A

Mini Project Report

on

PC log-in / log-out using RFID

Submitted by

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CERTIFICATE

This is to certify that the Project entitled "**PC log-in/log-out using RFID**" submitted by **Mr. SIDDHESH B. DANGADE (2130331372501) & Miss. DIKSHA P. KHARVILKAR (2130331372505)** is record of bonafide work is carried out in requirement of partial fulfilment for mini project in Electronic and Telecommunication Engineering course in Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad in the academic year 2022-2023.

Guide

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ABSTRACT

The aim of this project is crucial to prevent such data breeches. Using contactless authentication is very important in public places and highly confidential application, because as we are aware of covid-19 situation , hence contactless authentication plays vital role in preventing spread of such diseases and virus , as we talked above highly confidential area like government offices and banks , where entering password can revel password and degrade authenticity , hence without entering password we can access system and also the password remains confidential. RFID (RC522) module is device that communicates with system and performs specifies operations with very high accuracy and speed, module RC522 is well known for its accuracy and efficiency, it consumes very less power and easy to setup with and system despite of operating system and kernels. This makes it suitable for authentication application like password management and credentials confidentiality.

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CHAPTER 1

Introduction

As cyber crimes are increasing day by day , it is crucial to prevent such data breeches. Using contactless authentication is very important in public places and highly confidential application, because as we are aware of covid-19 situation , hence contactless authentication plays vital role in preventing spread of such diseases and virus , as we talked above highly confidential area like government offices and banks , where entering password can revel password and degrade authenticity , hence without entering password we can access system and also the password remains confidential. RFID (RC522) module is device that communicates with system and performs specifies operations with very high accuracy and speed, module RC522 is well known for its accuracy and efficiency , it consumes very less power and easy to setup with and system despite of operating system and kernels. This makes it suitable for authentication application like password management and credentials confidentiality.

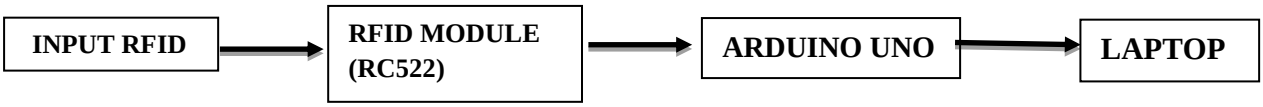

Fig. 1.1 :process flow diagram of project

1.1 Project Objective

Objective of this project, we are going to unlock windows laptops by using RFID tags. The Arduino Board and RFID reader will always be connected to the computer and to unlock system we only need to swap registered RFID tag over RFID reader. With this Arduino RFID windows Login Project we can unlock system very fast and without typing any passwords. RFID tag and program the Arduino to verify it. In this project, the RC522 RFID Module shown above is connected to Arduino and the Arduino itself is connected to the computer. When a RFID tag is placed near this reader, the Arduino reads the rfid tag ID number and sends it to computer.When the tag is brought close to the reader, the reader generates an electromagnetic field. This causes electrons to move through the tag's antenna and subsequently powers the chip. The chip then responds by sending its stored information back to the reader in the form of another radio signal. This is called a backscatter. The reader detects and interprets this backscatter and sends the data to a computer or microcontroller. This signal is processed by Arduino and then Arduino enters the password and log-in into system with provided credentials. RFID RC522 is very fast and responsive and efficient. It only sends

signals when pre-coded RFID ID is scanned. Basically RFID helps to enter password without need to type manually , by touching RFID card which is registered to RFID scanning module , the signal is send to Arduino where it looks for unique identification code and if it matches then enters password and hits enter like we manually do , but the password is not seen as it is entered very fast where normal human cannot enter at such speed , this makes it immune to people watching while entering password because so high speed and accuracy it is practically implementable in various industries and thus very effective in increasing security and at very high speed. It is very cost effective hence can be implemented in various industries and home security.

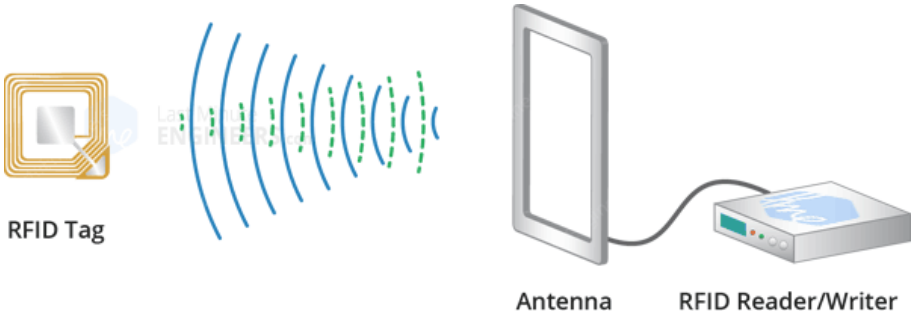

Fig 1.2 Principles of RFID

1.2 Arduino Uno

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

1.3 RFID (RC522)

The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can support I2C, SPI and UART and normally is shipped with a RFID card and key fob. It is commonly used in attendance systems and other person/object identification applications

1.4 Communication between RFID , Arduino and Laptop

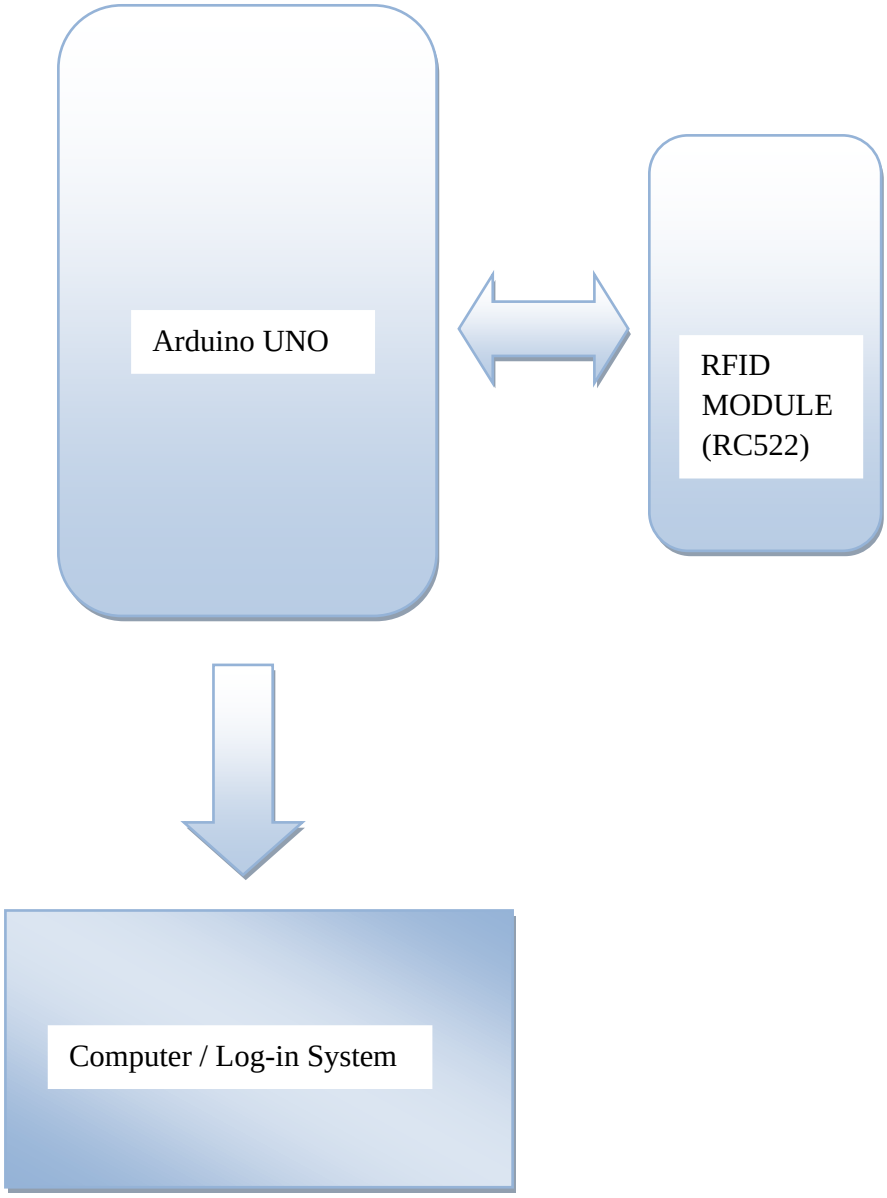

Fig 1.3: Communication between RFID , Arduino and Laptop

CHAPTER 2

Hardware Connection

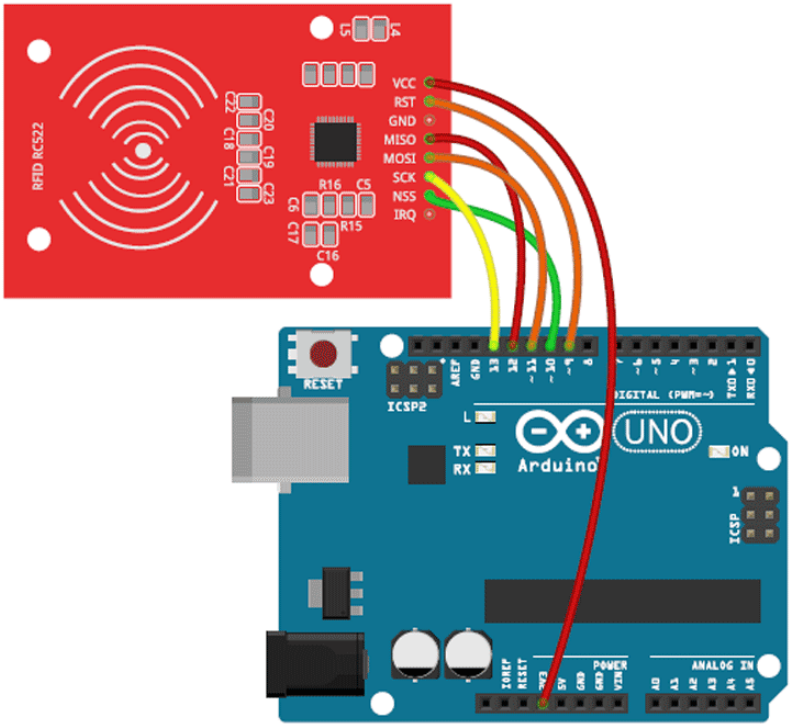

Fig 2.1Arduino and RFID Wiring

RFID RC522	**ARDUINO**
V_{CC}	3.3V
GND	GND
RST	D9
MISO	D12
MOSI	D11
SCK	D13
SDA/NSS	D10

Tab no. 2 Arduino & RFID connections

CHAPTER 3

Components Required

3.1 Hardware

3.1.1 Arduino Uno

1. Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst-case scenario you can replace the chip for a few dollars and start over again.
2. Powering up the Arduino Uno:

The Arduino Uno board can be powered via a USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's power jack.

3. The power pins are as follows:

- Vin. The input voltage to the Arduino/Genuine board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power sources). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V. This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- 3V3. A 3.3-volt supply generated by the on-board regulator. The maximum current draw is 50 mA.
- GND. Ground pins.

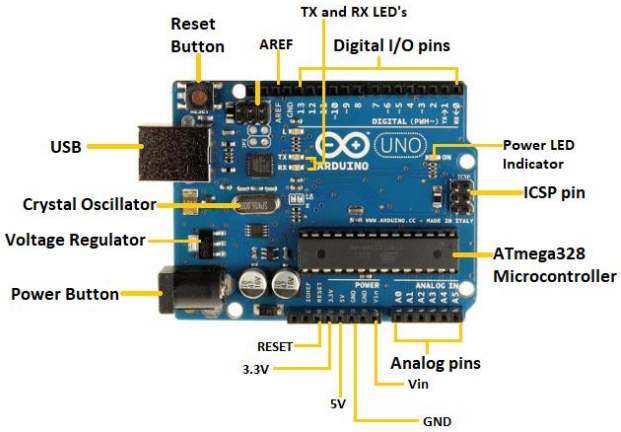

Fig 3.1.1 Arduino Uno Pin out

3.1.2 RFID Module (RC522)

The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob. It is commonly used in attendance systems and other person/object identification applications.

RC522 Features

• 13.56MHz RFID module

• Operating voltage: 2.5V to 3.3V

• Communication : SPI, I2C protocol, UART

• Maximum Data Rate: 10Mbps

• Read Range: 5cm

• Current Consumption: 13-26mA

• Power down mode consumption: 10uA (min)

The RC522 is a RF Module that consists of a RFID reader, RFID card and a key chain. The module operates 13.56MHz which is industrial (ISM) band and hence can be used without any license problem. The module operates at 3.3V typically and hence commonly used in 3.3V designs. It is normally used in application where certain person/object has to be identified with a unique ID. The keychain has 1kB memory in it which can be used to stored unique data. The RC522 reader module can both read and write data into these memory elements. The reader can read data only form passive tags that operate on 13.56MHz.

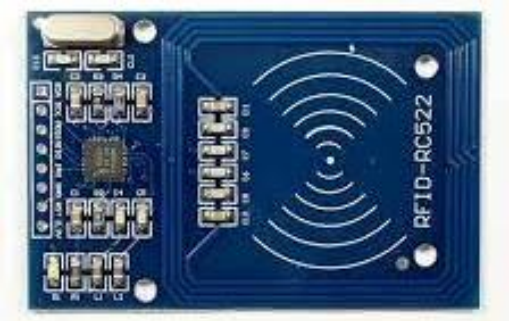

Fig 3.1.2: RFID Module

Since in application, most of the time reader module will be waiting for the tag to come into proximity. The Reader can be put into power down mode to save power in battery operated applications. This can be achieved by using the IRQ pin on the module. The minimum current consumed by the module during power down mode will be 10uA only. The module can be easily used with Arduino because of its readily available RC522 RFID Arduino library

3.*1.3* Jump Wires:

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.[1] Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

There are different types of jumper wires. Some have the same type of electrical connector at both ends, while others have different connectors. Some common connectors are:

1. Solid tips – are used to connect on/with a breadboard or female header connector. The arrangement of the elements and ease of insertion on a breadboard allows increasing the mounting density of both components and jump wires without fear of short circuits. The jump wires vary in size and colour to distinguish the different working signals.
2. Crocodile clips – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals, etc.
3. Banana connectors – are commonly used on test equipment for DC and low-frequency AC signals.
4. Registered jack (RJnn) – are commonly used in telephone (RJ11) and computer networking (RJ45).

5. RCA connectors – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable.
6. RF connectors – are used to carry radio frequency signals between circuits, test equipment, and antennas.

3.1.4 LED (Light Emitting Diode):

Light Emitting Diodes (LED) have recently become available that are white and bright, so bright that they seriously compete with incandescent lamps in lighting applications. They are still pretty expensive as compared to a GOW lamp but draw much less current and project a fairly well focused beam. When run within their ratings, they are more reliable than lamps as well. Red LEDs are now being used in automotive and truck tail lights and in red traffic signal lights. You will be able to detect them because they look like an array of point sources and they go on and off instantly as compared to conventional incandescent lamps.

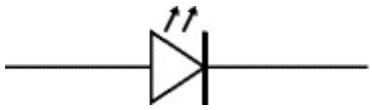

Fig 3.1.4: Light emitting diode

3.2 Software:

3.2.1 Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Fig 3.2.1 Arduino IDE

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension. ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays

errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

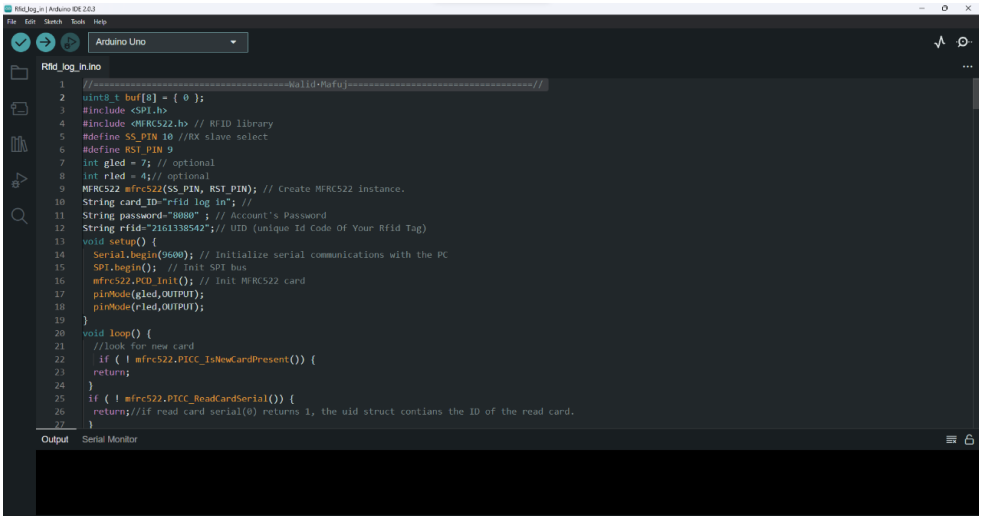

Fig 3.2.2 Coding Window

CHAPTER 4

Circuit Design

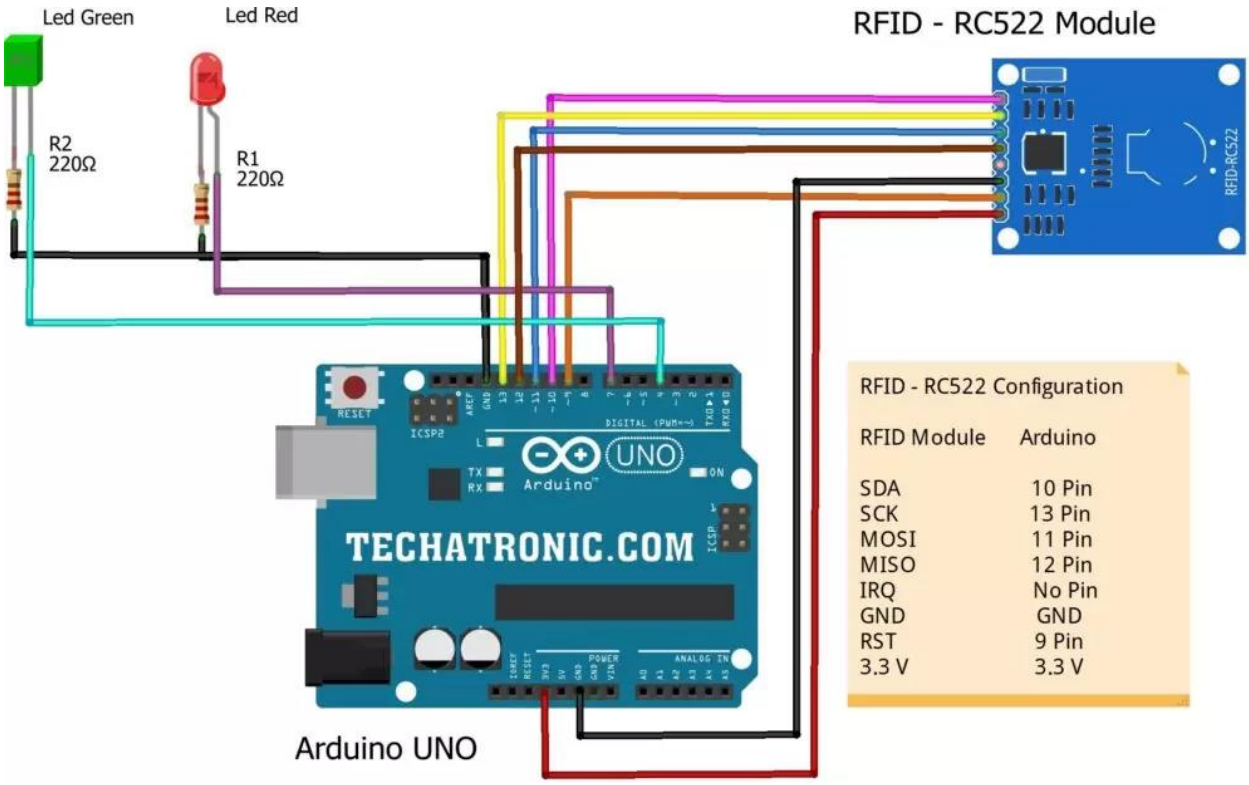

Fig 4.1 Circuit connection

4.1 List of parts used in the circuit:

1) **Arduino Uno:-** Arduino Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst-case scenario you can replace the chip for a few dollars and start over again.
2) **RFID RC522:-** The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob. It is commonly used in attendance systems and other person/object identification application.

CHAPTER 5

Coding

In coding , we firstly modify library code available in Arduino library. We also need J2SE Runtime Enviorment version 5.0 , so that external keyboard has access for entering password at secured login window.

Line no 11 to 13

String card_ID="rfid log in"; //

String password="8080" ; // Account's Password

String rfid="2161338542";// UID (unique Id Code Of Your Rfid Tag)

In line no. 32 we add if else statement for comparing UID of RFID Card, and line no. 99 to 106 we send key report back to Arduino via RFID.

Line no. 175 to 278

if (key == "a") { keycode = 4; }

else if (key == "b") { keycode = 5; }

else if (key == "c") { keycode = 6; } ……..

we use if else statement and assign all keywords including alpha numeric and special characters. Then we flash batch file which converts ports of Arduino to keyboard , but in such flash we cannot use Arduino as Arduino for programming , rather as generic keyboard. Batch files are sourced from Arduino community.

We actually code Arduino uno first and then change it to serial keyboard because it is not possible to code Arduino once its converted to keyboard. We freeze pre coded Arduino with by flashing it with keyboard converter batch file and our code is stored in flash memory of Arduino. When we connect to laptop it is then detected as keyboard, once RFID key registered is brought close to module then Arduino automatically puts saved password and hits enter key.

Fig 5.1: Port Selection

Fig 5.2 J2SE Runtime Environment

CHAPTER 6

Result of the project

In above performed project we came across many obstacles and errors while interfacing various modules, we tried our best to get it running despite of missing and faulty hardware. While compiling code there were many bugs like excessive delay , wrong pin allocation and wrong port selection. After fixing the code project was able to detect registered key and send the key report and details to Arduino where it compared the key , compared it with saved authorised key and if matched then Arduino starts typing the password and hits enters when finished , the project works very fast and accurate , the speed of scanning RFID is 50milliseconds and comparing it to saved key done by Arduino is additional 30milliseonds , that means projects gets work done in less than 100milliseonds. The speed of unlocking pc by this project is astonishingly fast which is impossible for human to enter. This project is designed and implemented to allow confidential passwords to be entered at rapid rate and without knowing other person present there. Speed of project is drastically affected by number of characters saved in program.

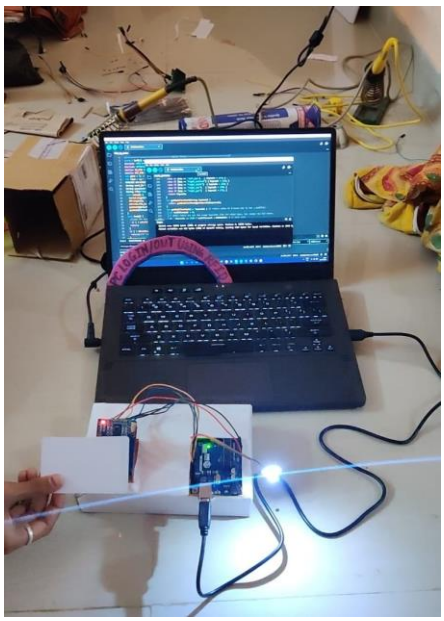

Fig 6.1 RFID detection and authorization

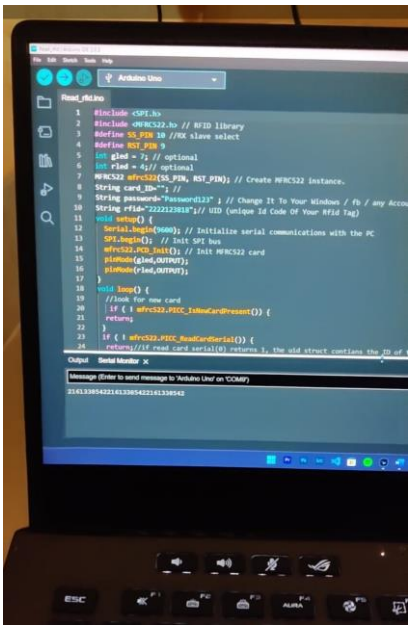

Fig 6.2 Serial monitoring

CHAPTER 7

Applications and features

7.1 Application of RFID PC log-in Project

1) **Contactless pc login/logout**

   Due to the use of RFID we do not have to type password manually serval times.

2) **Low power consumption authorizations**

   It Consumes very less power nearly 50mA, 0.05 watt .

3) **Cost friendly systems**

   The Components are low cost & easily available.

4) **Easy to setup at industries and domestic areas**

   The connections are easy to understand because the pinout are well lable.

5) **Efficient system unlocking**

   It is less power consuming project.

6) **Fast and accurate login purposes**

   This module has impressive accuracy, considering its price the performance is excellent.

7.2 Advantages:-

1) Easier to program
2) Easy to setup and wire
3) Easy to carry , handle and light weight
4) Contactless Authentication
5) Fast and accurate authorization

7.3 Future Scopes

This projects provides a solid base for future RFID authentication which will overcome all drawbacks of current RFID authentication generation. This signal is processed by Arduino and then Arduino enters the password and log-in into system with provided credentials. RFID RC522 is very fast and responsive and efficient. It only sends signals when pre-coded RFID ID is scanned. Basically RFID helps to enter password without need to type manually , by touching RFID card which is registered to RFID scanning module , the signal is send to Arduino where it looks for unique identification code and if it matches then enters password

and hits enter like we manually do , but the password is not seen as it is entered very fast where normal human cannot enter at such speed , this makes it immune to people watching while entering password because so high speed and accuracy it is practically implementable in various industries and thus very effective in increasing security and at very high speed. It is very cost effective hence can be implemented in various industries and home security.

CONCLUSION

In this project I and my project partner came across various errors and problems while practically implementing the idea , the concept was easy but implementation was challenging , there are very few resources regarding pc log-in as it is related to customization in windows and it is not easy. We initially selected Arduino Leonardo but due to faulty hardware and low memory we were unable to get RFID interfaced with it. Hence we changed Leonardo to UNO , and removed fingerprint sensor as simultaneously both cannot work, we initially selected Arduino Leonardo because it had USB serial direct interface , but as it was faulty , we selected Arduino UNO and modified keyboard batch file and flashed it as USB keyboard to get the work done. After successful completion of project we were able to contactless authentication in our system which was very fast and accurate.

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