

IOT PROJECT REPORT ON ATTENDANCE TRACKING SYSTEM

**SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE IN THE
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE
BACHELOR OF ENGINEERING (COMPUTER ENGINEERING) BY**

Atharva Baikar (TE B, Roll no 9)
Akanksha Kanade (TE B, Roll no 6)
Sakshi Chandekar (TE B, Roll no 35)
Azlaan Khan (TE B, Roll no 12)



**DEPARTMENT OF COMPUTER ENGINEERING
SHALAKA FOUNDATION'S KEYSTONE SCHOOL OF ENGINEERING,
NEAR HANDEWADI CHOWK, PUNE-412308**

ACADEMIC YEAR 2024-25



**SHALAKA FOUNDATION'S
KEYSTONE SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING**

CERTIFICATE

This is to certify that the SPPU Curriculum-based Mini-Project report entitled

“ATTENDANCE TRACKING SYSTEM”

Submitted by

Atharva Baikar (TE B, Roll no 9)
Akanksha Kanade (TE B, Roll no 6)
Sakshi Chandekar (TE B, Roll no 35)
Azlaan Khan (TE B, Roll no 12)

has satisfactorily completed the curriculum-based Mini-Project under the guidance of Prof. Rajeshwari Dandage towards the fulfillment of Third year Computer Engineering Semester V, Academic Year 2024-25 of Savitribai Phule Pune University.

Prof. Rajeshwari Dandage

Project Guide

Prof. Sagar Rajebhosale

Head Of Department

Dr. Sandip Kadam

Principal

Place:

Date :

ACKNOWLEDGEMENT

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Atharva Baikar

Akanksha Kanade

Sakshi Chandekar

Azlaan Khan

ABSTRACT

This project presents the development of an IoT-based attendance tracking system utilizing RFID technology and an Arduino Uno microcontroller. The system automates the attendance-taking process by using RFID readers to detect tags assigned to individuals. The data is then processed and stored in a MySQL database. This solution aims to reduce manual errors and save time by streamlining attendance management. The integration of the Arduino Uno, RFID readers, and a MySQL database demonstrates a low-cost, efficient system that can be applied in schools, offices, or any other environment requiring attendance tracking.

INTRODUCTION

1. BACKGROUND (Domain description):

Traditional methods of tracking attendance, such as paper-based systems or manual entry into spreadsheets, are often prone to errors, time-consuming, and inefficient. With the rise of IoT technology, more efficient and automated systems can be designed to minimize these issues. RFID-based systems provide a faster, more accurate, and automated approach to attendance management, reducing human errors and administrative effort.

2. PROBLEM STATEMENT

Manually tracking attendance can lead to inaccuracies, lost records, and inefficiencies. There is a need for a system that automates this process while ensuring data accuracy and reliability. This project aims to address this problem by designing an IoT-based attendance system using RFID technology, which will automate the collection and storage of attendance data.

3. SCOPE OF THE PROJECT

The scope of this project includes the design and implementation of an attendance tracking system that uses RFID readers and tags to automate the recording of attendance. The system will use an Arduino Uno to interface with the RFID reader and a MySQL database to store the attendance records. This system can be applied in various settings such as schools, offices, or events, offering real-time data tracking and easy record management.

LITERATURE REVIEW

Several research papers and projects have explored the use of IoT technologies in attendance systems. RFID-based attendance tracking has been widely adopted due to its accuracy and efficiency. Studies show that integrating RFID technology with microcontrollers like Arduino offers an affordable and scalable solution for real-time attendance monitoring. Various systems reviewed have used RFID combined with databases, showing significant improvements in data accuracy, record keeping, and retrieval processes compared to traditional method

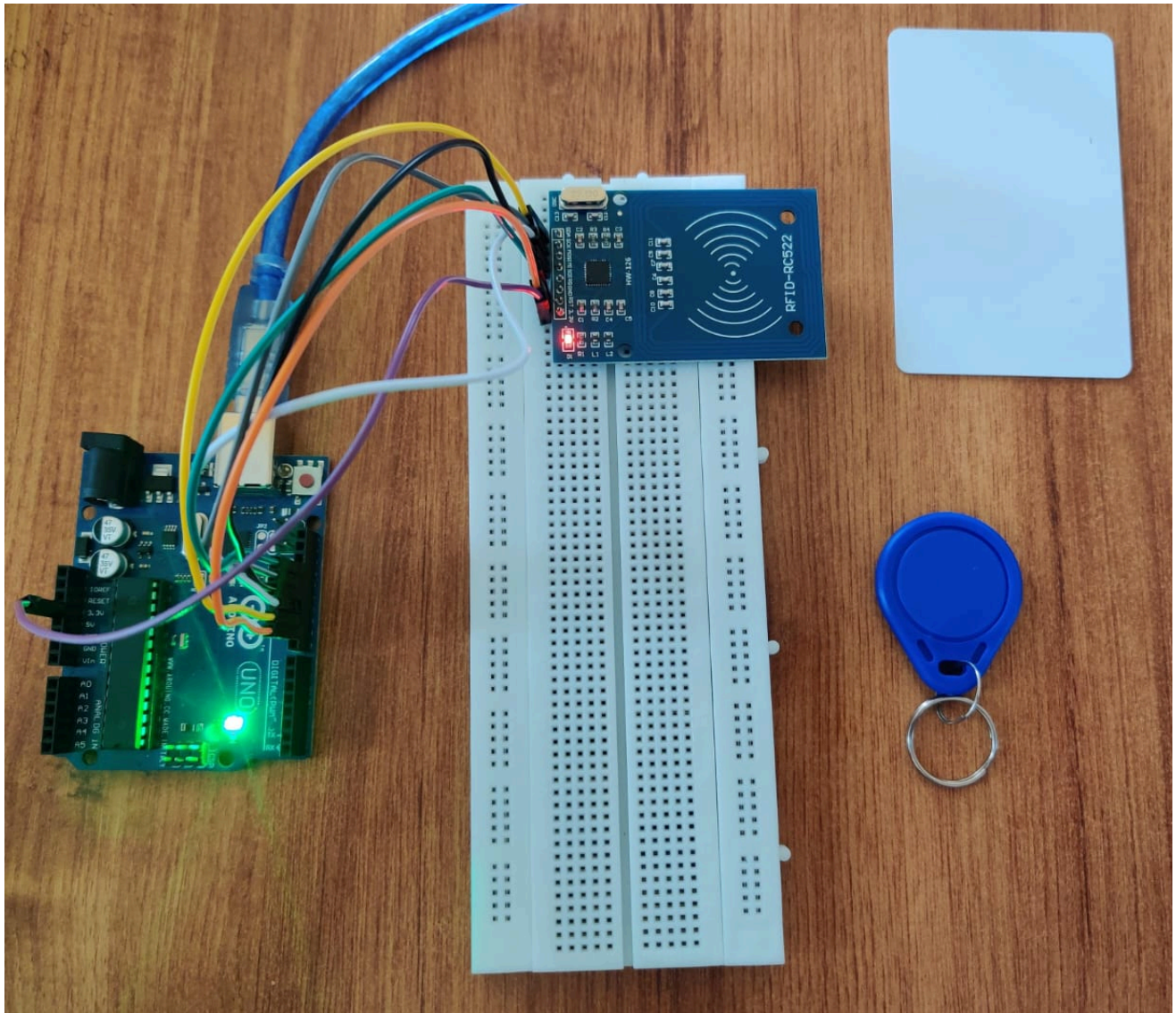
SYSTEM DESIGN

1. SYSTEM DESIGN

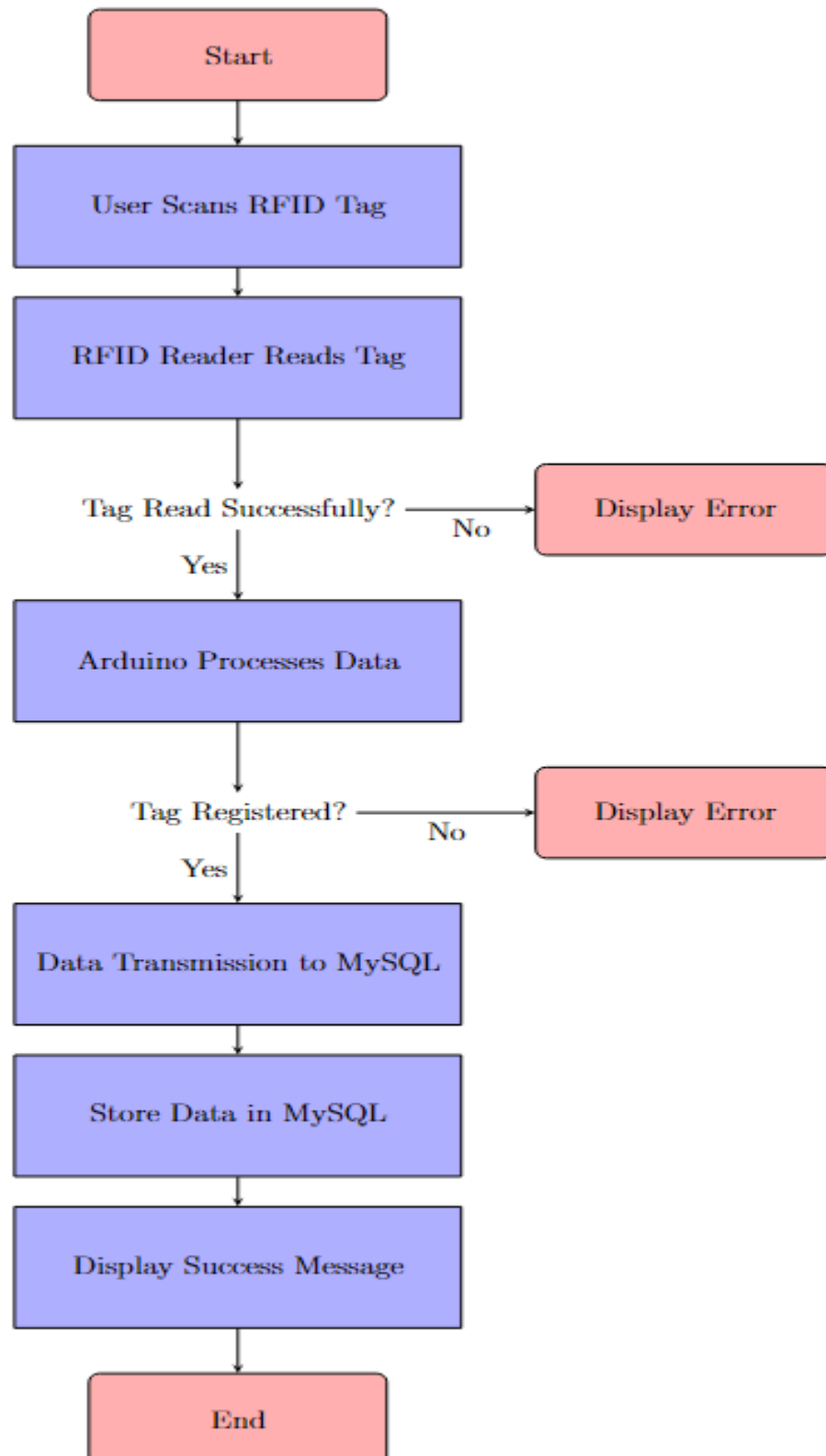
The system consists of several components:

1. **Arduino Uno:** Serves as the main microcontroller that interfaces with the RFID reader.
2. **RFID Reader and Tags:** RFID tags are assigned to individuals, and the RFID reader is used to scan these tags when individuals enter or exit the premises.
3. **MySQL Database:** Stores the attendance records and provides a user-friendly interface to retrieve data.
4. **Connecting Wires:** Used to connect the components such as the RFID reader to the Arduino.

2. SYSTEM DIAGRAM



3. DATA FLOW DIAGRAM



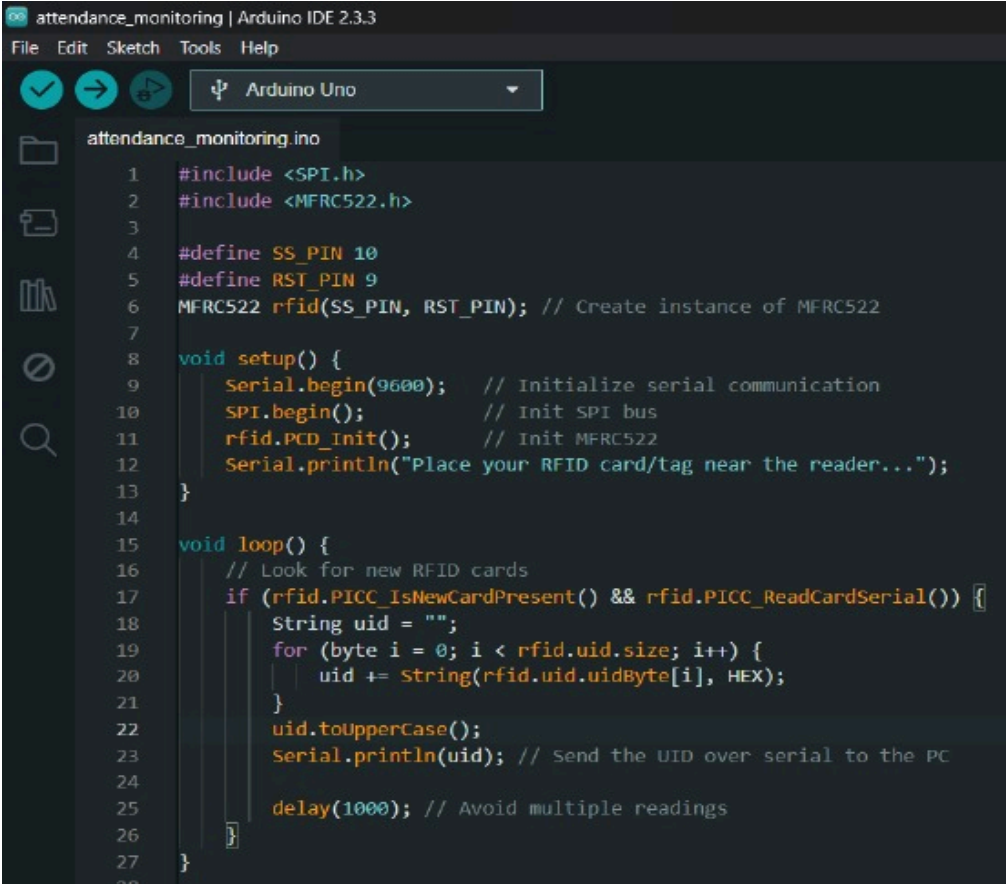
IMPLEMENTATION

1. MODULES DESCRIPTION

- **Hardware Setup:** The RFID reader is connected to the Arduino Uno using connecting wires. RFID tags are distributed to users.
- **Arduino Code:** A program is written in Arduino IDE to handle the reading of the RFID tags and communication with the MySQL database.
- **Database Setup:** MySQL is configured to store attendance records, including fields for RFID ID, name, date, and time.
- **Data Flow:** Once the RFID reader detects a tag, the Arduino processes the data and sends it to the MySQL database for storage.

2. SCREENSHOTS OF CODE:

Arduino code:



```
attendance_monitoring | Arduino IDE 2.3.3
File Edit Sketch Tools Help

attendance_monitoring.ino
1  #include <SPI.h>
2  #include <MFRC522.h>
3
4  #define SS_PIN 10
5  #define RST_PIN 9
6  MFRC522 rfid(SS_PIN, RST_PIN); // Create instance of MFRC522
7
8  void setup() {
9      Serial.begin(9600); // Initialize serial communication
10     SPI.begin(); // Init SPI bus
11     rfid.PCD_Init(); // Init MFRC522
12     Serial.println("Place your RFID card/tag near the reader...");
13 }
14
15 void loop() {
16     // Look for new RFID cards
17     if (rfid.PICC_IsNewCardPresent() && rfid.PICC_ReadCardSerial()) {
18         String uid = "";
19         for (byte i = 0; i < rfid.uid.size; i++) {
20             uid += String(rfid.uid.uidByte[i], HEX);
21         }
22         uid.toUpperCase();
23         Serial.println(uid); // Send the UID over serial to the PC
24
25         delay(1000); // Avoid multiple readings
26     }
27 }
```

Python code:

```
1  import serial
2  import mysql.connector
3  import time
4
5  # MySQL Database connection
6  db = mysql.connector.connect(
7      host="localhost",
8      user="root",
9      passwd="root",
10     database="attendance"
11 )
12
13 cursor = db.cursor()
14
15 ser = serial.Serial('COM9', 9600)
16
17 # Function to read RFID tag data
18 def read_rfid():
19     if ser.in_waiting > 0:
20         rfid_data = ser.readline().decode('utf-8').strip()
21         return rfid_data
22     return None
23
24 while True:
25     rfid_data = read_rfid()
26
27     # Insert only if RFID data is valid and not a placeholder message
28     if rfid_data and rfid_data != "Place your RFID card/tag near the reader...":
29         try:
30             # Fetch student name based on the RFID tag
31             cursor.execute("SELECT student_name FROM students WHERE rfid_uid = %s", (rfid_data,))
32             result = cursor.fetchone()
33
34             if result:
35                 student_name = result[0]
36                 cursor.execute("INSERT INTO records (student_name, timestamp) VALUES (%s, NOW())", (student_name,))
37                 db.commit()
38                 print(f"Student {student_name} recorded successfully.")
39             else:
40                 print("RFID tag not found in students table.")
41
42         except mysql.connector.Error as err:
43             print(f"Error: {err}")
44     else:
45         print("Waiting for valid RFID card...")
46
47     time.sleep(3)
```

TESTING

- **DESCRIPTION OF THE TEST CASES**

Test Case 1: Verify that the RFID reader correctly reads the tag.

- **Input:** RFID tag presented to the reader.
- **Expected Output:** Tag ID is displayed on the serial monitor and sent to the database.
- **Result:** Pass.

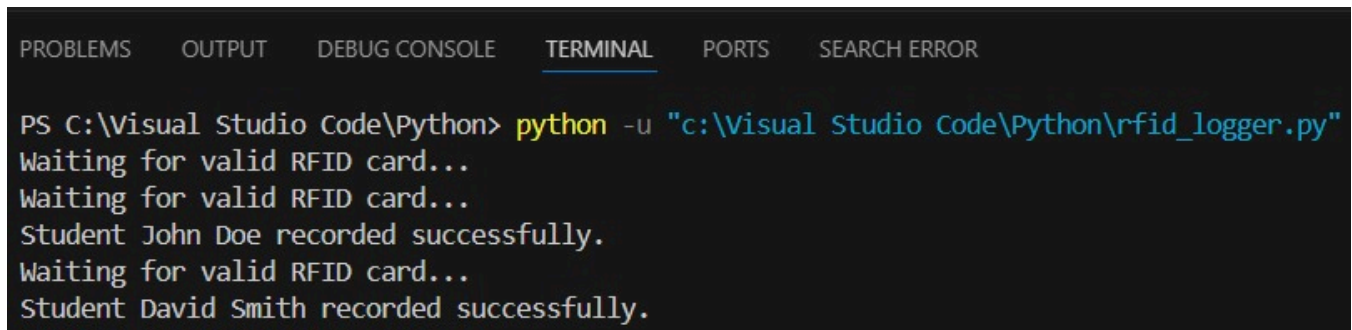
Test Case 2: Verify that the data is stored correctly in the MySQL database.

- **Input:** Tag ID, name, date, and time.
- **Expected Output:** Data is correctly stored in the respective database fields.
- **Result:** Pass.

Test Case 3: Test the system's ability to handle multiple tags.

- **Input:** Multiple RFID tags presented in succession.
- **Expected Output:** Each tag is read and stored without conflict.
- **Result:** Pass.

- **SAMPLE INPUT AND OUTPUT**



```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS C:\Visual Studio Code\Python> python -u "c:\Visual Studio Code\Python\rfid_logger.py"
Waiting for valid RFID card...
Waiting for valid RFID card...
Student John Doe recorded successfully.
Waiting for valid RFID card...
Student David Smith recorded successfully.
```

```
mysql> select * from records;
```

id	student_name	timestamp
1	John Doe	2024-10-16 09:43:00
2	David Smith	2024-10-16 09:43:06

2 rows in set (0.00 sec)

```
mysql> select * from students;
```

id	rfid_uid	student_name
1	B3C7F30	John Doe
2	31B4DF5	David Smith

2 rows in set (0.00 sec)

CONCLUSION AND FUTURE WORK

1. CONCLUSION

The IoT-based attendance tracking system was successfully designed and implemented using an RFID reader, Arduino Uno, and MySQL database. The system automates the attendance process, making it more efficient and less prone to human error. This solution is scalable and can be used in various environments where attendance tracking is required.

2. FUTURE WORK

Future improvements could include the integration of a Wi-Fi module for real-time data transmission, the development of a user interface for administrators to view attendance records easily, and adding security features to prevent unauthorized access to the system. Additionally, the system can be expanded to support multiple RFID readers in different locations.

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