

## Smart Attendance Card

**Dr. Anita Dixit<sup>1</sup>, Aarti Hiremath<sup>2</sup>, Sahana Talvar<sup>3</sup>, Varshini Handral<sup>4</sup>, Netravati Jogin<sup>5</sup>**

<sup>1</sup>Dr. Anita Dixit, Professor, Department of Information Science and Engineering, SDMCET Dharwad, Karnataka, India

<sup>2</sup>Aarti Hiremath, Student, Department of Information Science and Engineering, SDMCET Dharwad, Karnataka, India

<sup>3</sup>Sahana Talvar, Student, Department of Information Science and Engineering, SDMCET Dharwad, Karnataka, India

<sup>4</sup>Varshini Handral, Student, Department of Information Science and Engineering, SDMCET Dharwad, Karnataka, India

<sup>5</sup>Netravati Jogin, Student, Department of Information Science and Engineering, SDMCET Dharwad, Karnataka, India

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**Abstract** - The Smart Card-Based is the method used to monitor student attendance is a comprehensive project aimed at improving the efficiency and accuracy of tracks student attendance in educational institutions. This project utilizes smart card technology to automate attendance recording and provides a reliable solution for attendance management. Among the uses of radio frequency identification (RFID) are campuses access and public transportation tickets. It enables us to authenticate an RFID owner quickly and legally.

Smart Card-Based Student Attendance System is a novel solution designed to streamline and enhance the process of recording student attendance in educational institutions. This system leverages smart card technology to automate attendance tracking, ensuring accuracy and efficiency while reducing the administrative burden on educators. The core functionality of the system involves students simply tapping their smart cards on designated readers upon entering the classroom. This action instantly records their attendance in a centralized database. Educators can access real-time attendance data, track absenteeism, and generate reports effortlessly through a user-friendly interface.

**Key Words:** Smart attendance card, IoT, RFID, Arduino, data management.

### 1. INTRODUCTION

This system leverages smart card technology to automate attendance tracking, ensuring accuracy and efficiency while reducing the administrative burden on educators. Traditional attendance systems often rely on manual methods such as paper registers or manual data entry, which are prone to errors and time-consuming. In contrast, the Smart Card-Based Student Attendance System utilizes Each pupil received a contactless smart card. These cards contain unique identification information and makes ease scanning using RFID or NFC technology. Students can easily identify them with the help of RFID tags. RFID scanners possess the ability to read the data stored therein safely and readily. The

data will be transmitted to a distant cloud server for storage. After being evaluated, this saved data will yield real-time analysis and findings regarding student specifics. The RFID system consists of RFID tag (or card) and RFID reader. The tag (or card) possesses a distinct ID that is first stored within the database prior to being assigned to the user. To record the attendance, the user must position the tag a certain distance from the RFID reader. The tag is made up of a microchip that stores a special sequence number that are able to identify objects. The most essential component of the RFID system is the RFID reader. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags at varying frequencies are interrogated by the reader. The computer and reader are further connected so that the data may be processed. This can be done using a USB connector or any wireless connection. Managing student attendance is a critical task in educational institutions. Traditional paper-based methods are time-consuming and prone to errors. The Smart Card-Based Student Attendance System is designed to address these issues by implementing a smart card system that simplifies attendance recording and enhances data accuracy. A Smart Card-Based Student Attendance System is a cutting-edge solution that revolutionizes traditional attendance tracking in educational institutions. By leveraging advanced technology, this system streamlines the process of monitoring student attendance, ensuring accuracy, security, and efficiency. In this era of digital transformation, such a system not only simplifies administrative tasks but also enhances the overall. Educational experience by promoting transparency and accountability. In this discussion, we will delve deeper into the key components, benefits and implementation of this innovative system. Furthermore, this system promotes

security and ty by ensuring that only authorized individuals can record attendance. The data collected is encrypted and stored securely, protecting students' privacy.

## 2. LITERATURE REVIEW

[1] Smart Attendance Management is a solution to one the most challenging and long-standing problems in management of employee or student's attendance. This work introduces a new paradigm of monitoring student attendance utilizing Internet of Things-based Radio Frequency Identification (RFID) (IoT). Institutions of higher learning are worried about sporadic student attendance. A student's overall academic performance may be impacted by truancy. It takes a long time and is ineffective to take attendance the old-fashioned way, which involves slurs or having individuals sign papers. One way to solve the issue is to use an IoT system with an RFID-based attendance system. IoT and RFID, the two most prevalent trends in technological research, are included in the suggested study.

[2] This work is predicated on combination of RFID tags and facial recognition for monitoring systems. The authors have contributed to present a solution based on combination of facial recognition and RFID (radio frequency identification) tags for the office's surveillance monitoring system (SMS). The SMS is built based on two main techniques to building smart systems which consist of face recognition technology and RFID tag recognition which will enable the admin to monitor student attendance when they are entering or leaving. The authors have used the deep neural network for employing the face recognition module. The system is connected to the SQL Server database at the backend to store and retrieve student information that will help in monitoring ang managing the attendance. They have used MFRC522 as the RFID card reader.

[3] This paper discusses the usage of an RFID tag to uniquely identify a person and produce a key to access the RFID's content using the user's fingerprint template. Via an inventive Wi-Fi system, this data is transmitted to a cloud server. Additionally, this system encourages the use of the Internet, where data is processed, stored, and made available. RFID technology offer a unique blend of convenience, security, and functionality compared to traditional methods. Ditching pen and paper, simply tap the card for touchless, speedy attendance marking, saving time and reducing administrative burden. Plus, the embedded chip makes forging or copying difficult, boosting reliability and security. Real-time tracking and potential connection to access control systems further strengthen its effectiveness.

[4] This work presents a facial recognition utilizing convolutional neural networks for deep learning in an attendance system. This transfers learning by using three pre-trained convolution neural networks and trained them on our data. The networks show high performance in terms of high prediction accuracy and reasonable training time. Facial recognition systems seamlessly identify individuals as

they walk through designated points, offering a truly touchless and effortless experience. This improves convenience while also encouraging hygiene in sensitive environments. Facial recognition technology offers a unique and powerful approach to attendance management, providing unparalleled convenience, enhanced security, and efficient scalability. However, addressing privacy concerns, ensuring technological reliability.

[5] The design and development of smart attendance card using NFC simplifies smart attendance card development. Choose dedicated cards or leverage smartphones' built-in NFC for portability. Selecting an appropriate chip, encode data securely, and design a user-friendly interface. Developing a mobile app or reader software for data transmission. Build a central platform for secure data storage and management. Prioritize robust security throughout the process. NFC shines with its tap-to-mark convenience, real-time data access, and potential for additional features like location tracking or access control integration. Be mindful of smartphone compatibility, potential security vulnerabilities, and the need for technical expertise.

[6] This system also records attendance using Bluetooth low energy (BLE) wireless technology based on low-cost devices call beacons. A number of studies have proposed the integration of BLE beacons with RFID technology, placing BLE stickers on ID cards or enabling the scanning of an ID card after receiving identifiers from nearby beacons. But these methods suffer from the same problem, whilst being more complex and costly. It addresses both of those features, whilst opening the possibility for future advanced data analysis. The design relies on three main components: (1) BLE beacons, (2) a custom web service, and (3) a custom-built mobile application. Beacons assume the responsibility of the location providers. Given their little stature and are programmable in the sense that they can emit custom data tags up to a specified range (determined by the signal strength). Thus, they serve as landmarks for the lectures. The mobile application functions as the user interface providing the students with additional information.

## 3. SYSTEM ARCHITECTURE

### Imported Modules

**RFID Cards or Tags:** These are physical cards or tags embedded with RFID (Radio Frequency Identification). Each card is unique and is associated with an individual's identity in the system.

**RFID Readers:** These are devices capable of reading the information stored on RFID cards/tags. They are usually placed at entry points or designated locations where individuals need to register their attendance.

**Microcontroller or Single Board Computer (SBC):** A microcontroller (such as Arduino) is often used to interface with the RFID reader and manage the attendance data. It

processes details from the readers and send it to the database.

**Database:** A database is accustomed to store information about individuals, their attendance records, and other relevant data. This could be a relational database like MySQL.

**Communication Module:** This module facilitates communication between the microcontroller/SBC and the database server. It could be Ethernet, Wi-Fi, GSM, or any other communication protocol depending on the network infrastructure available.

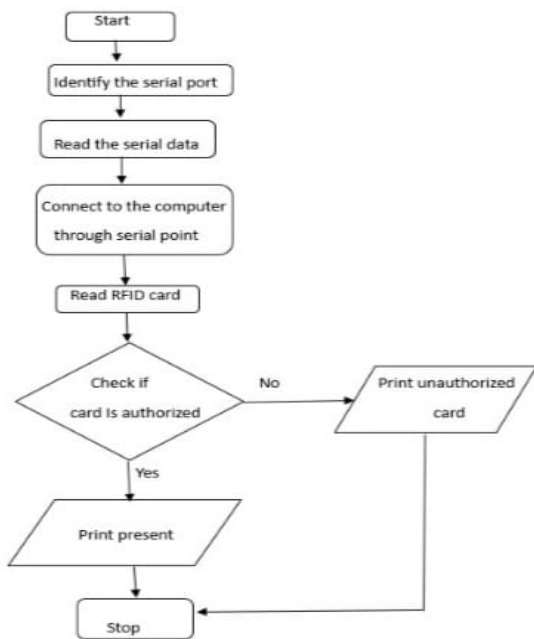
**Attendance Management Software:** This is the software interface that allows administrators to view, manage, and analyse attendance data. It provides functionalities such as registering new users, generating reports, and setting up attendance rules.

**Power Supply:** Depending on the setup, a power supply module might be needed to ensure continuous operation of the system. This could be a simple power adapter or a more sophisticated power management system.

**Security Features:** To guarantee the security and integrity of attendance data, encryption and authentication mechanisms may be implemented. This could involve encryption of data transmitted between the both Arduino and the reader user authentication mechanisms for accessing the attendance records.

**Flow Chart**

The Fig. 1 represents the flow chart of smart attendance card.



**Fig.1: Flow chart of proposed work**

**Start:** The process begins with the user scanning the card.

**Identify the serial port:** The initial action is to identify the serial port on the RFID reader. This is usually done by looking at the reader's documentation or by using a trial-and-error method.

**Read the serial data:** Once the serial port is identified, the next step is to read the serial data from the reader.

This data will contain the ID quantity of the RFID tag that has been scanned.

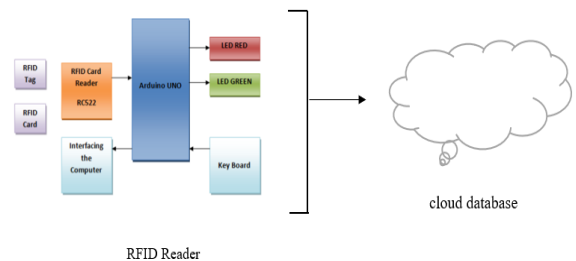
**Connect to the computer through serial point:** The next step is to connect the RFID reader to the computer through the serial port. This is usually done using a USB cable.

**Read RFID card:** Once the reader is connected to the computer the following action is to read the RFID card. This is done by placing the card near the reader's antenna.

**Check if card is authorized:** The system will then check if the ID number of the RFID card is authorized. If the card is authorized, the following step will be initiated by the system. If the card is not authorized, the system will print an unauthorized message and stop the process.

**Print for authorized card:** If the card is authorized, the system will print the name of the cardholder and the date and time the card was scanned. **Stop:** The process will then stop.

**Block Diagram**



**Fig.2: Block diagram of smart attendance card**

The above diagram displays a block schematic of an RFID-based attendance monitoring system. The system uses an RFID reader to read the ID of an RFID tag attached to a student's ID card. The reader then sends the ID to an Arduino Uno microcontroller, which communicates with a computer. The computer stores the ID in a cloud database. A keyboard is furthermore linked to the computer, which can be used to add or remove employee IDs from the system. This type of system can be used to track student attendance, as well as to control access to restricted areas. Here are some

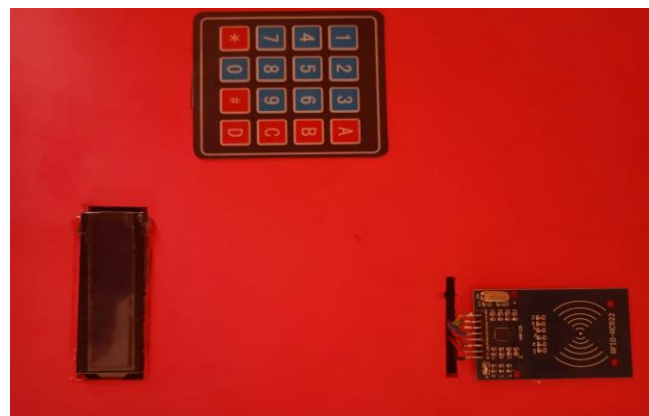
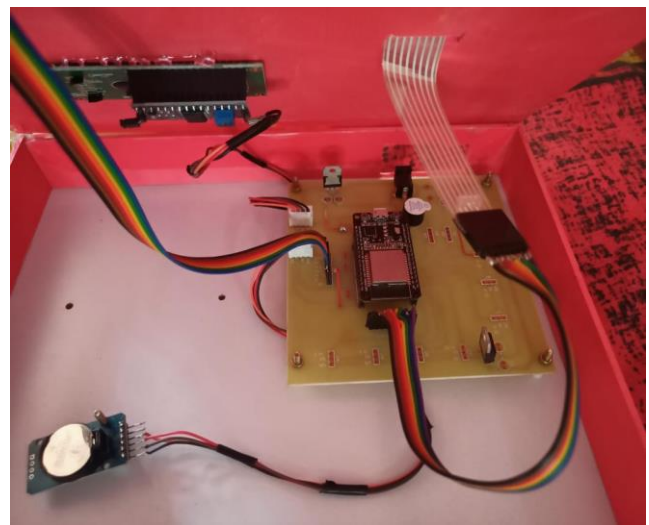
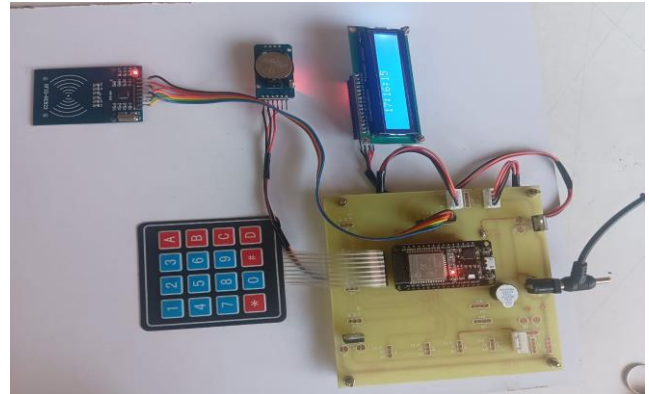
of the benefits of using an RFID-based attendance monitoring system.

- Improved accuracy: RFID Systems have far higher accuracy than traditional timekeeping methods, such as punch cards or time clocks.
- Reduced costs: RFID systems can help to reduce labour costs by automating the attendance tracking process.
- Increased security: RFID systems can assist in improve security by making it more difficult for unauthorized employees to gain access to restricted areas.

#### 4. METHODOLOGY

A smart attendance card system operates by utilizing smart cards and card readers to track and manage student or employee attendance. The methodology of a smart attendance card system is divided into the following steps: Card registration: The administration registers each student or employee with a unique smart card containing their information. Card reader integration: Card readers are strategically placed at entry points, classrooms, or workstations. These Readers interact with the main attendance system. Attendance marking: When a student swipes their card on a card reader, their attendance is automatically recorded in real-time. Data processing: The attendance data is processed and stored in a database, which can be accessed by authorized personnel. Data visualization: The system may display attendance data in various formats, such as registers, graphs, or reports. Integration with other systems: It is possible to integrate the attendance information with other systems, including HR, access control, and time and attendance software. Security: Smart cards can be designed with strong security features to prevent unauthorized access and duplication. The modules used in a smart attendance card system using RFID technology typically include: RFID Reader Module: This module is used to read the information stored on the RFID cards and record attendance. It can be a wireless or wired module, depending on the system design. RFID Cards: These are special cards issued to students or employees, containing unique identification information and access codes. They are used with the RFID reader module to register Attendance Management Software: This software is used to process and manage the attendance data collected from the RFID reader module. It can be integrated with other applications, such as student information management systems or access control systems. Central Section: All of the system's electrical components, including the RFID reader module, are kept in this part., database, and communication protocols.

#### 5. RESULTS



Date	Entry_id	Time	Name	Status
2024-02-19 12:09:04 UTC	12	17:39:22	AARTI	P
2024-02-19 12:09:21 UTC	13	17:40:00	NETRA	A
2024-02-19 12:09:38 UTC	14	17:39:18	VARSHINI	P
2024-02-19 12:09:55 UTC	15	17:39:26	SAHANA	P
2024-03-09 11:49:12 UTC	16	17:18:41	AARTI	P
2024-03-09 11:49:30 UTC	17	17:18:46	NETRA	P
2024-03-09 11:49:47 UTC	18	17:18:50	VARSHINI	P
2024-03-09 11:50:05 UTC	19	17:20:00	SAHANA	A
2024-03-09 11:58:12 UTC	20	17:28:00	AARTI	P
2024-03-09 11:58:30 UTC	21	17:26:40	NETRA	P
2024-03-09 11:58:47 UTC	22	17:26:33	VARSHINI	P
2024-03-09 11:59:05 UTC	23	17:29:00	SAHANA	A
2024-03-09 11:59:30 UTC	24	17:30:00	NETRA	A
2024-03-09 11:59:48 UTC	25	17:30:00	VARSHINI	A
2024-03-09 12:00:05 UTC	26	17:30:00	SAHANA	A
2024-03-10 11:43:13 UTC	27	17:13:40	AARTI	P
2024-03-10 11:43:30 UTC	28	17:14:00	NETRA	A
2024-03-10 11:43:48 UTC	29	17:13:36	VARSHINI	P
2024-03-10 11:44:06 UTC	30	17:13:31	SAHANA	P
2024-03-10 11:57:13 UTC	31	17:28:00	AARTI	A
2024-03-10 11:57:30 UTC	32	17:26:45	NETRA	P
2024-03-10 11:57:48 UTC	33	17:26:30	VARSHINI	P
2024-03-10 11:58:05 UTC	34	17:27:14	SAHANA	P

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## 6. CONCLUSIONS

A low-cost prototype RFID-based attendance system was successfully developed. Comparing the system prototype to the traditional classroom approach reveals a number of benefits. In this prototype for the project is lightweight and compact. It can also be powered by an adaptor or a battery. Due to the 26-bit Wiegand standard used for Tag ID encoding, the attendance is accurate and secure. With switches and communication connectors that are conveniently located, the prototype is simple to use. Participation is simply recoverable and kept. One further benefit of the system is its fast speed of identification and verification. This method has the potential to be utilized in both small and major companies going forward.

## ACKNOWLEDGEMENT

The authors of this paper, are very grateful and would like to express the support and facilities provided by SDMCET, Dharwad. We would also thank our guide, Dr. Anita Dixit for the support and guidance to carry out this implementation successfully. We would also like to thank our Co-Ordinator Prof. Varsha Jadhav for the support. We would also like to thank our friends to keep us motivated during the period of this project

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Dr. Anita Dixit, Professor, Dept of Information Science and Engineering SDMCET, Dharwad, Karnataka, India.



Aarti Hiremath, Student, Dept of Information Science and Engineering SDMCET, Dharwad, Karnataka, India.



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