Control Accessing Using RFID Door Lock System

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Abstract- *RFID stands for Radio Frequency Identification RFID technology uses electromagnetic waves to capture and read transmitted data. RFID tags, like the one on modern credit cards, hold electronic data .In the case of access control, these RFID tags hold the credential information that, when placed near a compatible reader, will transmit the info to unlock the door.*

I. LITERATURE REVIEW

Similar to a barcode reader, RFID readers work by sending and receiving data, but instead of having to scan a code, the data is transmitted over radio frequencies. An RFID door locking system requires RFID tags, antennas, an RFID reader, and a transceiver in order to function as a complete system.

CONSTRUCTION

1.1 Arduino Uno

1. Arduino Uno microcontroller:
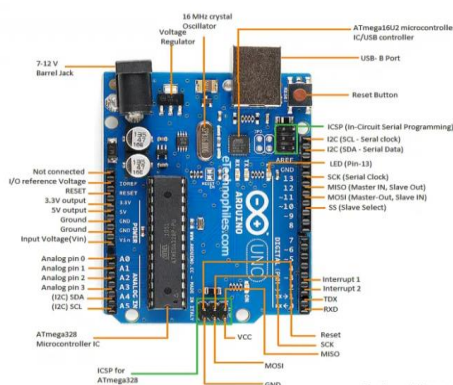
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010.The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark a major redesign of the Arduino hardware and software. The Uno board was the successor of the Demilunes release and was the 9th version in a series of USB-based Arduino boards. Version 1.0 of the Arduino IDE for the Arduino Uno board has now evolved to newer releases.The ATmega328 on the board comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

2. MFRC522 RFID Reader:-

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.

Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader, up to hundreds of meters.

Unlike a barcode, the tag does not need to be within the line of sight of the reader, so it may be embedded in the

tracked object. RFID is one method of automatic identification and data capture (AIDC).

RFID tags are used in many industries. For example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line, RFID-tagged pharmaceuticals can be tracked through warehouses, and implanting RFID microchips in livestock and pets enables positive identification of animals. Tags can also be used in shops to expedite checkout, and to prevent theft by customers and employees.

Since RFID tags can be attached to physical money, clothing, and possessions, or implanted in animals and people, the possibility of reading personally-linked information without consent has raised serious privacy concerns. These concerns resulted in standard specifications development addressing privacy and security issues.

RC522 Pinout
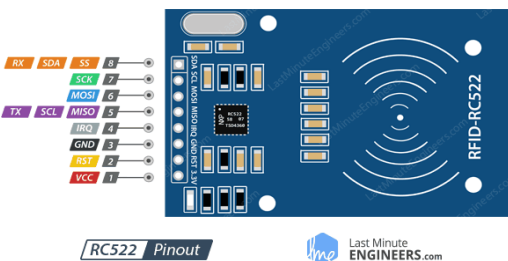
- **VCC** supplies power to the module. This can be anywhere from 2.5 to 3.3 volts. You can connect it to the 3.3V output from your Arduino. But remember that connecting it to the 5V pin will probably destroy your module!
- **RST** is an input for reset and power-down. When this pin goes low the module enters power-down mode. In which the oscillator is turned off and the input pins are disconnected from the outside world. Whereas the module is reset on the rising edge of the signal.
- **GND** is the ground pin and needs to be connected to the GND pin on the Arduino.
- **IRQ** is an interrupt pin that alerts the microcontroller when an RFID tag is in the vicinity.
- **MISO** / SCL / Tx pin acts as master-in-slave-out when SPI interface is enabled, as serial clock when I2C interface is enabled and as serial data output when the UART interface is enabled.
- **MOSI** (Master Out Slave In) is the SPI input to the RC522 module.
- **SCK** (Serial Clock) accepts the clock pulses provided by the SPI bus master i.e. Arduino.
- **SS / SDA / Rx** pin acts as a signal input when the SPI interface is enabled, as serial data when the I2C

interface is enabled and as a serial data input when the UART interface is enabled. This pin is usually marked by encasing the pin in a square so that it can be used as a reference to identify other pins.

3.Servo Motor:-

A servo (servomechanism) is an electromagnetic device that converts electricity into precise controlled motion by use of negative feedback mechanisms.

4. LED:-

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

5. Buzzer:-

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

6. **Jump Wires:-**

What is a jumper wire? A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit.

7. Breadboard:-

A breadboard, solderless breadboard, or protoboard is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable
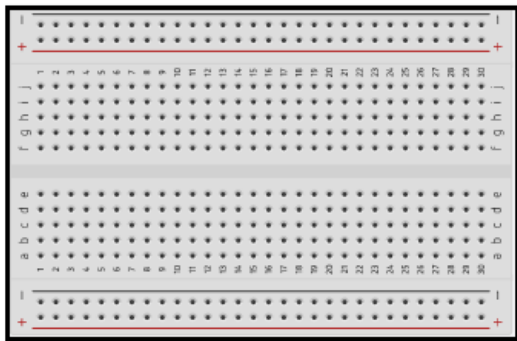
SOURCE CODE

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

#define SS_PIN 10
#define RST_PIN 9
#define LED_G 5
#define LED_R 4
#define BUZZER 2
MFRC522 mfrc522(SS_PIN, RST_PIN);
Servo myServo;
void setup()
{
  Serial.begin(9600);
  SPI.begin();
  mfrc522.PCD_Init();
  myServo.attach(3);
  myServo.write(0);
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  pinMode(BUZZER, OUTPUT);
  noTone(BUZZER);
  Serial.println("Put your card to the reader...");
  Serial.println();

}
void loop()
{

  if ( ! mfrc522.PICC_IsNewCardPresent())
  {
   return;
  }

  if ( ! mfrc522.PICC_ReadCardSerial())
  {
   return;
  }

  Serial.print("UID tag :");
  String content= "";
  byte letter;
  for (byte i = 0; i < mfrc522.uid.size; i++)
  {
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0"
: " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
  }
  Serial.println();
  Serial.print("Message : ");
  content.toUpperCase();
  if (content.substring(1) == " 93 F0 5D AC ")
  {
   Serial.println("Authorized access");
   Serial.println();
   delay(500);
```
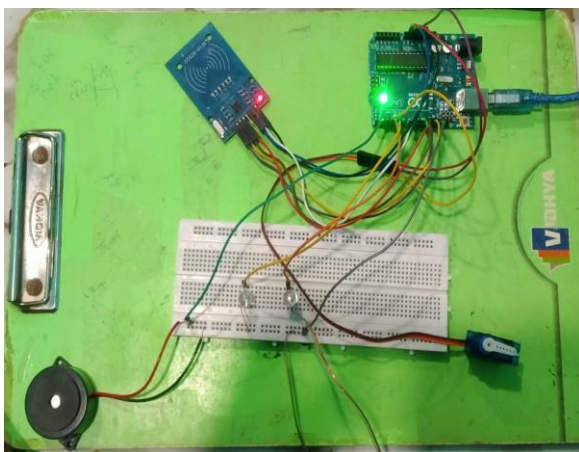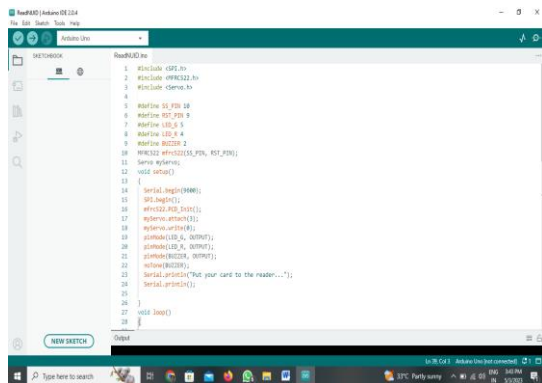
```
  digitalWrite(LED_G, HIGH);
  tone(BUZZER, 500);
  delay(300);
  noTone(BUZZER);
  myServo.write(180);
  delay(5000);
  myServo.write(0);
  digitalWrite(LED_G, LOW);
 }

 else  {
  Serial.println(" Access denied");
  digitalWrite(LED_R, HIGH);
  tone(BUZZER, 300);
  delay(1000);
  digitalWrite(LED_R, LOW);
  noTone(BUZZER);
 }
}
```

Program Uploading

II. CONCLUSION

In the healthcare industry, there are other advantages for example; increase accuracy tasks, reduce human errors, improve safety, and patient satisfaction. No doubt, in coming years, using of the RFID will be a requirement in the healthcare industry.

Although, the sole usage of RFID will not be able meet expectation of health care organizations. If it is used alone, health care organizations will be faced with numerous challenges. But, if we integrate it with hospital information systems (HIS) and electronic health records (EHRs) and support it by clinical decision support systems (CDSS), it facilitates magically processes and reduce medical, medication and diagnosis errors.

Advantage

1. **Security:**Only those who have a valid master card with them get permission to unlock the door
2. **Diverse**:The code inside each master card is different, so no one can open the door
3. **Convenience:**RFID can only be opened with master key

REFERENCES

[1] Arduino IDE: https://www.arduino.cc/en/software
[2] Servo_Motor: https://circuitdigest.com/article/servo-motor
[3] RFID:https://circuitdigest.com