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Smart Attendance System

Sumit Kumar Singh[1], Diksha Kumari[2], Ankur Singh[3], Anjali Mathur[4], Sameer Awasthi[5,*]

Abstract

Our attendance is made more sophisticated and self-controlled by using "the smart attendance system (SAS)," which is the topic of this paper. It has an innovative QR scanner technology that makes the process accurate and simple. The system operates efficiently, saving us time and requiring less labor to maintain attendance. Previous versions of the monitoring system had problems locating students and required a tedious manual attendance method. Thanks to developments in technology, it is now easier to monitor students by integrating automated technologies with the monitoring system. Radio Frequency Identification (RFID) technology is an automated method that enhances the present conventional method of student monitoring Due to the unique ID on each tag, it is simple to identify each tag holder. Furthermore, a Graphical User Interface (GUI) offers an even more effective means of verifying attendance. Consequently, the automatic system created by merging RFID technology and a graphical user interface (GUI) with an attendance system will outperform the conventional approach to student monitoring in terms of efficacy and efficiency. The system provides accurate and efficient attendance management by utilizing a QR scanner. It is a dependable and practical method for managing and monitoring attendance in a range of contexts. In addition to providing precise student information, our QR scanner lowers proxy attendance. This intelligent attendance solution streamlines our administrative tasks, increases overall effectiveness, and provides real-time access to data, analysis, and reporting. In addition to automating the recording of attendance, the intelligent attendance system offers actual insight that supports thoughtful decision-making.

Keywords: smart attendance system, scanner recognition, database, QR, Biometric, RFID.

INTRODUCTION

Earlier versions of the supervision system had a difficult time locating students and required a laborious manual attendance method. With the advancement of technology, monitoring students may now be done more conveniently by merging the monitoring system with automation technologies. Radio Frequency Identification (RFID) technology is an automated tool that helps enhance the present conventional method of student monitoring Since each tag has a distinct ID, it is simple to identify each tag holder. Furthermore, a Graphical User Interface (GUI) offers a more effective method for reviewing attendance. Therefore, the automatic system created by integrating RFID technology and a graphical user interface (GUI) with an attendance system will outperform the conventional approach to student monitoring in terms of performance and efficiency. Additionally, at a predetermined range (a few millimeters to hundreds of meters), RFID technology can assist in the wireless identification and monitoring of objects (things, persons, animals, etc.). We outline the suggested RFID technology for tracking and recognizing attendance in this article. The

***Author for Correspondence**
Sameer Awasthi
E-mail: sameerawasthi@gmail.com

[1–4]Students, Department of Computer Science and (Artificial Intelligence), Bansal Institute of Engineering & Technology, Lucknow, Uttar Pradesh, India
[5]Head of the Department, Department of Computer Science and (Artificial Intelligence), Bansal Institute of Engineering & Technology, Lucknow, Uttar Pradesh, India

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management staff at the school or university can monitor student movement in and out of the campus thanks to this technology, which uses RFID tags [1–4].

When the RFID tags pass through the RFID reader in the read range zone, the system will record the data from the tags to the database systems. The personnel staff should have a suitable procedure for approving and keeping the attendance record regularly in order to validate the student attendance record. The Automatic Attendance System (AAS) and the Manual Attendance System (MAS) are the two primary forms of student attendance frameworks. In actuality, it could be difficult for MAS staff members to regularly approve and keep track of every student's record in a classroom [1]. In a classroom with a high teacher-to-student ratio, keeping track of each student's cumulative and physical attendance becomes an extremely tedious and time-consuming task. Consequently, we are able to put into place a functional framework that automatically logs students' attendance using facial recognition. Employees at AAS may perform fewer managerial tasks. Students' facial photos are frequently taken when they come for class or when everyone is seated, especially in the case of an attendance system that uses Human Face Recognition (HFR) to record attendance [1]. Generally speaking, there are two established approaches for handling HFR: the feature-based approach and the brightness-based approach.

The feature-based methodology makes use of crucial facial landmarks, such as the mouth, nose, eyes, and edges, as well as other distinctive traits. In this manner, only a portion of the previously extracted picture is covered during the computation process. However, the brightness-based approach computes and unifies every aspect of the provided image [4–15].

It is also known as image-based approach or holistic methodology.

The brightness-based solution requires taking into account the entire picture, which increases processing time and complexity [1]. The two main stages of the face recognition framework process are face detection and face recognition, though other improvements are also done. To start, photos of the children's faces will be required in order to document their attendance. This image can be captured by the camera, which will be positioned within the classroom so that it can see the entire area. We will consider this image to be one of the system's inputs. For efficient face identification, the image should be enhanced utilizing image processing methods such histogram equalization and grayscale conversion. The image will be subjected to face detection after its quality has improved. The face identification step is followed by the face recognition process.

Several facial recognition techniques are available, including Eigen face, PCA, and the LDA hybrid algorithm. When faces are recognized in the Eigen face, they are removed from the image [2]. Various facial highlights are retrieved with the help of the element extractor. The student is identified by using these faces as Eigen characteristics, and their attendance is recorded by collaborating with the face database [2]. Building the face database is necessary in order to perform comparisons.

The need for a precise and effective attendance management system has grown in various contexts, such as corporate settings and educational institutions, in the age of rapidly advancing technology. In addition to being time-consuming, manual attendance tracking methods might be misused or prone to inaccuracy. This emphasizes the need for a cutting-edge solution that can streamline the attendance recording procedure while upholding dependability and security.

This paper provides a thorough analysis of our project, the smart attendance system (SAS), which revolutionizes the attendance management system by utilizing cutting-edge technologies. The SAS provides an updated approach to attendance tracking by overcoming the limitation of conventional approaches through the integration of scanning recognition technology. This SAS system does more than just automate tasks [16–20].

With the goal of increasing administrative effectiveness, it offers real-time access to attendance data and uses analytics to produce insightful data.

We examine the main elements of SAS, its technological underpinnings, and potential applications in various contexts in this paper. The SAS presents itself as a strong answer to the problems with traditional attendance systems by doing away with this manual system and incorporating cutting-edge capabilities. As we navigate the intricacies of our project, our main goal is to demonstrate advancements in technology along with a practical and easy-to-use tool that may significantly enhance attendance management and be used to make well-informed decisions. The teacher has direct access to this smart attendance system with QR scanner. With it, they can compute each student's monthly attendance and notify parents when their child's attendance is less than 50%. This technique has the benefit of allowing each student to view the number of days they have attended in a given month [20–25].

Related Works

Prior to the RFID system, smart cards and barcodes were more widely used for a variety of purposes, including tracking employees and students as well as for attendance and supervision.

1. In order to improve the current monitoring and attendance systems and ensure student security, we plan to integrate the RFID technology into our project.
    - An RFID tag is an item that is affixed to or placed within a product, a person, or an animal in order to use radio waves for tracking and identification. Certain tags have the ability to be read from distances of several centimeters or meters, even beyond the reader's line of sight.

PROPOSED APPROACH

The suggested approach allows teachers to take student attendance via a QR code instead of a paper sheet of paper. The teacher can create QR codes, view attendance, and update it as needed with this program. Whether a pupil is present or not, the teacher can send them a notification. We keep all student data in our database for easy backup and retrieval. Our suggested smart attendance system seeks to do away with the drawbacks of the old one. We can prevent the use of paper and save teacher and student time by implementing this approach. Unlike the old system, this one does not require teachers to keep any kind of record.

A two-dimensional barcode called a QR code (as shown in Figure 1) offers a rapid and effective way to store and retrieve student data. Numerous applications, including marketing, ticketing, contactless payment, and many more, make use of QR codes. The teacher's straightforward login procedure is required by the system. The user can scan the produced QR code after logging in. Students can scan the QR code at the start of class, and their attendance is recorded when they do so. For every student in the class, the entire process of effectively completing their attendance should take less than one minute. Flow chart is shown in Figure 2

Advantages of the Smart Attendance System

- Better security is provided by this system;
- Easy and affordable maintenance is provided;
- Results are generated promptly;
- Accurate and efficient data is provided;
- User-friendly;
- No paperwork is necessary;
- Real-time data is provided.

Figure 1. Generated QR code.

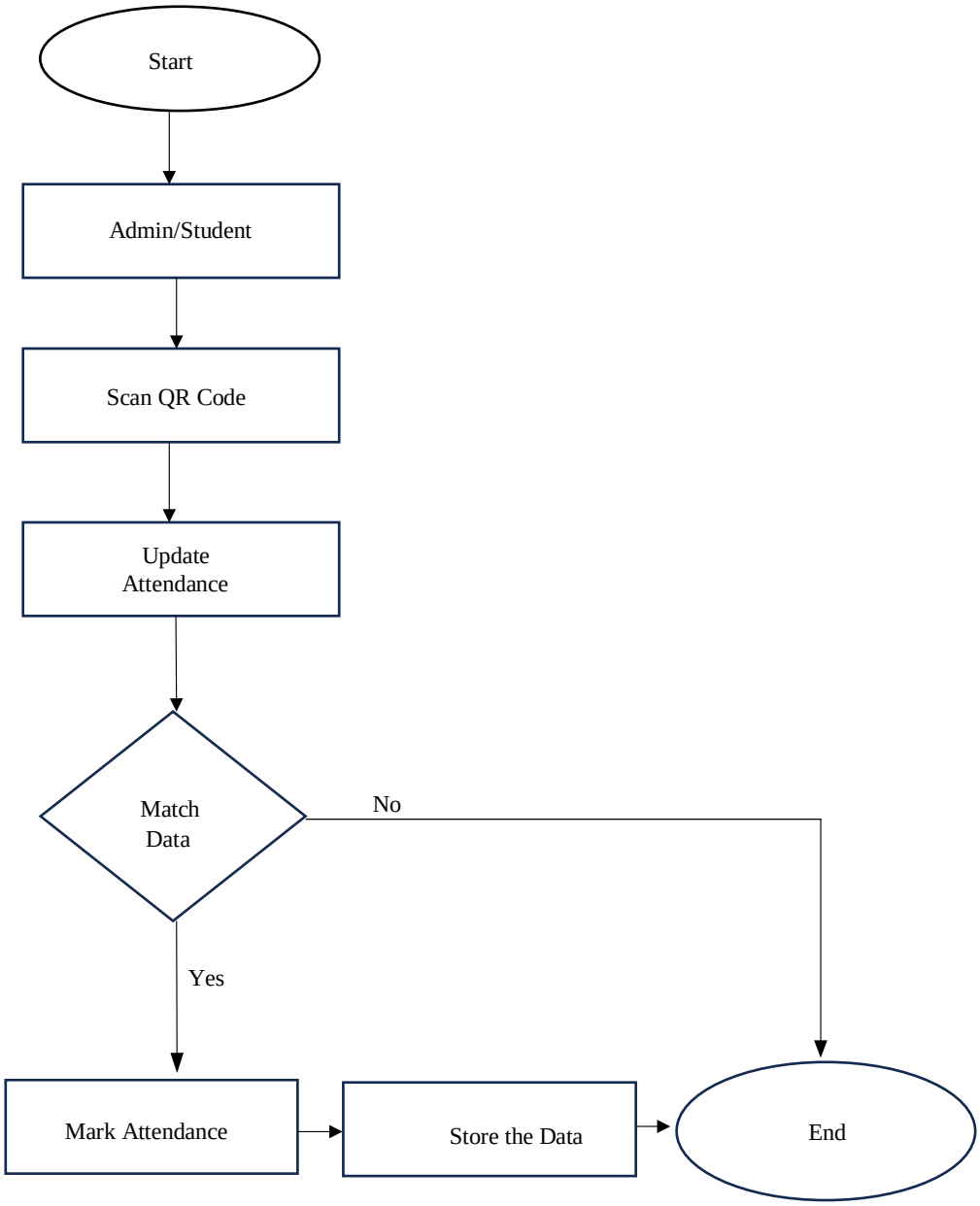

Figure 2. Flow Chart.

CONCLUSION

Nowadays, everyone needs to keep up with new technology, especially in the field of education. Presently, all educational establishments aim to improve their teaching methods by incorporating the newest technological advancements. Examining the old attendance system reveals that this procedure wastes lecture time and requires a lot of time from the professors Under this system, the student's

attendance will be recorded by utilizing the QR code scanner. The student attendance is accurately maintained and provided by the smart attendance system. We have given an overview and advantages of the smart attendance system in this article.

It is a productive way to keep the information in the database.

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