RFID Based Attendance and Lock System

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Abstract

This project presents an innovative RFID Card Attendance System leveraging Arduino technology for efficient tracking and management. By integrating RFID technology with Arduino, the system offers a secure and automated method for recording attendance. Each student or participant is assigned a unique RFID card, which, when swiped, communicates with the Arduino module to register the attendance data. The system aims to streamline traditional attendance processes, reduce manual efforts, and enhance overall accuracy. This project discusses the design, implementation, and evaluation of the RFID Card Attendance System, highlighting its potential in optimizing attendance management in various educational and organizational settings.

Keywords

RFID, Attendance, Lock System, Security, Automation, Access Control, Embedded System.

Introduction

The RFID Card Attendance System is a technology-based solution used to track and manage attendance in various settings, such as schools, offices, and events. It utilizes Radio Frequency Identification (RFID) technology to identify and record the presence of individuals. RFID (Radio Frequency Identification) Card Attendance System is a technology that allows for automated attendance tracking. The system consists of RFID cards, RFID readers, and a centralized database for storing attendance records.

Each individual is assigned a unique RFID card that contains an embedded RFID chip. These cards are typically in the form of ID cards or badges and can be easily carried or worn by the users. RFID readers are installed at various locations, such as entry points or classrooms, where attendance needs to be recorded. These readers use radio waves to communicate with the RFID cards and capture the unique identification information stored on the cards. When a user enters a designated area with an RFID reader, the reader detects the presence of the RFID card and reads its unique identification

information.The reader sends the captured information to the centralized database, which stores the attendance records. The database updates the attendance record for the corresponding user, marking them as present at the specific location and time and then opens the lock.

Literature Review

- RFID BASED ATTENDANCE SYSTEM USING ARDUINO UNO

This paper, published in July 2021, describes a system that uses RFID tags and reader, Arduino UNO, SD module, LCD, and RTC to record and store the attendance of students or employees. The system is accurate and time-saving, and can be connected to a computer or laptop via USB port to see the data. Authors: Mukesh Kumar Sharma, Nima Donka Tamang ; Date: July 2021

https://www.irjmets.com/uploadedfiles/paper/volume3/issue_7_july_2021/15100/1628083586.pdf

- A project report on ARDUINO BASED RFID ATTENDANCE SYSTEM

This project report, submitted in April 2019, presents a system that uses Arduino, RFID reader and tags, IR sensor, LCD, and buzzer to automate the process of receiving attendance in classrooms, meetings, or events. The system also has some additional functions, such as displaying the name and roll number of the student, and sending an SMS to the parents if the student is absent. Authors: DADI TIRUMALA TARUN; Date: April 2019

https://www.academia.edu/42640620/A_project_report_on_ARDUINO_BASED_RFID_ATTENDANCE_SYSTEM

- Attendance system using Face recognition using Arduino:

This paper outlines a system that uses Arduino UNO, RFID reader and tags, face recognition module, LCD, and buzzer to verify the identity and attendance of the students or employees. The system uses RFID tags as a primary method, and face recognition as a secondary method, to enhance the security and accuracy of the system. Authors: Sukanya Kumbhar, Mohit Jindal ; Date: May 2023

https://ijrdst.org/public/uploads/paper/114991705726066.pdf

- RFID Based Attendance System using Arduino and Adafruit IO:

This project, posted in June 2020, demonstrates a system that uses Arduino UNO, RFID reader and tags, ESP8266 Wi-Fi module, and Adafruit IO cloud platform to log the data of the attendance of the students or employees. The system also allows the user to view the data online through a dashboard, and to export the data as a CSV file.

https://iotdesignpro.com/projects/arduino-rfid-based-attendance-system

- Smart Attendance System using RFID and Arduino

This paper, published in March 2020, proposes a system that uses Arduino board, RFID reader and tags, IR sensor, LCD, and buzzer to monitor and manage the attendance of the students in an institution efficiently. The system also has a feature of voice announcement, which greets the student and announces their name and attendance status. Authors: Sukanya Kumbhar, Mohit Jindal ; Date: May 2023

https://www.ijarsct.co.in/Paper10314.pdf

Hardware Used

- Arduino
- RFID Card
- RFID Reader
- Breadboard
- Wires and Jumpers
- Servo Motors

Software Used

- Arduino IDE
- Microsoft Excel

Methodology

- Hardware Setup:

1. Gather Components:

Arduino Board (e.g., Arduino Uno)

RFID Reader Module, RFID Cards or Tags, Jumper Wires, USB Cable, Breadboard, Computer with Arduino IDE installed.

2. Connect Hardware:

Connect the RFID reader to the Arduino using jumper wires. Typically, RFID modules have pins labeled TX, RX, VCC, and GND. Connect them to the corresponding pins on the Arduino. Connect any additional components such as LEDs or buzzers for visual or auditory feedback.Ensure all connections are secure and check the datasheets for your components for any specific wiring requirements.

- Arduino Programming:

1. Install Necessary Libraries:

Install the required libraries for the RFID module. You can usually find these libraries on the Arduino Library Manager or download them from the manufacturer's website.

2. Write Arduino Code:

Develop an Arduino sketch that reads RFID card data when a card is placed near the RFID reader. Implement logic to record attendance data, for example, by storing RFID card IDs along with a timestamp in an array or a data structure. Include code to communicate with a computer or laptop via serial communication to send the RFID data.Test the code with a simple serial monitor output to ensure the RFID data is being read correctly.

- Data Logging to Excel

Configure Serial Communication:

Set up the Arduino to send data over serial communication to the computer. Ensure that the baud rate and other serial settings match between the Arduino code and the computer.

2. Configure Excel Sheet:

Set up an Excel sheet with appropriate headers, such as Name, Student ID, Date and Time. Save the Excel sheet in a location accessible by your PC application.

- Testing and Integration:

1.Test the System:

Test the RFID card attendance system by swiping RFID cards and verifying that the data is being logged correctly in the Excel sheet.

2. Troubleshoot and Refine:

Debug any issues and refine your system as needed. This may involve adjusting Arduino code, improving data processing logic, or enhancing the PC application.

3. Scale and Deploy:

Once satisfied with the system's performance, it can be deployed for use in the desired environment, such as classrooms, offices, or events.

Flow chart

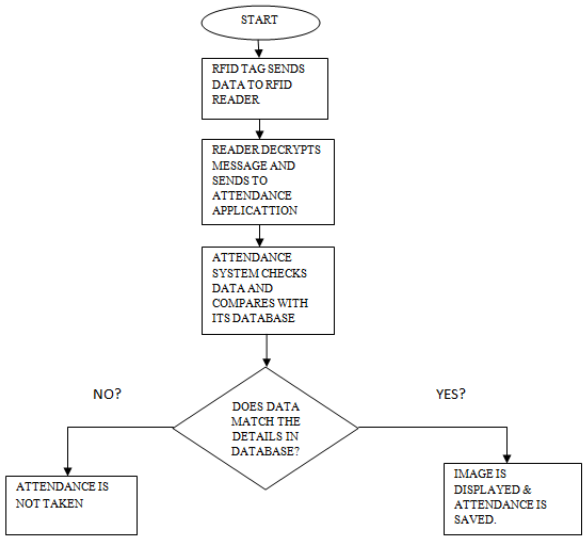


Figure 1

Circuit Diagram

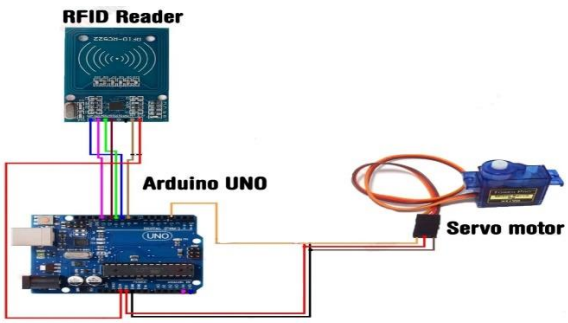


Figure 2

Code:

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

#define SS_PIN 10
#define RST_PIN 9

Servo servo;
MFRC522 mfrc522(SS_PIN, RST_PIN);

byte card_ID[4]; //card UID size 4byte
byte Name1[4]={0xD3,0xA4,0x61,0x1E};//first UID
card
byte Name2[4]={0x90,0x3A,0x6E,0x21};//second
UID card

int NumbCard[2];
int j=0;

String Name;//user name
String Number;
int n ;

void setup() {
  Serial.begin(9600);
  SPI.begin();
  mfrc522.PCD_Init();
  servo.attach(3);
  servo.write(110);

  Serial.println("CLEARSHEET");               // clears
starting at row 1
  Serial.println("LABEL,Name,Roll
Number,Date,Time,");// make four columns
  }

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="John";
      Number="21BRS1111";

      j=0;//first number in the NumbCard array :
NumbCard[j]
```

```
    }
    else if(card_ID[i]==Name2[i]){
     Name="Mathew";//user name
     Number="21BPS1234";//user number
     j=1;//Second number in the NumbCard array :
NumbCard[j]

    }
    else{
       goto cont;
    }
}
    if(NumbCard[j] == 1){
       servo.write(0);
         delay(3000);
         servo.write(110);
    }
    else{
         servo.write(0);
         delay(3000);
         servo.write(110);

    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," + Name);//send the Name to
excel
    Serial.print(",");
    Serial.print(Number); //send the Number to excel
    Serial.println(",DATE,TIME,");

Serial.println("SAVEWORKBOOKAS,Names/Work
Names");
    }
cont:
delay(2000);

}
```

Result

The RFID Based Attendance and Lock System is a cutting-edge solution that enhances security and streamlines attendance tracking processes. By utilizing RFID technology, this system offers efficient and accurate identification of individuals accessing a particular location. Each user is assigned a unique RFID tag, which they can use to gain entry into secured areas. Furthermore, the system automatically records attendance data as individuals swipe or pass their RFID tags, eliminating the need for manual attendance taking. This not only saves time but also reduces the likelihood of errors associated with traditional methods. Additionally, the system can be integrated with existing databases for seamless data management and analysis.

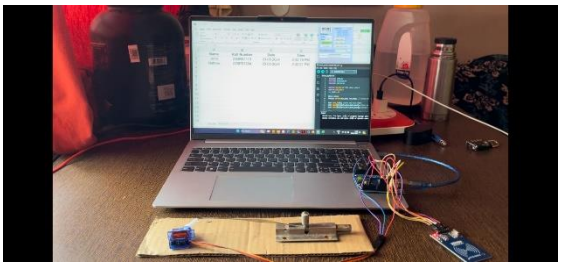
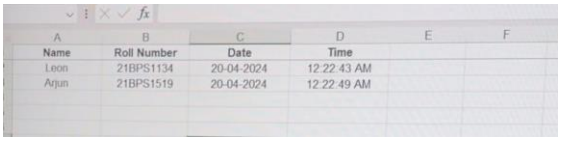


Figure 3: Project Setup



Name	Roll Number	Date	Time
Leon	21BPS1134	20-04-2024	12:22:43 AM
Arjun	21BPS1519	20-04-2024	12:22:49 AM

Figure 4: Excel Sheet Output

Moreover, the inclusion of a lock system adds an extra layer of security by restricting access to authorized personnel only. This ensures that sensitive areas remain protected at all times. Overall, the RFID Based Attendance and Lock System offers a comprehensive solution for organizations seeking to enhance security and streamline attendance tracking processes.

Novelity and Future Implementation

Mobile Application Integration: Develop a mobile application that syncs with the RFID Card Attendance System. This app could allow users to check their attendance records, receive notifications, and provide

a convenient alternative for attendance marking.

Geofencing for Location-Based Attendance: Integrate geofencing technology to ensure that attendance is recorded only when individuals are within a specified location. This adds an extra layer of accuracy and security, particularly in large campuses or organizations with multiple buildings.

Smart Notifications and Alerts: Implement smart notifications and alerts that notify administrators, teachers, or students about attendance-related events such as low attendance, late arrivals, or important announcements.

Biometric Integration for Multi-Factor Authentication: Explore the integration of biometric authentication (e.g., fingerprint or iris recognition) in addition to RFID cards. This multi-factor authentication enhances security and ensures that the person using the card is the authorized user.

Conclusion

In conclusion, the integration of RFID card access control with Excel spreadsheets represents a significant leap forward in modern security and data management systems. The seamless interaction between RFID technology and Excel enables a streamlined and efficient approach to access control, eliminating the need for cumbersome manual record-keeping. The real-time transmission of user details to an Excel sheet not only enhances accuracy but also centralizes data, providing administrators with a comprehensive tool for monitoring and managing access logs. This project showcases the potential of RFID technology in enhancing security and efficiency in various settings, from educational institutions to corporate offices.

By leveraging RFID-based attendance and lock systems, organizations can ensure better control over access, improve accountability, and enhance overall security measures. The successful implementation of this project underscores the effectiveness of integrating innovative technologies to address contemporary challenges in access management and data tracking.

References

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[4] Mukesh Kumar Sharma, Nima Donka Tamang ; Date: July 2021 RFID BASED ATTENDANCE SYSTEM USING ARDUINO UNO https://www.irjmets.com/uploadedfiles/paper/volume3/issue_7_july_2021/15100/1628083586.pdf

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