized users can access the attendance data through a web-based interface or mobile application using internet-connected devices. The cloud-based system typically offers features such as anytime-anywhere accessibility, real-time monitoring, reporting, analytics, scalability, automatic backups and integration with other HR or management systems.

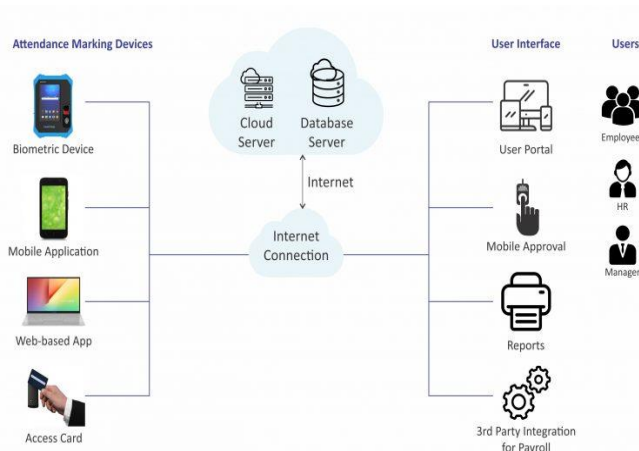


Fig. 5: Cloud Based Attendance System

II. CONCLUSION & FUTURE WORK

This paper gave us an overview of all the techniques of attendance management. We have found that Fingerprint[10] and Iris Based Attendance Systems[8] uniquely identifies an individual as the fingerprint and iris patterns of each person differs. But Fingerprint based systems[10] are not contactless as individuals has to touch the scanner while scanning of their fingerprints whereas Iris based system[8] follows contactless approach. Face recognition based attendance[4][6][7][9] system is time efficient but can be vulnerable to spoofing attacks whereas iris based system consumes more time but these systems are resistant to spoofing. In RFID based system[5], individuals need to carry RFID tags and these can make inconvenience for them, it's a time consuming method and in this case there are chances of proxy attendance marking. Cloud based attendance systems[1][2][3] are accessible anywhere and anytime, provides real time updates, can scale up or down as needed, reduced IT overhead costs associated with hardware maintenance, upgrades and security management, automatic backups are done and this system can be integrated with other management systems. But cloud based systems[1][2][3] rely on internet connectivity and vendor reliability. Each system has some pros and cons over the other as discussed above.

These attendance management systems can be further modified by combining two methods, adding some extra features related to data extraction ,security ,etc and by making use of services which can be substitute of already existing ones ,which will create a more reliable and secure system for attendance.

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