A
Project Report
On

AttenderX
(RFID Attendance System)

Submitted in partial fulfillment of the requirements
For the degree of

Bachelor of Engineering in
CSE(A.I.M.L.)

By

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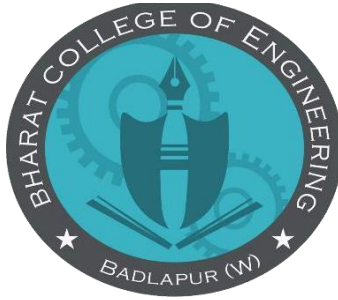**Prof. (Pratiksha Shinde)**

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CERTIFICATE

This is to certify that, the Project titled
" AttenderX(RFID Attendence System) "
is a bonafide work done by

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Bachelor of Engineering In
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ABSTRACT

REASEARCH FOCUS : RFID Attendance System with Simple Function of collecting Data from the User (Using their unique NFC Identity Card)

PRESENTATION TYPE : Working Module Presentation.

The traditional methods of taking attendance in educational institutions and workplaces often involve manual, time-consuming processes that are prone to errors and inefficiencies. In response to these challenges, RFID (Radio-Frequency Identification) technology has emerged as a promising solution to automate and streamline attendance management. This paper presents an in-depth exploration of an RFID-based attendance system, highlighting its key components, advantages, and potential applications.

The RFID attendance system leverages RFID tags and readers to identify and record the presence of individuals, thereby offering a swift and accurate means of tracking attendance. The system's architecture and workflow are outlined in this paper, emphasizing its ease of integration into existing attendance tracking systems. Furthermore, we discuss the advantages of RFID technology, including real-time data capture, reduced administrative burden, enhanced security, and the elimination of manual data entry errors.

In addition to its use in educational institutions, the RFID attendance system's versatility extends to various industries, such as corporate settings and events management. By automating attendance management, organizations can enhance their operational efficiency and allocate resources more effectively. Moreover, the system's ability to generate detailed attendance reports and analytics provides valuable insights for decision-makers.

This paper concludes by underlining the potential of RFID technology to revolutionize attendance management and improve overall productivity in diverse settings. By adopting RFID-based attendance systems, institutions and organizations can save time, reduce costs, and ensure more accurate attendance records, ultimately leading to improved performance and accountability.

[1]

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1. Introduction:

1.1 About

Attendance tracking is a fundamental aspect of managing educational institutions, corporate workplaces, and various other organizations. Traditionally, this process has relied on manual methods, such as paper-based sign-in sheets or biometric systems, which often prove to be cumbersome, time-consuming, and prone to inaccuracies. In response to these limitations, Radio-Frequency Identification (RFID) technology has emerged as a transformative solution to automate and enhance attendance management. RFID attendance systems offer a seamless and efficient means of recording and monitoring attendance, providing a more accurate and convenient alternative to traditional methods.

RFID technology utilizes wireless communication and data capture through RFID tags and readers. Each RFID tag, typically attached to an identification card or wearable device, emits a unique identifier when activated by an RFID reader. This technology is adaptable to various environments, from classrooms to boardrooms, and has the potential to revolutionize how organizations manage attendance.In this era of digital transformation, the RFID attendance system not only simplifies the process of taking attendance but also offers valuable insights, analytics, and streamlined administrative tasks. This introduction sets the stage for a comprehensive exploration of RFID attendance systems, delving into their architecture, applications, benefits, and the potential to revolutionize attendance management in a variety of settings.

1.2 Problem Defination

1. Inaccuracy and Fraud: Manual attendance can be easily manipulated or marked on behalf of absent individuals, leading to inaccurate records and potential fraud.
2. Time-Consuming Administrative Tasks: The manual entry of attendance data consumes valuable administrative time and resources, diverting them from more productive activities.
3. Inefficient Resource Allocation: Without real-time data, institutions and organizations struggle to make timely decisions regarding resource allocation and scheduling.
4. Data Integrity and Security: Manual records are susceptible to loss, damage, and unauthorized access, posing risks to data integrity and privacy.
5. Lack of Timely Insights: Traditional methods hinder the ability to generate timely attendance reports and analytics for effective decision-making.
6. Cumbersome Tracking in Large Groups: In large gatherings, events, or lectures, manual attendance tracking becomes impractical, making it difficult to monitor participants

1.3 Scope of Project:

The scope of the RFID attendance system project encompasses the design, development, and implementation of an efficient and user-friendly system for automating attendance tracking in diverse environments such as educational institutions, corporate offices, and events. The project will involve the selection and deployment of RFID technology, including RFID tags and readers, to accurately record attendance. Key features will include real-time data capture, secure data storage, and reporting capabilities, along with integration into existing attendance management systems where applicable. The project's scope also covers customization to suit specific requirements of different organizations, scalability for future expansion, and the potential for further enhancements and integrations with complementary technologies. Overall, the RFID attendance system project aims to provide a comprehensive solution for optimizing attendance management processes while offering opportunities for adaptability and future improvements.

2 Review of Related Work:

2.1 Review on Existing Attendance System

The conventional paper-based attendance system, which many educational institutions and workplaces still rely on, is nothing short of a relic in today's technologically advanced world. It embodies the worst of outdated practices, causing frustration and inefficiencies for both students and employees.

First and foremost, the manual attendance system is plagued by its inherent inaccuracy. The reliance on individuals to mark their attendance on a sheet of paper or sign-in book leaves ample room for dishonesty and manipulation. It's a system that practically encourages proxy attendance, where someone else can easily sign in on your behalf, rendering the records utterly unreliable.

2.1.2 Review on Simple Attendance System

The old-fashioned attendance system is far from compliant with modern data security standards. The lack of real-time data is another glaring issue. In an era where real-time information is vital for decision-making, the manual system falls woefully short. Managers and administrators are left in the dark, unable to make timely adjustments or allocate resources effectively, which can result in scheduling and resource allocation mishaps.

2.2 Critical Remarks

2.2.1 Strength and Weakness

Application	Strength	Weakness
Simple Attendance System	It can't be hack and edit by another person.	It needs to be preserved carefully.
Existing Attendance System	Existing attendance system very precise to collect attendance form the user	Since it's on Digital platform it can be hacked.

Table 2.2.1 Strength and Weakness of Reviewed Attendance System

2.2.2 Application Comparison

Application/Criterial	Simple Attendance syatem	Existing Attendance System	Proposed Application (AttenderX)
User Interface	Poor	Good	Doesn't need
Sorting and searching User Data (Information)	slow	average	Super Fast
Preciseness	X	√	√
Storing Information	√	√	√
Acessibility	√	√	√

Table 2.2.2 Comparison among Reviewed and Proposed Application

3. Planning:

The RFID attendance system planning involves a comprehensive process of designing, implementing, and managing an efficient and user-friendly attendance tracking system. It includes the identification of key stakeholders and their requirements, selection of suitable RFID technology components (tags, readers, and software), customization of the system to cater to specific organizational needs, consideration of budget constraints, and a timeline for deployment. Additionally, planning encompasses data security and privacy measures, as well as user training and support strategies to ensure a smooth transition from traditional methods to the RFID-based system. The planning phase should also account for scalability and potential future enhancements, making it a crucial step in the successful integration of RFID technology into attendance management processes.
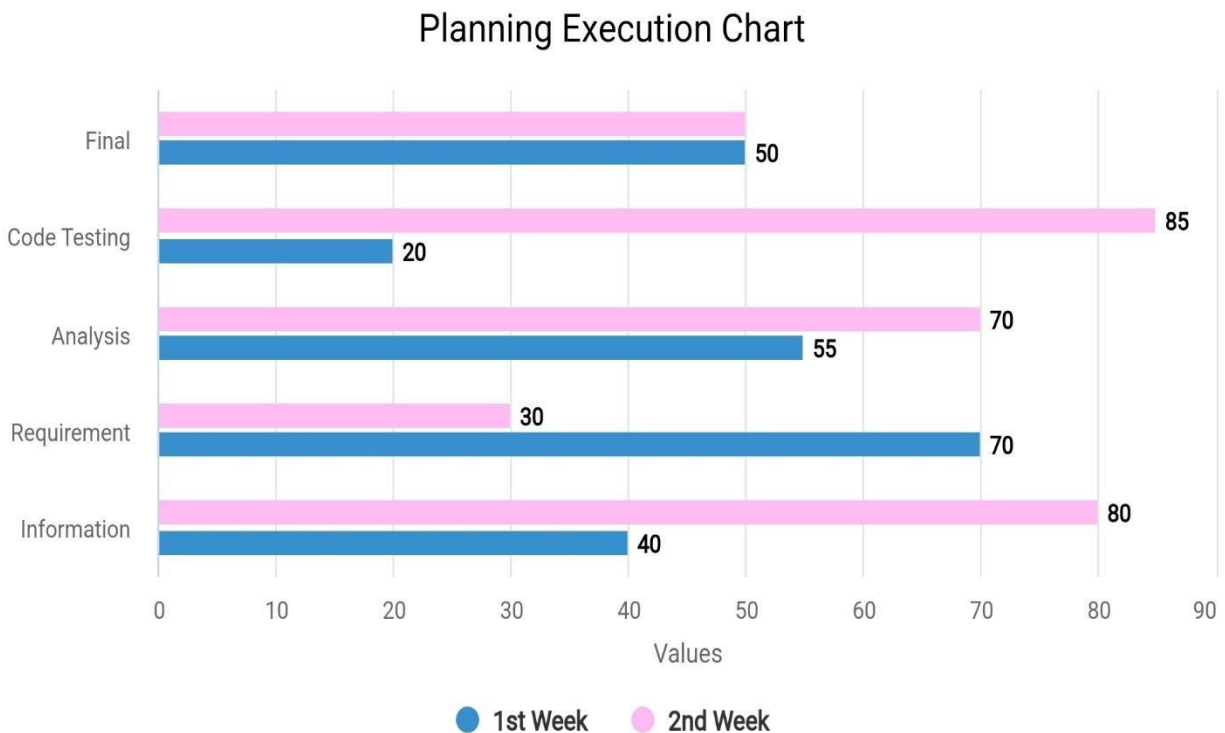

Fig.3 Work Plan

The Distribution of project work.

Blue for 1st Week

Pink for 2nd Week

4. Methodology:

4.1 Project System and Methodology

The RFID attendance system methodology entails a structured approach to the system's development and implementation. It involves initial requirements gathering, system design, and component selection, followed by the installation and configuration of RFID hardware and software. The system's functionality is thoroughly tested, and any necessary customizations are made. Once operational, users are trained, and the system undergoes a pilot phase to identify and rectify any issues. Full-scale deployment follows, and ongoing monitoring, maintenance, and support mechanisms are established to ensure the system's long-term effectiveness and efficiency. Regular evaluation and feedback loops are implemented to drive continuous improvements and adaptations as needed, making the methodology a dynamic and iterative process.

Fig.4.1 Spring Boot

4.2 System Requirements

4.2.1 Software Requirements

1.VScode Studio

2.Spring Boot

3.Java

4.2.2 Hardware Requirements

NodeMCU   RFID (RC-Reciver)

4.3 User Requirements

User requirements for an RFID attendance system include the need for a user-friendly interface that allows quick and efficient RFID tag registration, real-time attendance tracking, and a user authentication process. Users expect secure and accurate data capture, easy integration with existing attendance management systems, and the ability to generate comprehensive attendance reports and analytics. The system should also accommodate various user roles, such as administrators, teachers, and students or employees, with specific access levels and permissions. Additionally, users may require mobile accessibility for convenient on-the-go attendance monitoring, as well as customization options to adapt the system to their specific organizational or institutional needs, ensuring a seamless and user-centric experience.

5. Design of the System:

FLOWCHART
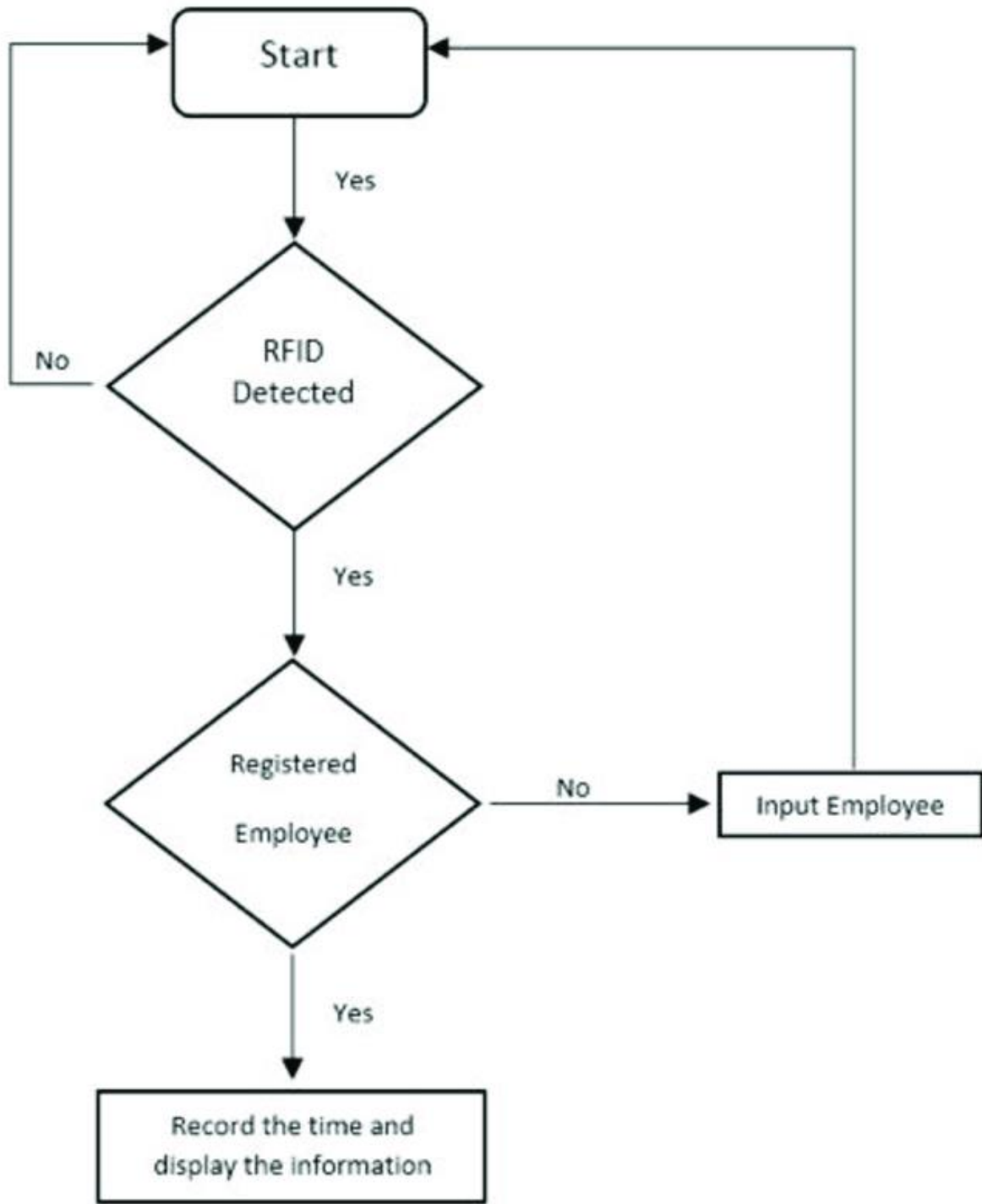
5.2 Connection and Working

The connection of a NodeMCU (an open-source IoT platform based on the ESP8266 WiFi module) and an RFID (Radio-Frequency Identification) module involves interfacing the RFID module with the NodeMCU using suitable pins. Typically, you would connect the RFID module's power and ground pins to the NodeMCU's 3.3V and GND pins, respectively, to ensure proper power supply. Then, you connect the RFID module's data pins (usually Rx and Tx) to the NodeMCU's GPIO pins, which are designated for serial communication. This allows the NodeMCU to receive RFID tag data and process it for various applications, such as attendance tracking or access control. The NodeMCU can then use its WiFi capabilities to send the RFID tag information to a remote server or perform other IoT-related tasks based on the RFID data received, offering a wireless and connected solution for RFID applications.
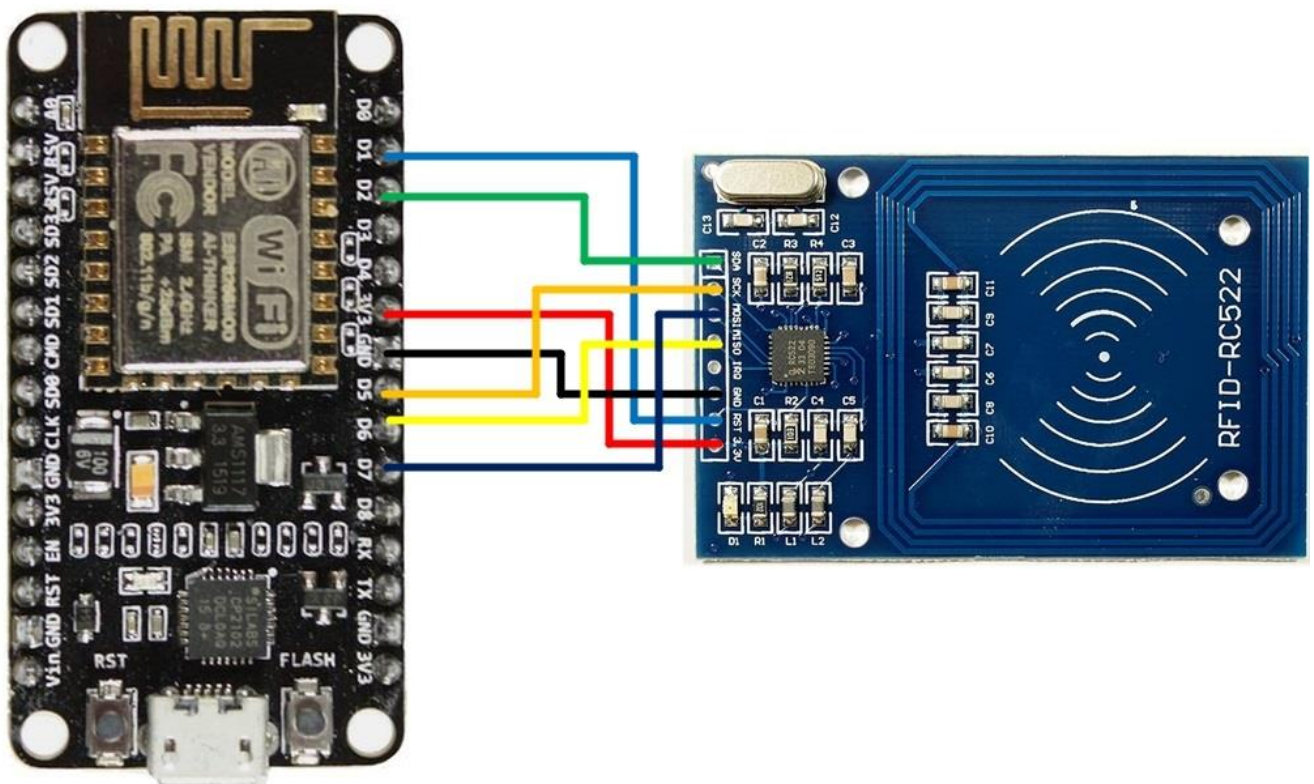

Fig.5.2.2

Fig.5.5.3

- Tap the NFC Identity Card on the RFID Reader Device

Fig.5.2.4

- Once you tap the tag on the device the program execute and the registered ID is get printed on the Excel Sheet

5.2.1 Code

Audrino NodeMCU and RFID Reader Connecting Code

```
#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266WebServer.h>
#include <EEPROM.h>
#include <SPI.h>
#include <MFRC522.h>
//#include <ESP8266HTTPClient.h>
#include <ESP8266HTTPClient.h>
#include <ESP8266httpUpdate.h>
#ifndef APSSID
#define APSSID "AttenX"
#define APPSK "12345678"
#define SS_PIN 15
#define RST_PIN 2
#endif
const char * ssid = APSSID;
const char * password = APPSK;
String qpass, qsid;
//RFID Card
int readsuccess;
byte readcard[4];
char str[32] = "";
String StrUID, adrs;
ESP8266WebServer server(80);
WiFiClient client;
MFRC522 mfrc522(SS_PIN, RST_PIN);
void clearErom();
void WifiSetupAttenx();
```

```
void handleRoot();
void setup() {
  Serial.begin(9600);
  pinMode(LED_BUILTIN, OUTPUT);
  digitalWrite(LED_BUILTIN, LOW);
  Serial.println();
  SPI.begin(); //--> Init SPI bus
  mfrc522.PCD_Init(); //--> Init MFRC522 card
  EEPROM.begin(512);
  Serial.print("Configuring access point...");
  WifiSetupAttenx();
  server.on("/", handleRoot);
  server.begin();
  Serial.println("HTTP server started");
  Serial.println("Please tag a card or keychain to see the UID !");
  Serial.println("");
}
void loop() {
  server.handleClient();
  readsuccess = getid();
  if (readsuccess) {
    String UIDi=String(String(adrs)+ String(StrUID));
    Serial.println(UIDi);
    ESPhttpUpdate.update(client, UIDi.c_str());
    delay(1000);
  }
}
void WifiSetupAttenx() {
  WiFi.mode(WIFI_STA);
  for (int i = 96; i < 300; ++i) {
    adrs += char(EEPROM.read(i));
```

```
}
String esid;
for (int i = 0; i < 32; ++i) {
  esid += char(EEPROM.read(i));
}
Serial.println();
Serial.print("SSID: ");
Serial.println(esid);
Serial.println("Reading EEPROM pass");
String epass = "";
for (int i = 32; i < 96; ++i) {
  epass += char(EEPROM.read(i));
}
Serial.print("PASS: ");
Serial.println(epass);
WiFi.begin(esid.c_str(), epass.c_str());
delay(8000);
if (WiFi.status() == WL_CONNECTED) {
  Serial.println("Wifi Connect.......");
  Serial.print("IP address: ");
  Serial.println(WiFi.localIP());
  digitalWrite(LED_BUILTIN, HIGH);
} else {
  digitalWrite(LED_BUILTIN, LOW);
  Serial.println("Wifi Accesse Point............");
  WiFi.mode(WIFI_AP);
  WiFi.softAP(ssid, password);
  IPAddress myIP = WiFi.softAPIP();
  Serial.print("AP IP address: ");
  Serial.println(myIP);
}
```

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```cpp
}
void clearErom() {
  for (int i = 0; i < 96; ++i) {
    EEPROM.write(i, 0);
  }
}
void handleRoot() {
  if (server.arg("wifi") != "") {
    server.send(200, "text/html", "<h1>You are connected to " + server.arg("wifi") + "</h1>");
    // ESPhttpUpdate.update(client, "http://192.168.0.173/LMS/rfid.php?id="+server.arg("wifi"));
    WiFi.mode(WIFI_STA);
    qsid = server.arg("ssid");
    qpass = server.arg("psk");
    clearErom();
    for (int i = 0; i < qsid.length(); ++i) {
      EEPROM.write(i, qsid[i]);
      Serial.print("Wrote: ");
      Serial.println(qsid[i]);
    }
    Serial.println("writing eeprom pass:");
    for (int i = 0; i < qpass.length(); ++i) {
      EEPROM.write(32 + i, qpass[i]);
      Serial.print("Wrote: ");
      Serial.println(qpass[i]);
    }
    EEPROM.commit();
    // WiFi.begin(qsid, qpass);

    WifiSetupAttenx();
  } else if (server.arg("api") != "") {
    String ads = server.arg("api");
```
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```cpp
    Serial.println("CLEARing EEPROM:");
    for (int i = 96; i < 300; ++i) {
      EEPROM.write(i, 0);
    }
    Serial.println("writing eeprom pass:");
    for (int i = 0; i < ads.length(); ++i) {
      EEPROM.write(96 + i, ads[i]);
      Serial.print("Wrote: ");
      Serial.println(ads[i]);
    }
    EEPROM.commit();
    server.send(200, "text/html", "<h>AttenX API Set=> " + server.arg("api") + "</h1>");
    adrs=ads;
  }
  else if(server.arg("uapi") != ""){
    adrs =server.arg("uapi");
  }
  else if (server.arg("led") != "") {
    if (server.arg("led") == "1") {
      digitalWrite(LED_BUILTIN, HIGH);
    } else {
      digitalWrite(LED_BUILTIN, LOW);
    }
  } else if (server.arg("ID") != "") {
    server.send(200, "text/html", StrUID);
  } else if (server.arg("test") != "") {
    bool AAb = mfrc522.PCD_PerformSelfTest();
    server.send(200, "text/html", (AAb) ? "Connected" : "Disconnect");
  } else {
    server.send(200, "text/html", "<h>Attenx is ready /n</h1>");
  }
```

```
}
int getid() {
 if (!mfrc522.PICC_IsNewCardPresent()) {
   return 0;
 }
 if (!mfrc522.PICC_ReadCardSerial()) {
   return 0;
 }
 Serial.print("THE UID OF THE SCANNED CARD IS : ");
 for (int i = 0; i < 4; i++) {
   readcard[i] = mfrc522.uid.uidByte[i]; //storing the UID of the tag in readcard
   array_to_string(readcard, 4, str);
   StrUID = str;
 }
 String UIDi=String(String(adrs)+ String(StrUID));
   Serial.println(UIDi);
   ESPhttpUpdate.update(client, UIDi.c_str());
 mfrc522.PICC_HaltA();
 return 1;
}
void array_to_string(byte array[], unsigned int len, char buffer[]) {
 for (unsigned int i = 0; i < len; i++) {
   byte nib1 = (array[i] >> 4) & 0x0F;
   byte nib2 = (array[i] >> 0) & 0x0F;
   buffer[i * 2 + 0] = nib1 < 0xA ? '0' + nib1 : 'A' + nib1 - 0xA;
   buffer[i * 2 + 1] = nib2 < 0xA ? '0' + nib2 : 'A' + nib2 - 0xA;
 }
 buffer[len * 2] = '\0';
}
```

5.2.2 *Device to Excel Sheet Java Code*

```java
import java.io.BufferedWriter;
import java.io.FileWriter;
import java.io.IOException;
import java.util.Scanner;
import java.time.*;

public class New {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        LocalDate Date = LocalDate.now();
        LocalTime Time = LocalTime.now();
        System.out.print("Enter your code: ");
        String code = scanner.nextLine();
        String name="123";

        try {
            FileWriter writer = new FileWriter("attendence.csv", true);


         if (code.equals("836BA7AA"))
           {
            name="Yash Pal";
           }
            else if(code.equals("81C10940"))
          {
            name="Harshad Bhutal";
          }
            else if(code.equals("43D880A6"))
          {
            name="Prajwal Kedari";
          }
            else
          {
            System.out.println("you are not the student ");
          }

          System.out.println(name+" is present");
           writer.append(name);
            writer.close();
            System.out.println("Data added to the CSV file successfully.");

      }

        catch (IOException e) {
            System.out.println("An error occurred while writing to the CSV file.");
            e.printStackTrace();
        }
    }
}
```

5.2.2

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5.2.3 *Spring Boot API*

```java
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;
@RestController
public class HomeController {
    abc a= new abc();
@RequestMapping("/{cardid}")
public String Index(@PathVariable String cardid){
    a.record(cardid);
    System.out.println(cardid);
    return "Oneplus ===> "+ cardid;
}
}
```

6. Experimental Results:

- The module was tested . The module performed efficiently with no errors.

- The Program did not crash at any point in time.
- Program was able to list all User Data from User's ID(NFC Tag).
- While examining the working of the Program, it was found that there is success rate in each direction of the Data Entered.

7. Conclusion:

In conclusion, the RFID attendance system represents a significant leap forward in the realm of attendance management, offering an innovative and efficient solution to the challenges posed by traditional manual methods. By harnessing the power of Radio-Frequency Identification technology, this system has demonstrated its capacity to revolutionize how we track and record attendance in various settings, from educational institutions to corporate workplaces and beyond. Its advantages, including real-time data capture, accuracy, and automation, not only streamline administrative tasks but also provide valuable insights for decision-makers. Additionally, the RFID attendance system's adaptability and potential for customization ensure that it can meet the unique needs of diverse organizations. As technology continues to advance, the RFID attendance system stands as a beacon of progress, empowering institutions and businesses to optimize their operations, enhance data security, and improve the overall efficiency of attendance management processes. Its adoption paves the way for a future where attendance tracking is no longer a burden but a seamless, integral part of daily operations.

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