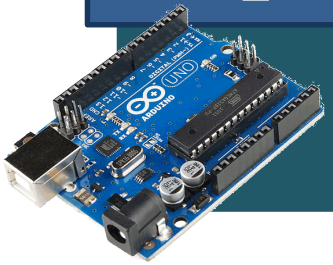
2022년 IoT기반 스마트 솔루션 개발자 양성과정



Firmware [펌웨어]

20-Door Lock

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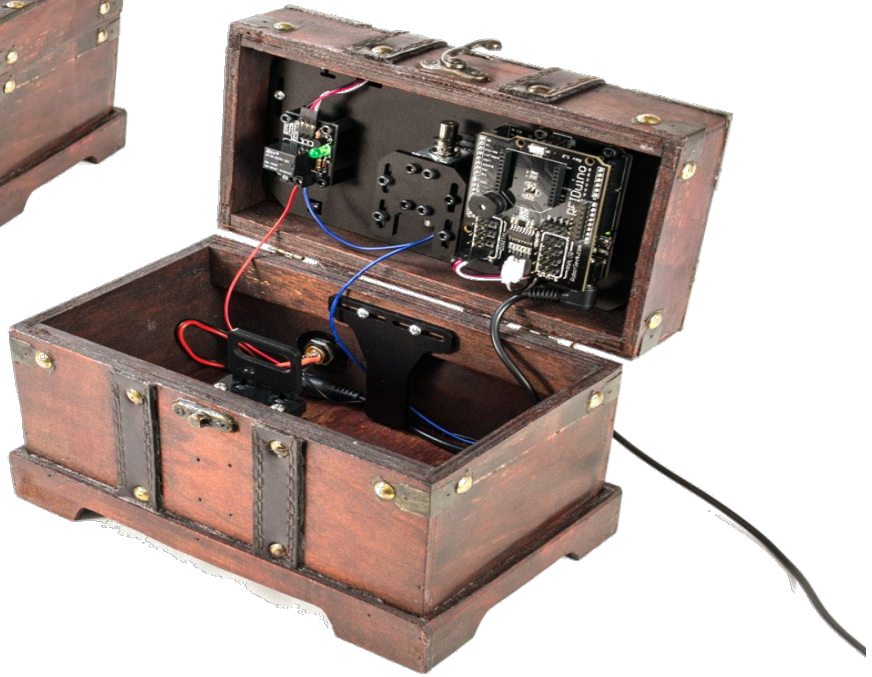
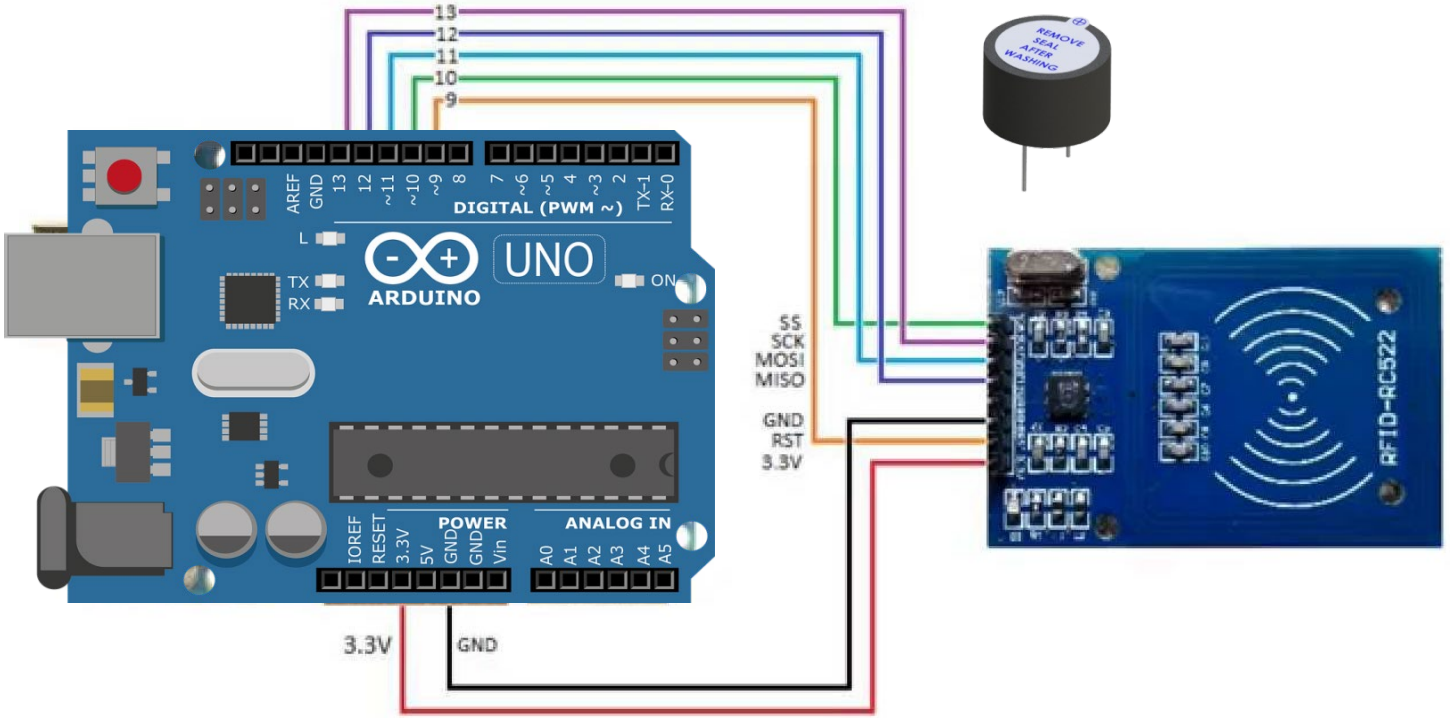
Arduino Door Lock



RFID Door Lock



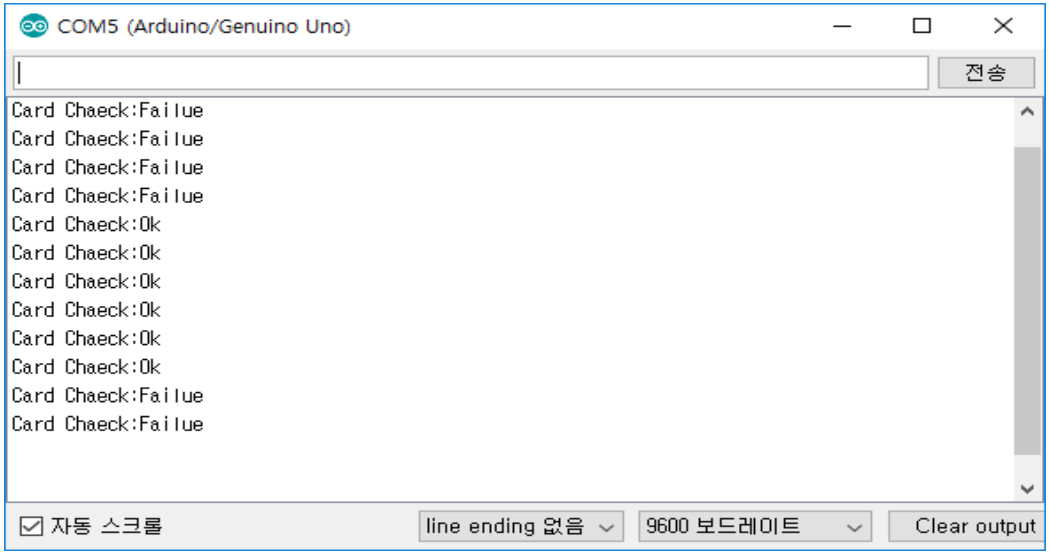
Buzzer 울리기

- UID가 다르면 짧게 '삐'
- UID가 맞으면 길게 '삐 '

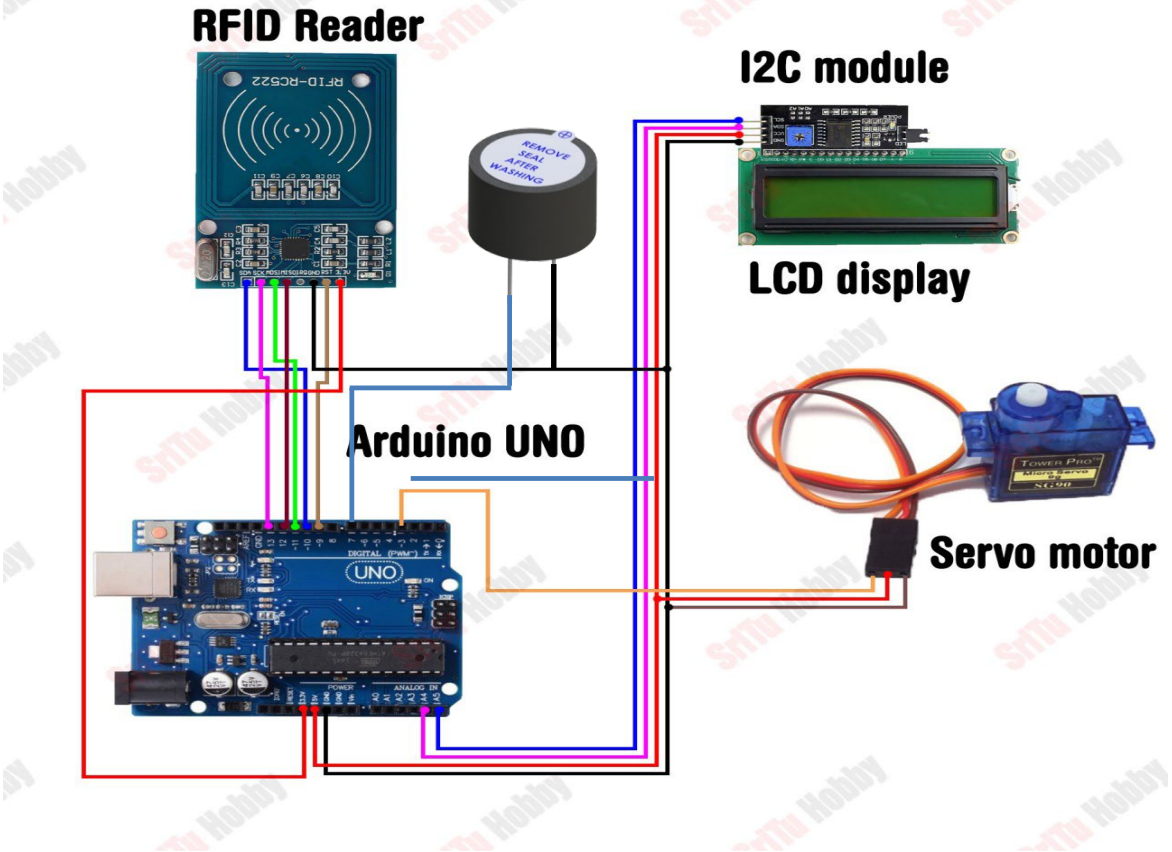
```
#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10
#define RST_PIN 9
#define BUZZ 8

MFRC522 mfrc522(SS_PIN, RST_PIN);
byte SetID[8]={0xD4,0xDF,0x06,0x85};

void setup() {
  Serial.begin(9600);
  pinMode(BUZZ,OUTPUT);
  SPI.begin();
  mfrc522.PCD_Init();
  Serial.println("MFRC522 Ready");
}
```

```
void loop( ) {
  if ( !mfrc522.PICC_IsNewCardPresent( ) ) {  return;  }
  if ( !mfrc522.PICC_ReadCardSerial( ) ) {  return;  }

  Serial.print("Card Chaeck:");
  for (byte k = 0; k < mfrc522.uid.size; k++) {
    if (SetID[k] != mfrc522.uid.uidByte[k]) {
      Serial.println("Failue");
      tone(BUZZ,500,100);
      delay(1000);
      return;
    }
  }
  Serial.println("Ok");
  tone(BUZZ,500,1500);
}
```

Buzzer 울리기 결과



RFID-lock



MFRC522-LCD 1

```
1.  /*RFID tag scan code */
2.  #include <LiquidCrystal_I2C.h>
3.   #include <SPI.h>
4.  #include <MFRC522.h>


5.  #define RST_PIN 9
6.  #define SS_PIN 10
7.  byte readCard[4];
8.  byte a = 0;
9.  LiquidCrystal_I2C lcd(0x27, 16, 2);
10. MFRC522 mfrc522(SS_PIN, RST_PIN);
11. void setup() {
12.   Serial.begin(9600); lcd.init();
13.   lcd.backlight();
14.  while (!Serial); SPI.begin();
15.   mfrc522.PCD_Init();
16.   delay(4);
17.   mfrc522.PCD_DumpVersionToSerial();
18.   lcd.setCursor(2, 0);
19.  lcd.print("Put your card");
20. }
```

MFRC522-LCD 1

```
1.  void loop() {
2.  if ( ! mfrc522.PICC_IsNewCardPresent()) { return 0; }
3.  if ( ! mfrc522.PICC_ReadCardSerial()) { return 0; }
4.  lcd.clear();
5.  lcd.setCursor(0, 0);
6.  lcd.print("Scanned UID");
7.  a = 0;
8.  Serial.println(F("Scanned PICC's UID:"));

9.  for ( uint8_t i = 0; i < 4; i++) {
10.  // readCard[i] = mfrc522.uid.uidByte[i];
11. Serial.print(readCard[i], HEX);
12. Serial.print(" ");
13. lcd.setCursor(a, 1); lcd.print(readCard[i], HEX);
14. lcd.print(" ");
15. delay(500);
16. a += 3;
17. }
18. Serial.println("");
19. mfrc522.PICC_HaltA();
20. return 1;
21. }
```

MFRC522-LCD 2

```
#include <Servo.h>
#include <LiquidCrystal_I2C.h>
#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10
#define RST_PIN 9

String UID = "A3 C6 13 E9";
byte lock = 0;
Servo servo;
LiquidCrystal_I2C lcd(0x27, 16, 2);
MFRC522 rfid(SS_PIN, RST_PIN);

void setup() {
  Serial.begin(9600);
  servo.write(70);
  lcd.init();
  lcd.backlight();
  servo.attach(5);
  SPI.begin();
  rfid.PCD_Init();
}

void loop() {
  lcd.setCursor(4, 0);
  lcd.print("Welcome!");
  lcd.setCursor(1, 1);
  lcd.print("Put your card");

if( !rfid.PICC_IsNewCardPresent()
||  !rfid.PICC_ReadCardSerial() ) {
  delay(500);
  return;  }

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Scanning");
  Serial.print("NUID tag is :");
  String ID = "";
```

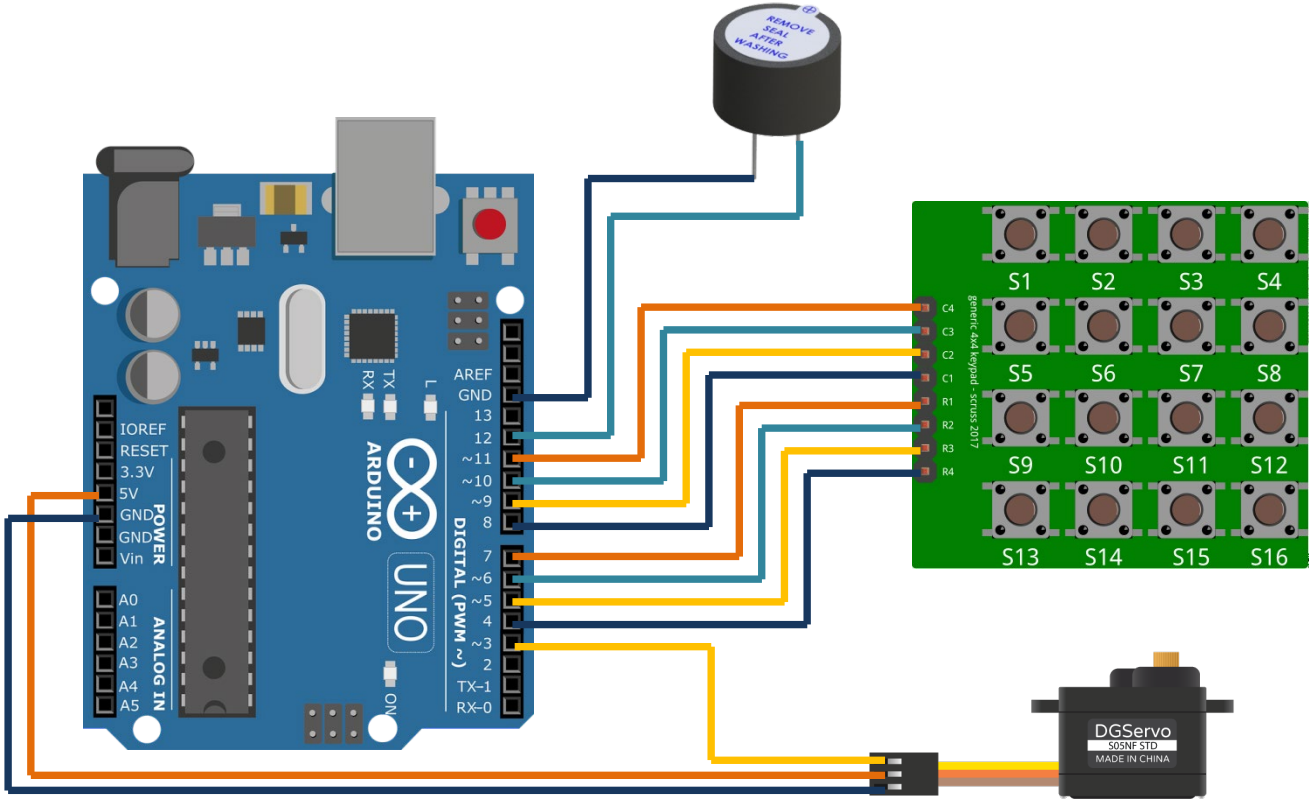
MFRC522-LCD 2

```
1.      for (byte i = 0; i < rfid.uid.size; i++) {
2.          lcd.print(".");
3.          ID.concat(String(rfid.uid.uidByte[i] < 0x10 ? " 0" : " "));
4.          ID.concat(String(rfid.uid.uidByte[i], HEX));
5.          delay(300);
6.        }
7.        ID.toUpperCase();

8.        if (ID.substring(1) == UID && lock == 0 ) {
9.          servo.write(70);
10.         lcd.clear();
11.         lcd.setCursor(0, 0);
12.         lcd.print("Door is locked");
13.         delay(1500);
14.         lcd.clear();
15.         lock = 1;
16.       } else if (ID.substring(1) == UID && lock == 1 ) {
17.         servo.write(160);
18.         lcd.clear();
19.         lcd.setCursor(0, 0);
20.         lcd.print("Door is open");
21.         delay(1500);
22.         lcd.clear();
23.         lock = 0;
24.       } else {
25.         lcd.clear();
26.         lcd.setCursor(0, 0);
27.         lcd.print("Wrong card!");
28.         delay(1500);
29.         lcd.clear();
30.       }
31.     }
```

KeyPad Door Lock

- 비밀번호 : 4자리
- Lock : Servo Motor
- Piezo Buzz
  - PW 맞으면 길게 “삐”
  - PW 틀리면 짧게 “삐”

Wiring


REMOVE SEAL AFTER WASHING
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
C4
C3
C2
C1
R1
R2
R3
R4
generic 4x4 keypad - scruss 2017
IOREF
RESET
3.3V
5V
GND
GND
Vin
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM ~)
TX
RX
L
ON
ARDUINO
UNO
DGServo
S05NF STD
MADE IN CHINA

Define & Setup

```
#include <Servo.h>
#define servoPin 3
Servo servo;

#include <Keypad.h>
const byte ROWS = 4;
const byte COLS = 4;
byte KeyRow[ROWS] = { 7,  6,  5,  4 };
byte KeyCol[COLS] = { 8,  9, 10, 11 };
char KeyCode[ROWS][COLS]={
                {'1', '2', '3', 'A'},
                {'4', '5', '6', 'B'},
                {'7', '8', '9', 'C'},
                {'*', '0', '#', 'D'} };
Keypad keypads = Keypad( makeKeymap(KeyCode),KeyRow,KeyCol,ROWS,COLS);

byte PWD[4]={'1', '2', '3', '4'};
byte KeyBuff[4];
byte BuffPoint=0;

#define Buzz 12
```

```
void setup( ) {
  servo.attach(servoPin);
  pinMode(Buzz,OUTPUT);
  Serial.begin(9600);
  tone(Buzz,500,100);
  delay(150);
  tone(Buzz,500,100);
  servo.write(0);
}
```

Loop & sub Function

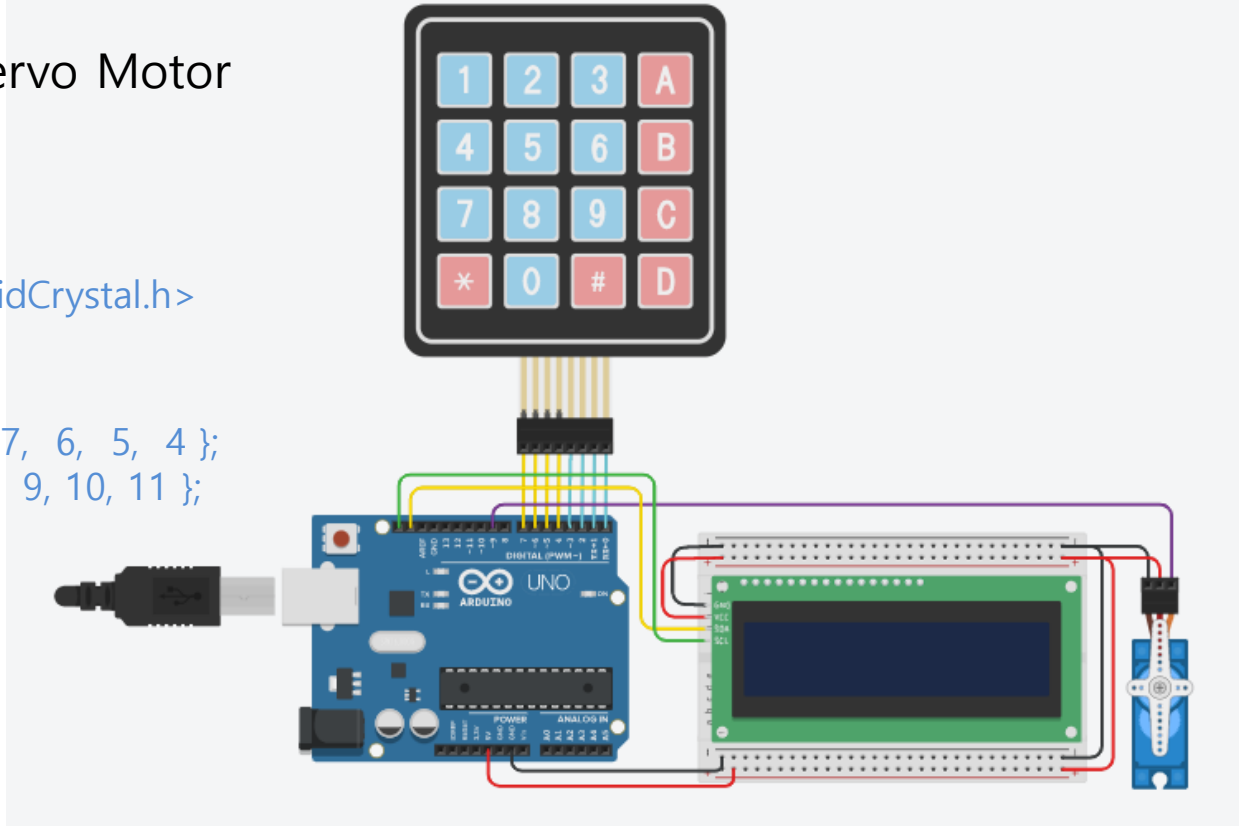
```
void loop( ) {
  char key=keypads.getKey( );
  switch (key){
    case 0:    break;       //아무키도 없으면 Pass
    case 'A':
      servo.write(0);       Serial.println("Close Door");
      break;
    case 'B':
      servo.write(90);      Serial.println("Open Door");
      break;
    case 'C':  break;
    case 'D':  break;
    case '*':  break;
    case '#':
      ComparePWD( );        break;
    default:
      KeyBuff[BuffPoint]=key;
      if (++BuffPoint>3) BuffPoint=0;
      tone(Buzz,1000,100);
      delay(150);
      break;
  }
}
```

```
void ComparePWD( ){
  if ( KeyCheck( ) ){
    servo.write(90);
    Serial.println("Passed No");
  }else{
    servo.write(0);
    Serial.println("Failed No");
  }
  KeyBuff[BuffPoint]=0x20;
}

bool KeyCheck( ){
  signed int chkPoint=BuffPoint-1;
  if (chkPoint<0) chkPoint=3;
  for (int k=3; k>=0; k--){
    if (PWD[k] != KeyBuff[chkPoint]) return false;
    if (--chkPoint<0) chkPoint=3;
  }
  return true;
}
```

Door Lock Password

1. Keypad, LCD, Buzzer, Servo Motor 사용

2. Thinkercad 시뮬레이션
   - #include <Adafruit_LiquidCrystal.h>
   - #include <Servo.h>
3. 입력핀번호
   - byte KeyRow[ROWS] = { 7, 6, 5, 4 };
   - byte KeyCol[COLS] = { 8, 9, 10, 11 };
4. 부져 사용
   - pinMode(6, OUTPUT);
5. Servo Motor
   - pinMode(3, OUTPUT);



coding

```
#include <Keypad.h>
#include <LiquidCrystal_I2C.h>
#include <Servo.h>
LiquidCrystal_I2C lcd(0x27,16,2);
Servo myservo;

String password,cpassword;
int myservopin = 9;

const byte ROWS = 4;
const byte COLS = 4;
char hexaKeys [ROWS] [COLS] = {
  {'1','2','3','A'},
  {'4','5','6','B'},
  {'7','8','9','C'},
  {'*','0',' # ','D'} };
byte rowPins [ROWS] = {7,6,5,4};
byte colPins [COLS] = {3,2,1,0};
Keypad customKeypad=Keypad(makeKeymap(hexaKeys),rowPins,colPins,ROWS,COLS);
void setup(){
  myservo.attach(myservopin);
  myservo.write(90);
  lcd.init();
  lcd.backlight();
  lcd.print("Set the password");
  lcd.setCursor(0,1);

  char customKey=customKeypad.waitForKey();
  while(int(customKey)!=42){
    password=password+customKey;
    lcd.print("*");
    customKey=customKeypad.waitForKey(); }
  delay(1000);
  lcd.clear();
  lcd.print("The password has");
  lcd.setCursor(0,1);
  lcd.print("been set already");
  delay(1000);}
```

```
1.    void loop(){
2.      lcd.clear();
3.      lcd.print("Enter your pwd:");
4.      lcd.setCursor(0,1);
5.      char customKey=customKeypad.waitForKey();
6.      while(customKey!=42){
7.        if(customKey){
8.          cpassword=cpassword+customKey;
9.          lcd.print("*");
10.         customKey=customKeypad.waitForKey();   }   }
11.     delay(1000);
12.     lcd.clear();
13.     if(password.equals(cpassword)){
14.       lcd.print("The pwd is right");
15.       myservo.write(0);
16.       lcd.print("The door is open");
17.       delay(1000);
19.       lcd.print("Enter # to close");
20.       lcd.setCursor(0,1);
21.       delay(500);
22.       lcd.print("Wait to close...");
23.       char closeKey=customKeypad.waitForKey();
24.       if(int(closeKey)==35){
25.         myservo.write(90);  }
26.       lcd.clear();
27.       lcd.print("The door close!");
28.       delay(1000);
29.     } else{
30.       lcd.print("The pwd is wrong");
31.       lcd.setCursor(0,1);
32.       delay(500);
33.       lcd.print("Please try again");
34.       delay(1000);   }
35.       cpassword="";
36.   }
```