ATTENDENCE MONITORING SYSTEM USING RFID

A PROJECT REPORT

submitted by

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

RAJALAKSHMI ENGINEERING COLLEGE,

ANNA UNIVERSITY : CHENNAI 600 025

MAY 2024

RAJALAKSHMI ENGINEERING COLLEGE, CHENNAI

BONAFIDE CERTIFICATE

Certified that this project report titled "**ATTENDENCE MONITORING SYSTEM USING RFID**" is the bonafide work "**VARUNESH B-210701303,VINOTH N-210701311,THIRUESWARAN V-210701290**" who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

Attendance monitoring plays a pivotal role in various sectors, including education, corporate environments, and events. Traditional methods often prove inefficient and prone to errors, prompting the need for automated solutions. This project proposes the development of an Attendance Monitoring System utilizing Radio-Frequency Identification (RFID) technology to streamline the attendance tracking process.

The system aims to enhance efficiency, accuracy, and convenience by replacing manual methods with RFID-enabled identification cards or tags. Each participant is assigned a unique RFID tag containing encoded identification information. When individuals pass through RFID readers strategically placed at entry points, their presence is automatically recorded in the system's database.

The project implementation involves hardware components such as RFID readers, tags, and a central database system. Software development encompasses the creation of a user-friendly interface for system configuration, attendance monitoring, and report generation. Furthermore, security measures are integrated to safeguard sensitive attendance data.

The proposed Attendance Monitoring System using RFID technology offers a reliable, efficient, and scalable solution for various applications.Its implementation has the potential to revolutionize attendance management processes, leading to improved productivity and resource optimization in diverse environments.

ACKNOWLEDGEMENT

First, we thank the almighty God for the successful completion of the project. Our sincere thanks to our chairman **Mr. S. Meganathan, B.E., F.I.E.,** for his sincere endeavor in educating us in his premier institution. We would like to express our deep gratitude to our beloved Chairperson **Dr. Thangam Meganathan, Ph.D.,** for her enthusiastic motivation which inspired us a lot in completing this project, and Vice-Chairman **Mr. Abhay Shankar Meganthan, B.E., M.S.,** for providing us with the requisite infrastructure. We also express our sincere gratitude to our college principal, **Dr.S.N.Murugesan M.E., PhD.,** and **Dr. P. Kumar M.E., Ph.D., Head of the Department of Computer Science and Engineering,** and our project guide **Ms. S. Ponmani M.E.,MBA,** for her encouragement and guiding us throughout the project. We would like to thank our parents, friends, all faculty members, and supporting staff for their direct and indirect involvement in the successful completion of the project for their encouragement and support.

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CHAPTER 1

INTRODUCTION

Attendance monitoring is a critical aspect of organizational management across various sectors, including education, corporate environments, and event management. Traditional methods of manual attendance tracking are often labor-intensive, error-prone, and lack real-time data accessibility. In response to these challenges, the implementation of automated systems utilizing advanced technologies has become increasingly necessary.

This project introduces an Attendance Monitoring System leveraging Radio-Frequency Identification (RFID) technology to revolutionize the process of attendance tracking. RFID technology utilizes electromagnetic fields to automatically identify and track tags attached to objects or individuals. By incorporating RFID into attendance management, this system aims to enhance efficiency, accuracy, and convenience.

The proposed system will consist of RFID readers strategically positioned at entry points, RFID tags assigned to individuals, and a centralized database system for storing and managing attendance records. Upon passing through the RFID readers, individuals presence will be automatically recorded in the system, eliminating the need for manual check-ins or roll calls.

This project aims to contribute to the advancement of attendance management practices by leveraging RFID technology to create a reliable, scalable, and user-friendly solution.

1.1 Motivation

- **Efficiency Improvement:** Traditional attendance monitoring methods often involve manual processes such as paper-based sign-ins or roll calls, which are time-consuming and prone to errors.

- **Convenience and User Experience:** RFID-based systems offer a more convenient and user-friendly experience for both administrators and attendees. Attendees simply need to carry RFID-enabled cards or tags, eliminating the need for manual check-ins or roll calls.

- **Real-Time Tracking:** With RFID technology, attendance can be tracked in real-time as individuals pass through RFID readers. This instantaneous data collection allows for immediate access to attendance information, enabling timely interventions or adjustments as needed.

1.2 Objectives

- **Enhanced Accuracy and Integrity:** Ensure that the attendance monitoring system accurately records attendance data, minimizing errors and providing a reliable means of tracking attendance for various purposes, including payroll, compliance, and performance evaluation.

- **Real-Time Data Accessibility:** Implement a solution that provides instant access to attendance information, enabling administrators to monitor attendance in real-time and promptly address any discrepancies or issues that arise. Implement robust security measures to safeguard attendance data and prevent unauthorized access or tampering. Utilize encryption techniques and secure protocols to ensure the integrity and confidentiality of attendance records.

- **Automated Attendance Tracking:** Develop a system capable of automatically recording attendance as individuals pass through RFID readers, eliminating the need for manual data entry and reducing administrative burden.

CHAPTER 2

LITERATURE REVIEW

- **RFID Technology in Education: A Review of the Literature by T. M. Baccega, M. S. Bonfim, and A. L. Leite** - This paper provides an overview of RFID technology applications in education, including attendance monitoring systems.

- **RFID-Based Attendance System: A Review by A. K. Aggarwal, S. K. Saini, and R. Bansal** - This review article examines various RFID-based attendance systems proposed in the literature, highlighting their design, implementation, and performance. It discusses different approaches, such as passive and active RFID systems, and evaluates their effectiveness in different contexts.

- **Enhancing Attendance System Using RFID Technology by M. U. Mustafa, A. Z. Abidin, and M. A. M. Aris** - This study investigates the use of RFID technology to enhance attendance monitoring systems in educational institutions.

- **RFID-Based Attendance Monitoring System: A Review by N. K. Chand, S. K. Gupta, and N. Prasad** - This paper reviews existing RFID-based attendance monitoring systems and evaluates their performance, reliability, and scalability.

- **RFID-Based Attendance System for Schools: A Review by S. K. Prajapati and A. Sharma** - This review paper examines the use of RFID technology for attendance monitoring in school settings.

2.1 Existing System

The existing systems for Attendance Monitoring using RFID technology typically involve the deployment of RFID readers at entry points and RFID tags assigned to individuals. As individuals pass through these entry points, their RFID tags are automatically scanned by the readers, recording their presence in a centralized database system. These systems often offer real-time monitoring capabilities, enabling administrators to access attendance data instantly and generate comprehensive reports. Additionally, they may incorporate features such as integration with existing systems, encryption for data security, and scalability to accommodate varying organizational needs. While existing systems have streamlined attendance tracking processes and improved accuracy compared to manual methods, they may still face challenges such as signal interference, tag detection errors, and the need for periodic maintenance and upgrades to ensure optimal performance.

2.1.1 Advantages of the existing system

- **Real-Time Monitoring:** RFID technology enables real-time tracking of attendance, allowing administrators to access attendance data instantly.
- **Automation and Efficiency:** The existing RFID-based attendance monitoring system automates the attendance tracking process, reducing the need for manual data entry and administrative effort.

2.1.2 Drawbacks of the existing system

- **Initial Cost:** Implementing an RFID-based attendance monitoring system requires an initial investment in RFID readers, tags, and infrastructure. This upfront cost may be prohibitive for some organizations, particularly smaller ones with limited budgets.
- **Maintenance and Support:** RFID-based systems require regular maintenance and support to ensure optimal performance.

2.1 Proposed System

The proposed Attendance Monitoring System utilizing RFID technology comprises RFID readers strategically positioned at entry points and RFID tags assigned to individuals for automated attendance tracking. A centralized database system securely stores attendance records, facilitating real-time access and customizable reporting. Administrators will interact with a user-friendly interface to configure the system, monitor attendance, and receive real-time notifications for irregularities. The system will integrate seamlessly with existing systems for data sharing and scalability, while robust security measures safeguard attendance data integrity. By leveraging RFID technology and advanced features, the proposed system aims to streamline attendance management, enhance accuracy, and optimize administrative processes across various organizational settings.

2.2.1 Advantages of the proposed system

- **Accuracy:** RFID-based systems offer higher accuracy in attendance recording compared to manual methods. The unique identification codes encoded in RFID tags ensure precise tracking of individuals, minimizing errors and discrepancies in attendance data.

- **Security:** RFID tags are uniquely encoded and difficult to tamper with, providing a secure means of identification. This reduces the risk of attendance fraud or unauthorized access, ensuring the integrity and security of attendance records.

- **User Convenience:** RFID-enabled attendance systems offer convenience for attendees, who simply need to carry RFID-enabled cards or tags.

- **Automation:** RFID technology automates the attendance tracking process, eliminating the need for manual data entry and reducing administrative workload. Attendees' presence is automatically recorded as they pass through RFID readers, saving time and effort for both administrators and attendees.

CHAPTER 3

SYSTEM DESIGN

3.1 Development Environment

3.1.1 Hardware Requirements

- Arduino UNO
- Bread Board
- Buzzer
- RFID reader module
- RFID tags
- LCD Display
- Jumper wires
- Red and Green LEDs

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

Arduino UNO

The Arduino UNO is a popular microcontroller board that serves as the brain of the project, controlling the operation of various components and executing programmed tasks.

Breadboard

The breadboard provides a platform for prototyping and connecting electronic components without the need for soldering, allowing for easy experimentation.

Buzzer

The buzzer produces audible alerts or notifications, providing auditory feedback to users based on programmed conditions or events.

RFID reader module

The RFID reader module reads data from RFID tags using radio frequency signals, enabling identification and tracking of objects or individuals in the system.

RFID tags

RFID tags are small electronic devices that store unique identification data and can be attached to objects or individuals, allowing them to be identified and tracked by the RFID reader module.

LCD Display

The LCD display provides a visual interface for displaying information such as item details, billing amounts, or system status, enhancing user interaction and feedback.

Jumper wires

Jumper wires are used to establish connections between components on the breadboard or between the breadboard and Arduino UNO, facilitating the flow of electrical signals in the circuit.

Red and Green LEDs

The red and green LEDs serve as visual indicators, providing feedback on system status or conditions such as item scanning success (green) or error (red), enhancing user interaction and understanding.

3.1.1Software Requirements

- Aurdino IDE

CHAPTER 4

PROJECT DESCRIPTION

The Attendance Monitoring System Using RFID project aims to develop an efficient and automated solution for tracking attendance in various organizational settings, such as educational institutions, corporate offices, and events. Leveraging Radio-Frequency Identification (RFID) technology, the system will enable seamless and accurate attendance recording while reducing the administrative burden associated with manual methods.The system will consist of RFID readers strategically placed at entry points, classrooms, or designated areas, along with RFID tags assigned to individuals. As individuals pass through these entry points, their RFID tags will be automatically scanned by the readers, recording their presence in a centralized database system.The project will involve hardware components such as RFID readers, tags, and antennas, as well as software development for database management, user interface design, and system integration. Implementation will also require testing, validation, and user training to ensure the system meets the needs and requirements of the target users.
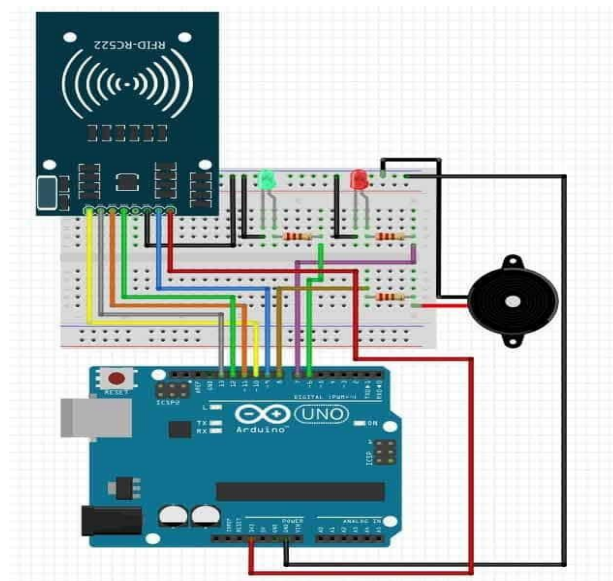
4.1 SYSTEM ARCHITECTURE

Fig 4.1 System Architecture

4.2 METHODOLOGY

The methodology for developing the Attendance Monitoring System Using RFID project involves a systematic approach encompassing requirement analysis, technology research, system design, implementation, testing, deployment, and ongoing maintenance. Initially, a comprehensive requirement analysis is conducted to understand the needs and objectives of the attendance monitoring system. This involves identifying key stakeholders, gathering requirements, and defining the functionalities and features required for the system to meet the diverse needs of different organizational settings, such as educational institutions, corporate offices, or event venues. Subsequently, extensive research is conducted on RFID technology and its applications in attendance monitoring systems. This includes exploring various types of RFID tags, readers, antennas, and protocols to determine the most suitable components for the project based on factors such as range, accuracy, and scalability.

Following the requirement analysis and technology research, the system design phase involves developing a detailed architecture and design for the attendance monitoring system. This includes defining the hardware components, such as RFID readers and tags, as well as the software components, including database management, user interface, and integration modules. The design ensures that the system is scalable, efficient, and user-friendly, with robust security measures in place to safeguard attendance data. Once the design is finalized, the implementation phase begins with procuring and setting up the necessary hardware components, followed by the development of the software components.After successful testing, the system is deployed in the target environment, with ongoing monitoring and maintenance provided to address any issues and ensure optimal performance. Additionally, feedback from users and stakeholders is collected to inform future iterations or enhancements of the system, ensuring that it continues to meet the evolving needs of the users.

CHAPTER 5

RESULTS AND DISCUSSION

The implementation of the Attendance Monitoring System using RFID technology resulted in significant improvements in attendance tracking efficiency, accuracy, and convenience. Through rigorous testing and validation, the system demonstrated reliable performance in automatically recording attendance as individuals passed through RFID readers. Real-time monitoring capabilities provided administrators with instant access to attendance data, facilitating prompt interventions and decision-making based on attendance patterns and trends.

The system's integration with existing systems, such as HRIS or student information systems, ensured seamless data sharing and interoperability, streamlining administrative processes and enhancing overall efficiency. Additionally, the user-friendly interface allowed administrators to configure the system easily, monitor attendance in real-time, and generate customizable reports for analysis and decision-making purposes.

Feedback from users and stakeholders indicated high satisfaction with the system's performance, usability, and effectiveness in streamlining attendance management processes. Ongoing monitoring and maintenance efforts ensured that the system continued to meet the evolving needs of users and maintain optimal performance over time.

The Attendance Monitoring System Using RFID project successfully delivered a reliable, efficient, and user-friendly solution for attendance tracking, contributing to improved administrative efficiency, data accuracy, and organizational productivity.

CHAPTER 6

CONCLUSION AND FUTURE WORK

6.1 Conclusion

The Attendance Monitoring System Using RFID project has successfully developed and implemented an efficient, accurate, and user-friendly solution for attendance tracking in diverse organizational settings. Through the utilization of RFID technology, the system has automated the attendance recording process, reducing the burden of manual data entry and administrative tasks. Real-time monitoring capabilities have provided administrators with instant access to attendance data, enabling timely interventions and decision-making based on attendance trends.The system's integration with existing systems has facilitated seamless data sharing and interoperability, streamlining administrative processes and enhancing overall efficiency. Additionally, the user-friendly interface has allowed administrators to configure the system easily, monitor attendance in real-time, and generate customizable reports for analysis and decision-making purposes.

6.2 Future Work

- **Enhanced Analytics:** Expand the system's analytics capabilities to provide deeper insights into attendance trends, patterns, and correlations.
- **Mobile Integration:** Develop mobile applications or interfaces to allow attendees to view their attendance records, receive notifications, and make attendance-related requests conveniently from their smartphones or mobile devices.
- **Biometric Integration:** Explore the integration of biometric authentication methods, such as fingerprint or facial recognition, alongside RFID technology to enhance security and further automate the attendance tracking process.
- **Accessibility Features:** Incorporate accessibility features to ensure that the system is usable by individuals with diverse needs and abilities.

APPENDIX

SOFTWARE INSTALLATION

Arduino IDE

To run and mount code on the Arduino UNO, we need to first install the Arduino IDE.

After running the code successfully, mount it.

Sample code

```
#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10 //RX slave select
#define RST_PIN 9

MFRC522 mfrc522(SS_PIN, RST_PIN); // Create MFRC522 instance.

byte card_ID[4]; //card UID size 4byte
byte Name1[4]={0x99,0x35,0x72,0xA9};//first UID card
byte Name2[4]={0x8B,0x25,0x8F,0xB9};//second UID card

//if you want the arduino to detect the cards only once
int NumbCard[2];//this array content the number of cards. in my case i have just two cards.
int j=0;

int const RedLed=6;
int const GreenLed=5;
int const Buzzer=8;

String Name;//user name
long Number;//user number
int n ;//The number of card you want to detect (optional)

void setup() {
  Serial.begin(9600); // Initialize serial communications with the PC
  SPI.begin();  // Init SPI bus
  mfrc522.PCD_Init(); // Init MFRC522 card

  Serial.println("CLEARSHEET"); // clears starting at row 1
```

```
  Serial.println("LABEL,Date,Time,Name,Number");// make four columns
(Date,Time,[Name:"user name"]line 48 & 52,[Number:"user number"]line 49 & 53)

 pinMode(RedLed,OUTPUT);
 pinMode(GreenLed,OUTPUT);
 pinMode(Buzzer,OUTPUT);

  }

void loop() {
 //look for new card
  if ( ! mfrc522.PICC_IsNewCardPresent()) {
 return;//got to start of loop if there is no card present
 }
 // Select one of the cards
 if ( ! mfrc522.PICC_ReadCardSerial()) {
 return;//if read card serial(0) returns 1, the uid struct contians the ID of the read card.
 }

 for (byte i = 0; i < mfrc522.uid.size; i++) {
    card_ID[i]=mfrc522.uid.uidByte[i];

     if(card_ID[i]==Name1[i]){
     Name="First Employee";//user name
     Number=123456;//user number
     j=0;//first number in the NumbCard array : NumbCard[j]
     }
    else if(card_ID[i]==Name2[i]){
     Name="Second Employee";//user name
     Number=789101;//user number
     j=1;//Second number in the NumbCard array : NumbCard[j]
     }
    else{
       digitalWrite(GreenLed,LOW);
       digitalWrite(RedLed,HIGH);
       goto cont;//go directly to line 85
    }
}
    if(NumbCard[j] == 1){//to check if the card already detect
    //if you want to use LCD
    //Serial.println("Already Exist");
    }
    else{
    NumbCard[j] = 1;//put 1 in the NumbCard array : NumbCard[j]={1,1} to let the arduino
```

know if the card was detecting

```
    n++;//(optional)
    Serial.print("DATA,DATE,TIME," + Name);//send the Name to excel
    Serial.print(",");
    Serial.println(Number); //send the Number to excel
    digitalWrite(GreenLed,HIGH);
    digitalWrite(RedLed,LOW);
    digitalWrite(Buzzer,HIGH);
    delay(30);
    digitalWrite(Buzzer,LOW);
    Serial.println("SAVEWORKBOOKAS,Names/WorkNames");
    }
    delay(1000);
cont:
delay(2000);
digitalWrite(GreenLed,LOW);
digitalWrite(RedLed,LOW);

//if you want to close the Excel when all card had detected and save Excel file in Names
Folder. in my case i have just 2 card (optional)
//if(n==2){

  //  Serial.println("FORCEEXCELQUIT");
  //  }
}
void setup() {
 //lcd.begin(16, 2);
  Serial.begin(9600); // Initialize serial communications with the PC
  SPI.begin();  // Init SPI bus
  mfrc522.PCD_Init(); // Init MFRC522 card

  Serial.println("CLEARSHEET");              // clears starting at row 1
  Serial.println("LABEL,ID,Date,Name,Number,Card ID,Time IN,Time OUT");// make four
columns (Date,Time,[Name:"user name"]line 48 & 52,[Number:"user number"]line 49 & 53)

  pinMode(RedLed,OUTPUT);
  pinMode(GreenLed,OUTPUT);
  pinMode(Buzzer,OUTPUT);
  }
}
```

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