# EL203 Embedded Hardware Design

## *Security Lock System Through PIN/Password*

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## Aim:-

To create a circuit in which using Arduino, along shaft motor and keypad, which is used to make a password protected Automatic door lock system. As we investigated daily living issues, we realized that safety was a primary concern. A feeling of security is necessary for everyone. We have a door access control system as part of our security plan. We made a simple and automatic password-protected door lock system using Arduino where if the password is entered correctly door opens, and if not , it shows Wrong Password.

## Components Required:-

Arduino UNO

Keypad 4x3

LCD 16x02

Breadboard

Potentiometer 10k

Resistor 220 Ohm

LED

Jumper Wires

Bi-Directional Circuit

Long-Shaft Motor

## Software Required:-

Arduino IDE

## Introduction to the project:-

 To create a circuit in which using Arduino, along shaft motor and keypad, which is used to make a password-protected door lock system. As we investigated daily living issues, we realized that safety was a primary concern. A feeling of security is necessary for everyone. We have a door access control system as part of our security plan. We made a simple password-protected door lock system using Arduino where if the password is entered correctly door opens, and if not, it remains closed. In this project, we have defined the default password "1234" in Arduino. You can change it via coding. When we enter a password, it will match it with the password stored in Arduino. If correct, it will show 'Pin Verified, Unlocked Thank You' and rotate the long shaft DC motor to 180 doors as the door is opened. It will then give 5 seconds to enter via the door. Once 5 seconds is completed, the door will get locked automatically. If the password is wrong,  It shows "Wrong PIN". Initially, we connected two LEDs with a lock system, in which if the password entered is correct green led will light up or else red if incorrect We planned to open the door automatically on correct input, but it still needs to close back. We connected the motor with LEDs for the same purpose. In final testing, we tested the door operated by the bidirectional motor, which opens automatically on the correct password and closes

after a 5 seconds. This is all about our automatic Door lock System . We just have to only write right password.

## Working with the project:-

LCD 16x02 Connection:

The Arduino's +5V and GND will be connected to the pin of the breadboard

The LCD has 16 pins and the first one from left to right is the Ground (GND) pin

The second pin is the VCC which we connect the +5V pin on the breadboard.

Next is the Vo pin on which we can attach a potentiometer for the contrast of the display.

The RS pin will be connected to the A0 pin of the Arduino.

The RW pin will be connected to the GND pin of the breadboard.

The E pin will be connected to the A1 pin of the Arduino.


Keypad 4x4 Connections:

The keypad has 8 pins, 4 of them are for the rows and other 4 pin for the columns.

The keypad I'm using is 4x4. It has an additional connection input. The keypad used in the circuit diagram is 3x4.

The Keypad's pins will be connected respectively to the Digital 1-2-3-4-5-6-7-8 pin of the Arduino.


Potentiometer Connection:

Middle edge will be connected to lcd, and other 2 edges will be connected to gnd and 5V respectively.


Arduino connection:

Analog pins are connected with LCD and Digital pins are connected with Keypad.

## Application of our project:-

```
#include <LiquidCrystal.h>
#include <Servo.h>

#define redLED 10
#define greenLED 2
#define servoPin 12

Servo myservo;

char* password ="1234";
int pozisyon = 0;

LiquidCrystal lcd (A0, A1, A2, A3, A4, A5);

void setup() {
  Serial.begin(9600);
  lcd.begin(16, 2);
  pinMode(redLED, OUTPUT);
  pinMode(greenLED, OUTPUT);
  digitalWrite(redLED, LOW);
  digitalWrite(greenLED, LOW);
  myservo.attach(servoPin);
}

void loop() {
  digitalWrite(redLED, LOW);
  digitalWrite(greenLED, LOW);
  lcd.setCursor(0, 0);
  lcd.print("   Welcome   ");
  lcd.setCursor(0, 1);
```

```
lcd.print(" Enter Password");

while (!Serial.available()); // wait for input from serial monitor

char whichKey = Serial.read(); // read the character entered in the serial monitor

Serial.println(whichKey); // print the entered character for confirmation




if (whichKey < '0' || whichKey > '9') { // check if the entered character is not a digit

  pozisyon = 0;

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print("  Invalid Key!");

  delay(1000);

  lcd.clear();

  pozisyon = 0;

} else if (whichKey == password[pozisyon]) { // check if the entered digit is correct

  pozisyon++;

} else { // entered digit is incorrect

  pozisyon = 0;

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print(" Access Denied");

  delay(1000);

  lcd.clear();


}


if (pozisyon == 4) { // password entered correctly

  pozisyon = 0;

  digitalWrite(redLED, LOW);

  digitalWrite(greenLED, HIGH);

  lcd.clear();
```

```
    lcd.setCursor(0, 0);

    lcd.print(" Access Granted ");

    myservo.write(90);

    delay(1200);

    digitalWrite(redLED, LOW);

    digitalWrite(greenLED, LOW);

    lcd.clear();

    lcd.setCursor(0, 0);

    lcd.print("   UNLOCKED");

    delay(5000);

    lcd.clear();

    digitalWrite(redLED, HIGH);

    digitalWrite(greenLED, LOW);

    myservo.write(-90);

    lcd.setCursor(0, 0);

    lcd.print("    LOCKED");

    delay(1800);

    digitalWrite(redLED, LOW);

    digitalWrite(greenLED, LOW);

    lcd.clear();
  }
}
```

## Design of our project:-
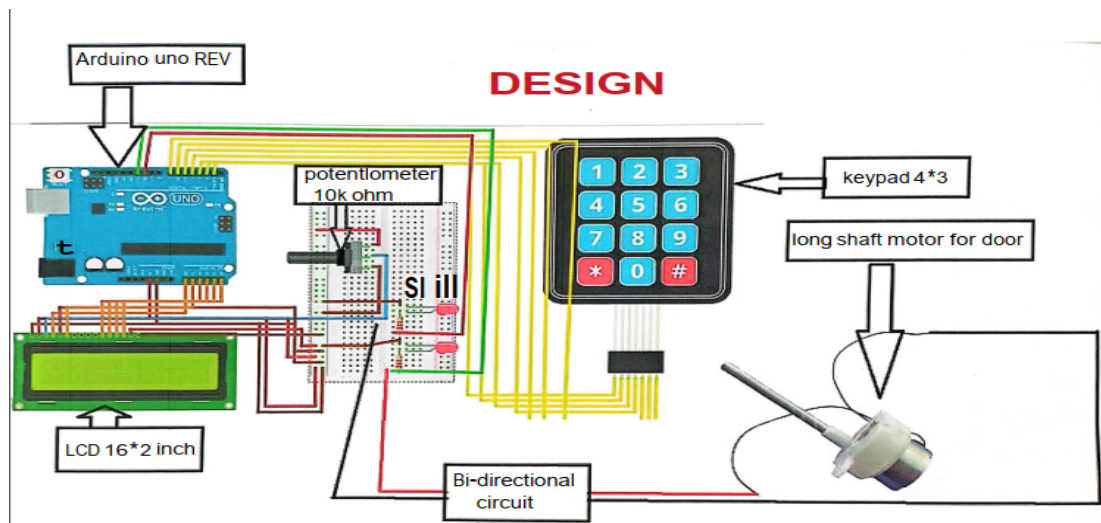


## Video of our project:-

Click [here](#)

## Conclusion:-

In this project, we learnt how to work with Arduino to make a simple password protected automatic door lock system. We learnt How to code in Arduino . What are the different features and applications of Arduino.