

Khulna University of Engineering & Technology

Department of Computer Science and Engineering



Course Title: Peripherals and Interfacing Laboratory

Course No: - 3220

Project Title: **ATTENDX – a secured RFID Based Attendance System for office.**

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Abstract:

Our project is **“ATTENDX”** a RFID based Attendance Keeping System for Office. RFID (Radio Frequency Identification) based attendance systems are becoming increasingly popular in various industries and educational institutions. This technology allows for efficient and automated tracking of attendance, replacing traditional manual methods. The goal is to reduce long term attendance keeping cost and increase security. We can already see many versions of this project at many places being used very frequently. The motive that led us to take up this project is rather the security problem that lies within this system. Though in our project we used a computer to power the Arduino and keep the attendance value, we used an additional monitor for further clearance.

Objectives:

The objectives of an RFID Based Attendance System are given Below:

- i. Automate attendance tracking process.
- ii. Improve accuracy of attendance records.
- iii. Enhance security of attendance data.
- iv. Reduce administrative workload.
- v. Provide real-time attendance monitoring.
- vi. Minimize errors and instances of proxy attendance.
- vii. Generate comprehensive attendance reports.

- viii. Streamline integration with other systems.
- ix. Increase efficiency in attendance management.
- x. Facilitate quick and easy access control.

Introduction:

This project presents a small prototype of an RFID Based Attendance System that uses low cost, miniature sensors and RFID technology to enable efficient, secure, cost-effective and real-time attendance monitoring. This prototype works mostly like a regular RFID System. However, we extended it further by adding a two-step verification system (Password) to remove the shortcomings of a RFID Tag. For further clarification, we added Green LED (to notify of access grant), Red LED (to notify of access prohibition) and respective buzzer routine in both the cases.

Types of Equipment Needed:

Table: Apparatus Required

Apparatus Type	Serial No	Name of Apparatus	Ratings	Quantity	T TITLE
Hardware	01.	Arduino Uno R3	Vin(max):20v V(usb):5.5v	01	
	02.	RFID Reader Module (MFRC 552)	3.3V DC, 30mA, 13.56 MHz	01	
	03.	RFID Tags	13.56 MHz	02	
	04.	Active Buzzer	5v(dc) 2048Hz	01	
	05.	LCD Display	16X2, 5 V	01	
	06.	LED	Red, Green	02,02	
	07.	I2C Module	5V, 16pin	01	
	08.	Connecting Wire		As Required	
	09.	4*4 Keypad Module	8 pins	01	
Software	13.	Arduino IDE		01	
	14.	PLX-DAQ	V2.11	01	

Working Principle of ATTENDX:

ATTENDX is a smart attendance system that consists of automated and connected devices which we use to take attendance. This system uses a combination of technologies, including radio-frequency identification (RFID) tags, various connected sensors like RFID scanners, and software application, to automate the attendance process. It consists of two portion –

1. Hardware.
2. Software.

Hardware -

The hardware portion consists of a RFID Scanner, two LED's (green and red), a buzzer, a keypad (4*4), a LED (16*2) with I2C module, and most importantly, Arduino Uno R3. The connection is given as the diagram below: -

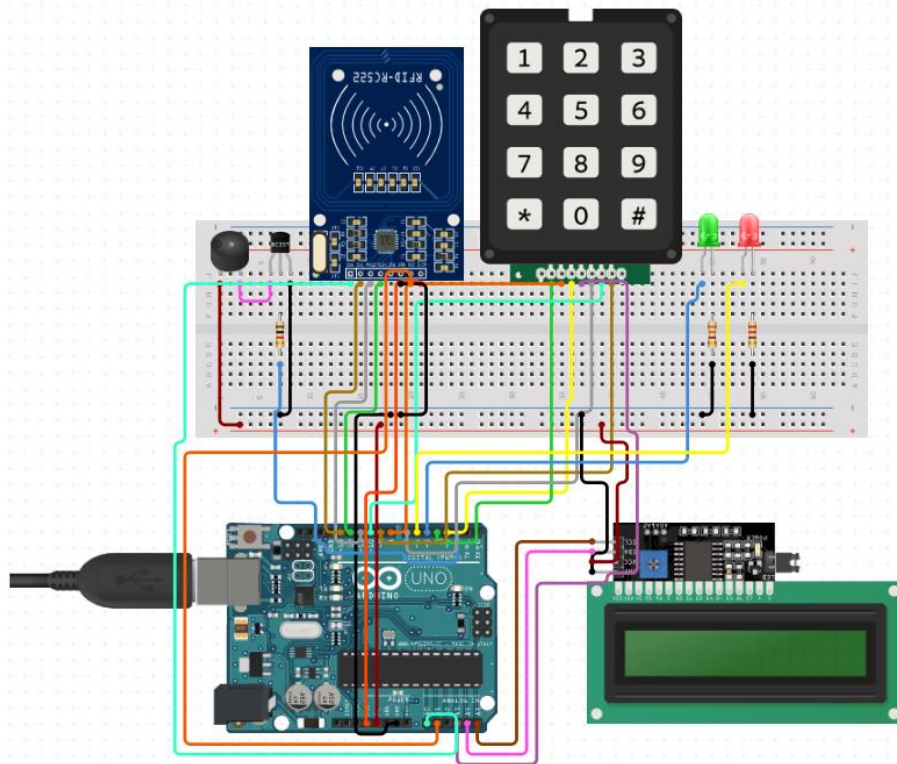


Fig – Circuit Diagram for ATTENDX

Software –

This portion uses a software named PLX-DAQ that we use to send scanned data to Excel.

The working principle is quite simple. We have two tags – one is recognized by the Scanner, other is not .



T1: recognized Tag

T2: Unrecognized Tag

1st case:

If we show the scanner T2, it will not be recognized and the LCD display, red led and buzzer will assist in notifying the concerned authority of the security breach. In this case, no data will be inserted into the Excel.

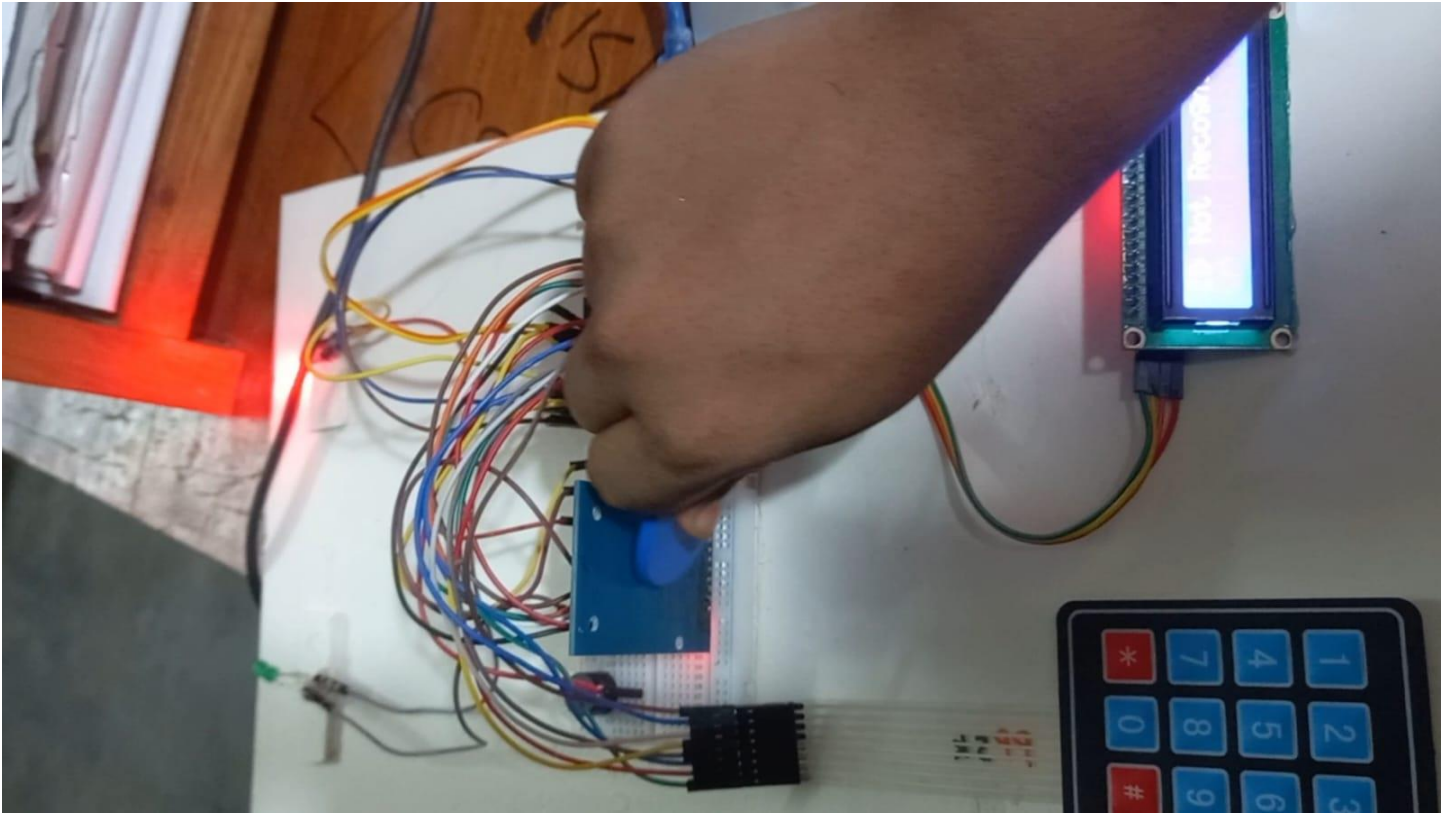


Fig – T2 shown.

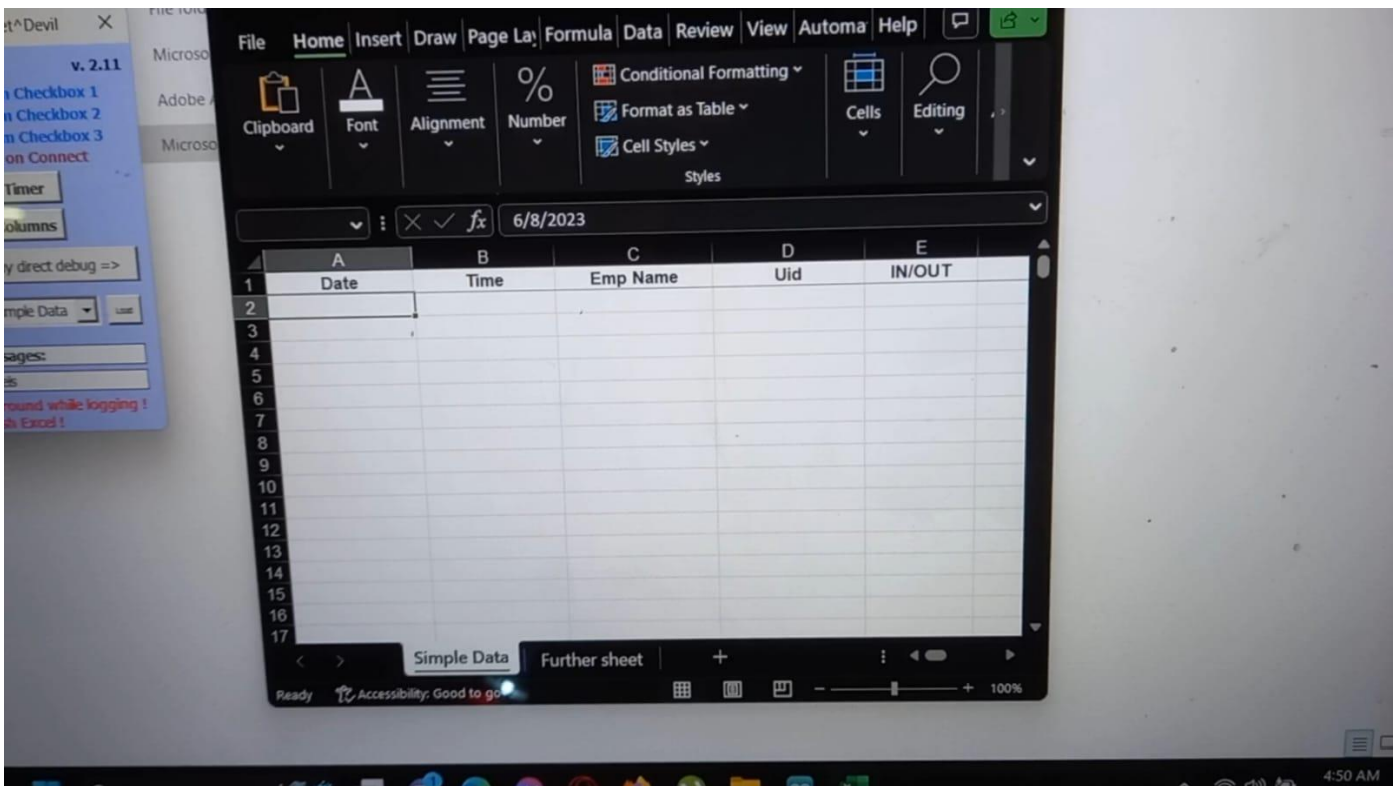
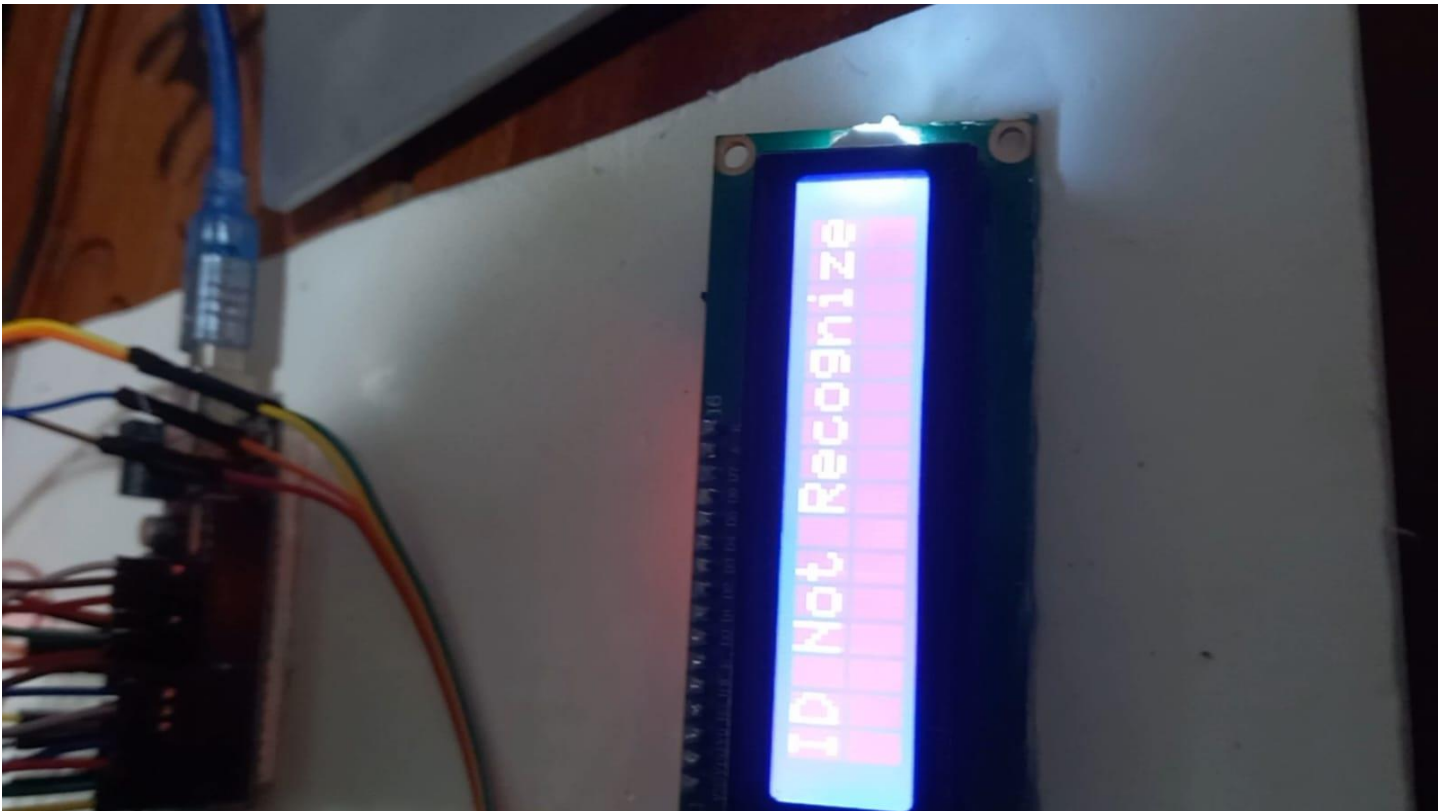


Fig - No data sent to excel.

2nd case -

In this case, we scan T1. However, we have successfully resolved a security issue. As RFID's work, as soon as the recognized tag is shown, it will let anyone in, and the attendance will be noted. To improve integrity, we could have introduced two technologies –

1. Fingerprint Module.

2.Password.

As this is merely a prototype, we didn't go into the hassle of using an expensive Fingerprint module; we used a KEYPAD (4*4) to enter the respective password given to the tags.



So, as we scan T1, the system will call for a password input.

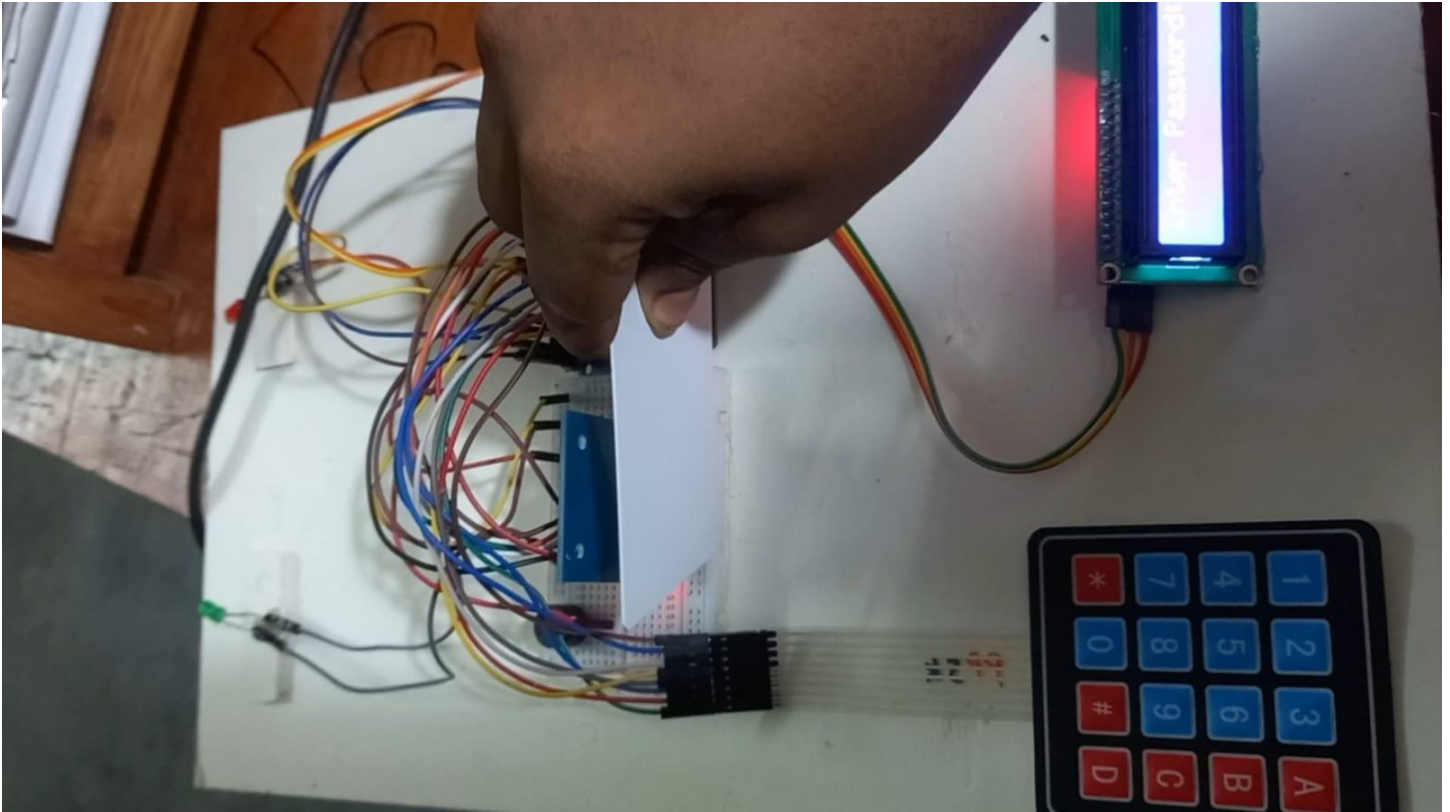


Fig – showing T1.



Fig – password sequence

Then, the password for the tag is put and if it matches, the attendance is noted and it is notified with the help of LCD, Green Led and Buzzer.

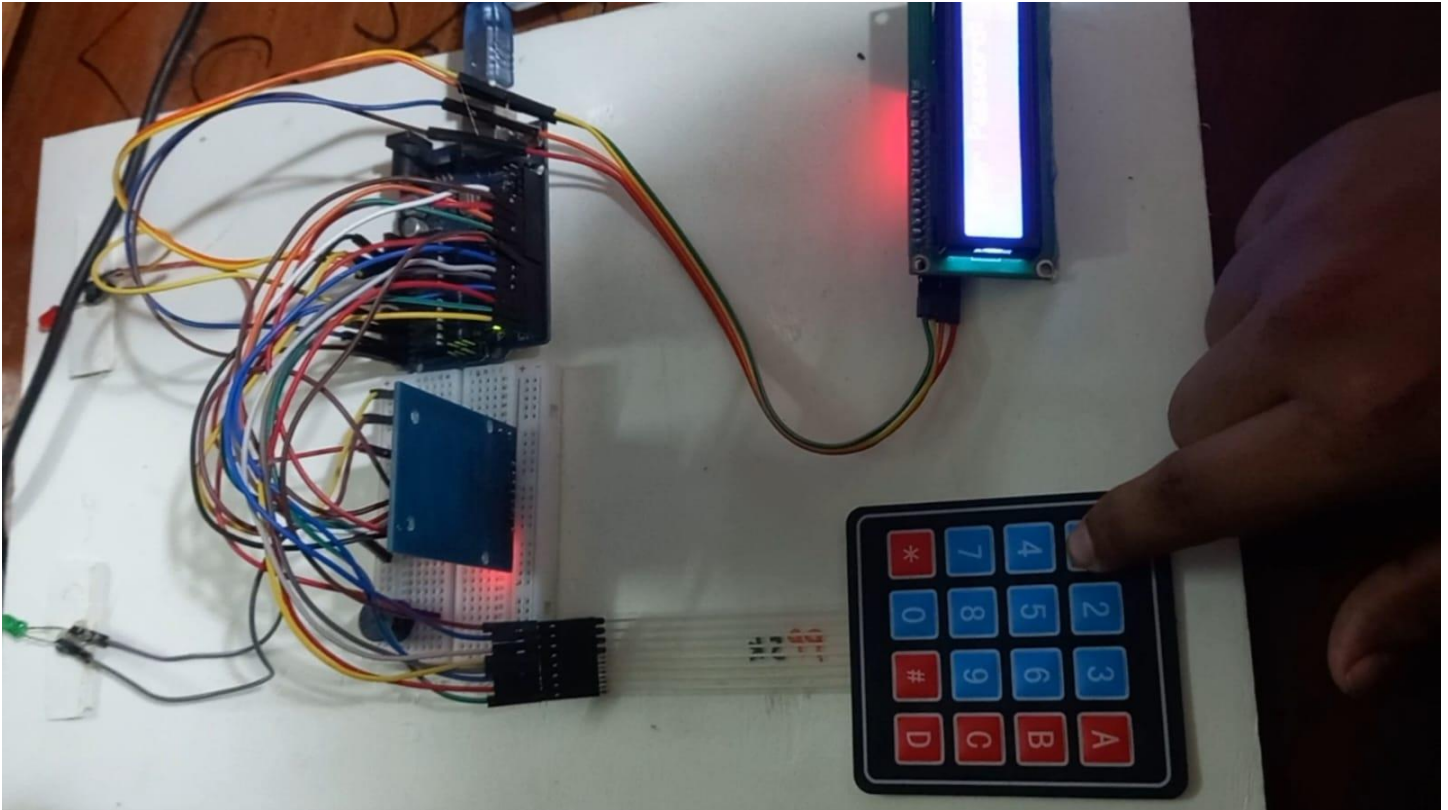
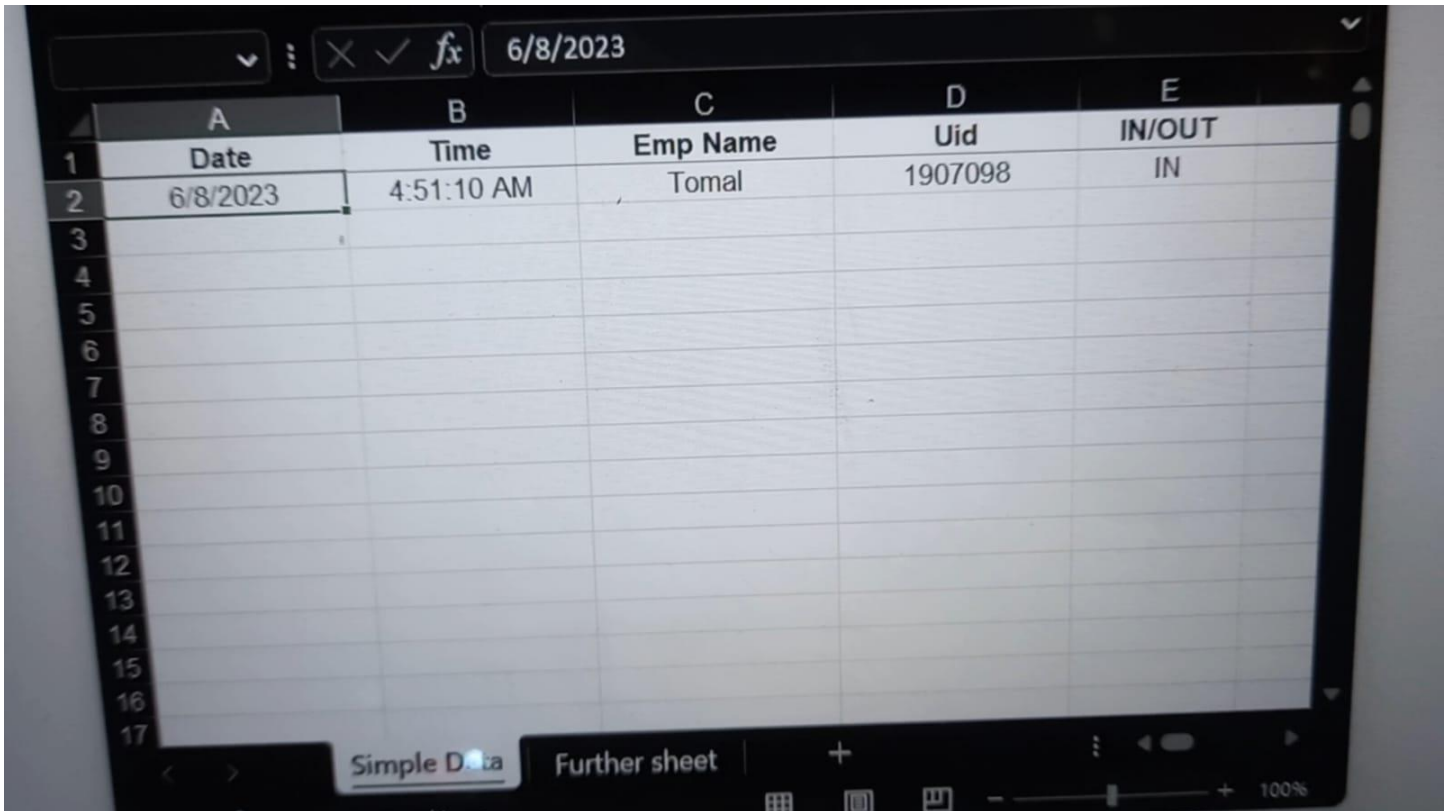


Fig – Putting password.



Then the data will be sent to the excel and as the card is shown once, this will be considered as check in.



The image shows a screenshot of an Excel spreadsheet on a screen. The spreadsheet has five columns: A (Date), B (Time), C (Emp Name), D (Uid), and E (IN/OUT). The first row (row 1) contains the headers. The second row (row 2) contains the data: 6/8/2023, 4:51:10 AM, Tomal, 1907098, and IN. The rows are numbered 1 through 17 on the left. The bottom of the screen shows the Excel interface with tabs for 'Simple Data' and 'Further sheet', and a zoom level of 100%.

	A	B	C	D	E
1	Date	Time	Emp Name	Uid	IN/OUT
2	6/8/2023	4:51:10 AM	Tomal	1907098	IN
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

Now, if the card is shown once again, then only it will be considered as check-out. So, no one can get out of the facility without showing their tag.

Clipboard Font Alignment Number Cell Styles Styles					
6/8/2023					
A	B	C	D	E	
Date	Time	Emp Name	Uid	IN/OUT	
1					
2	6/8/2023	4:51:10 AM	Tomal	1907098	IN
3	6/8/2023	4:51:23 AM	Tomal	1907098	OUT
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

Now, suppose, somehow the tag is lost and anyone with bad intention wants to come inside the facility with the tag. But even if they show tag, the password sequence will a put a stop to this. This will be like case no. 1.

And that's how the system will take attendance and preserve security.

Required Pseudocode for ATTENDX:

Initialize RFID reader
Initialize keypad
Initialize LCD display

Define variables:
MasterPassword
AttendanceStatus

RFIDTag
EnteredPassword

Main Loop:

Display "Please scan RFID tag or enter password" on LCD

If RFID tag is detected:

Read RFID tag

Store tag data in RFIDTag variable

Check if RFIDTag matches any registered tags

If a match is found:

Retrieve corresponding user information (Name, ID, etc.)

Set AttendanceStatus to "IN"

Store attendance record (Date, Time, Name, ID, AttendanceStatus)

Display "Welcome [Name]!" on LCD

Blink green LED

Wait for a few seconds

Clear LCD display

If no match is found:

Display "RFID tag not recognized" on LCD

Blink red LED

Wait for a few seconds

Clear LCD display

If no RFID tag is detected or no match is found:

Wait for keypad input

If a key is pressed:

Append the entered key to EnteredPassword

Display "*" on LCD to mask the entered password

If EnteredPassword length equals MasterPassword length:

If EnteredPassword matches MasterPassword:

Retrieve corresponding user information (Name, ID, etc.)

Set AttendanceStatus to "IN"

Store attendance record (Date, Time, Name, ID, AttendanceStatus)

Display "Welcome [Name]!" on LCD

Blink green LED

Wait for a few seconds

Clear LCD display

If EnteredPassword does not match MasterPassword:

Display "Invalid password" on LCD

Blink red LED

Wait for a few seconds

Clear LCD display

Reset EnteredPassword to an empty string

End of main loop

Discussion:

This project presents a prototype of an RFID Attendance System. In the case of an RFID-based Attendance System, RFID technology is leveraged to automate and streamline the process of recording attendance.

The RFID-based Attendance System utilizes RFID tags, readers, and a centralized database. Everyone is provided with a unique RFID tag, which can be in the form of a card or a wearable device. The RFID tag contains a small microchip and an antenna that allows it to communicate with RFID readers placed strategically at entry points or designated areas.

When individuals enter the premises or specific locations equipped with RFID readers, the readers detect the RFID tags within their vicinity. The RFID reader captures the unique identification information embedded in the tag, such as an employee or student ID number. This information is then transmitted to a centralized database via a network connection.

The centralized database stores the attendance records and can be accessed by authorized personnel for various purposes, such as attendance tracking, payroll management, or academic monitoring. The system can generate real-time reports, highlighting attendance patterns, late arrivals, or absences, offering valuable insights for decision-making.

Implementing an RFID-based Attendance System brings several benefits. Firstly, it eliminates the need for manual attendance recording, eliminating paperwork and reducing administrative

overhead. Secondly, the system ensures accurate and reliable attendance data, minimizing errors and preventing fraudulent practices such as buddy punching. Additionally, it offers real-time monitoring capabilities, allowing immediate access to attendance information when needed.

Furthermore, the system can be enhanced by integrating additional features like automated notifications to inform supervisors or guardians about attendance irregularities. It can also facilitate seamless integration with other systems like payroll or academic management software, streamlining overall operations. Even in this project we integrated an advanced security system.

In conclusion, the RFID Attendance System presents a modern and efficient approach to attendance management. By leveraging RFID technology, organizations can automate the attendance recording process, improve accuracy, and gain valuable insights. This system not only simplifies administrative tasks but also enhances accountability and facilitates better decision-making based on reliable attendance data.

Conclusion:

In conclusion, RFID Attendance System offers a modern and streamlined approach to attendance management. By leveraging RFID technology, this system eliminates the need for manual attendance tracking, reducing administrative burdens and paperwork. The system provides numerous benefits, including increased accuracy, efficiency, and real-time monitoring capabilities.

With an automated RFID-based attendance system, organizations can ensure reliable and precise attendance data, minimizing errors and eliminating fraudulent practices. The system captures

attendance information in real-time, enabling immediate access to attendance records and facilitating timely decision-making.

By adopting an RFID Attendance System, organizations can optimize their attendance management processes, save valuable time and resources, and gain valuable insights into attendance patterns. This system not only improves accountability and record-keeping but also enables organizations to make data-driven decisions based on accurate attendance data.

In summary, an RFID Attendance System offers a convenient, accurate, and efficient solution for attendance management. With its ability to automate and simplify the attendance tracking process, organizations can improve efficiency, reduce errors, and enhance overall productivity. By leveraging the power RFID technology, this system provides a modern and reliable approach to attendance management in various domains, ranging from educational institutions to corporate environments.

References:

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