Activity 9. KnockLock

Project carried out and documented by Mircioiu David, eleventh grade D, mathematics-computer science specialization, "Constantin Cantacuzino" National Pedagogical College Târgoviște.

Introduction

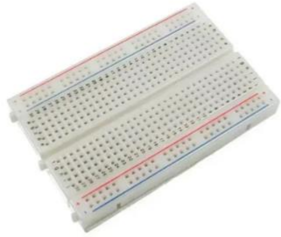
KnockLock is an innovative security system that uses a knock recognition mechanism instead of the traditional code or key to unlock a door. This concept combines accessible technology, such as Arduino and piezo sensors, to create a locking system that recognizes a specific pattern of beats.

The central idea of the project is to allow users to create a custom knock pattern, which will serve as a "password" for unlocking a door or compartment. This model is memorized by the system and compared with future access attempts, providing a secure and unconventional solution for protecting personal spaces.

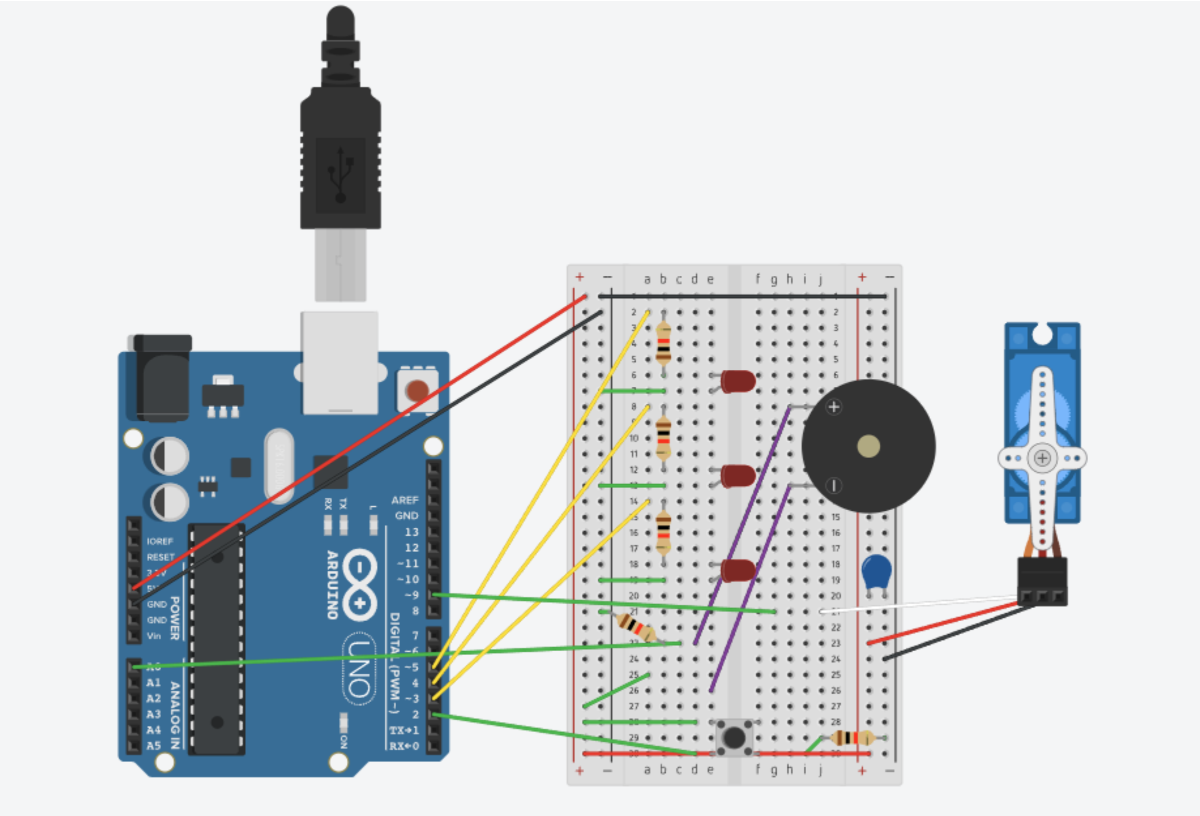
KnockLock not only brings extra security, but it is also an excellent educational project for those interested in electronics and programming, as it combines coding, the use of sensors and actuation mechanisms to create a functional and useful device.

Required components

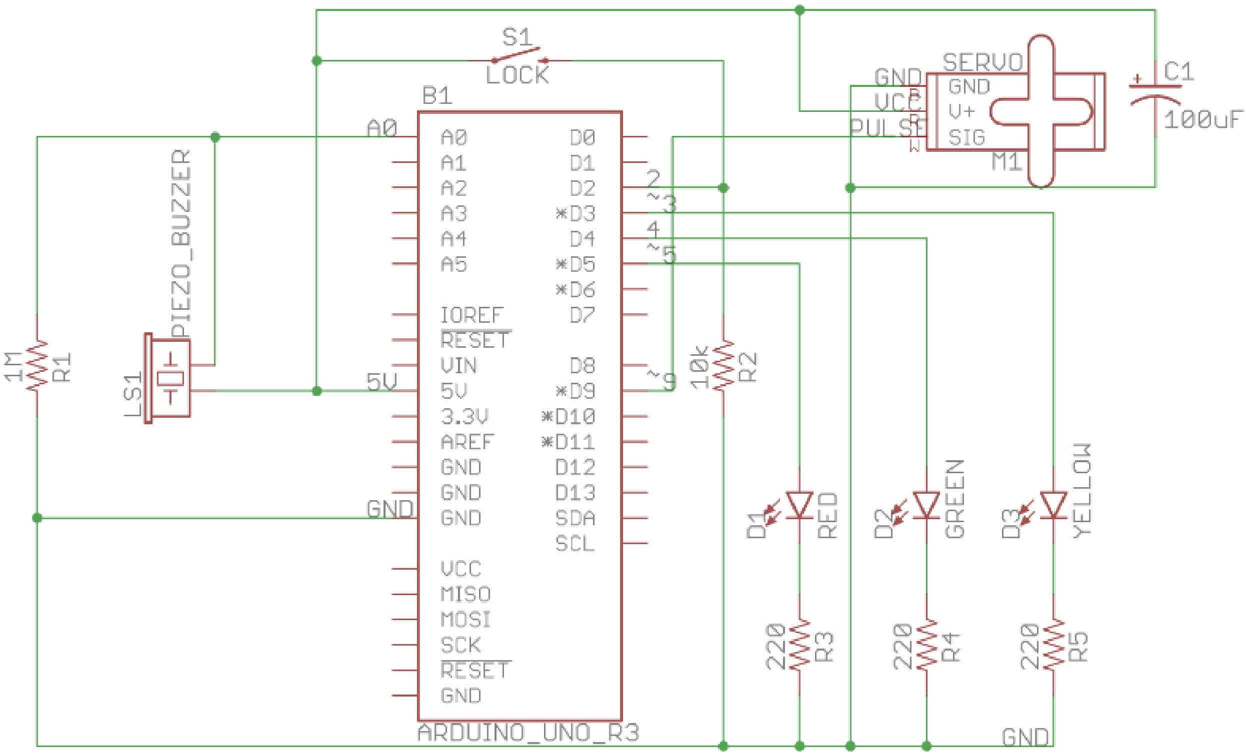
Arduino Uno R3 Versatile microcontroller board with 14 digital pins and 6 analog inputs, ideal for electronic projects.	
Piezoelectric sensor Sensor that converts vibration or pressure into an electrical signal.	

Breadboard Tool used to connect electrical components without soldering.	
Resistors Components that limit the electrical current in a circuit.	
Led Emissive diode of light.	
Capacitor A component that stores and releases electricity.	
Servo Motor Small motor with precise position control.	
Switch Device that switches between different circuits or functions.	

Circuit diagram

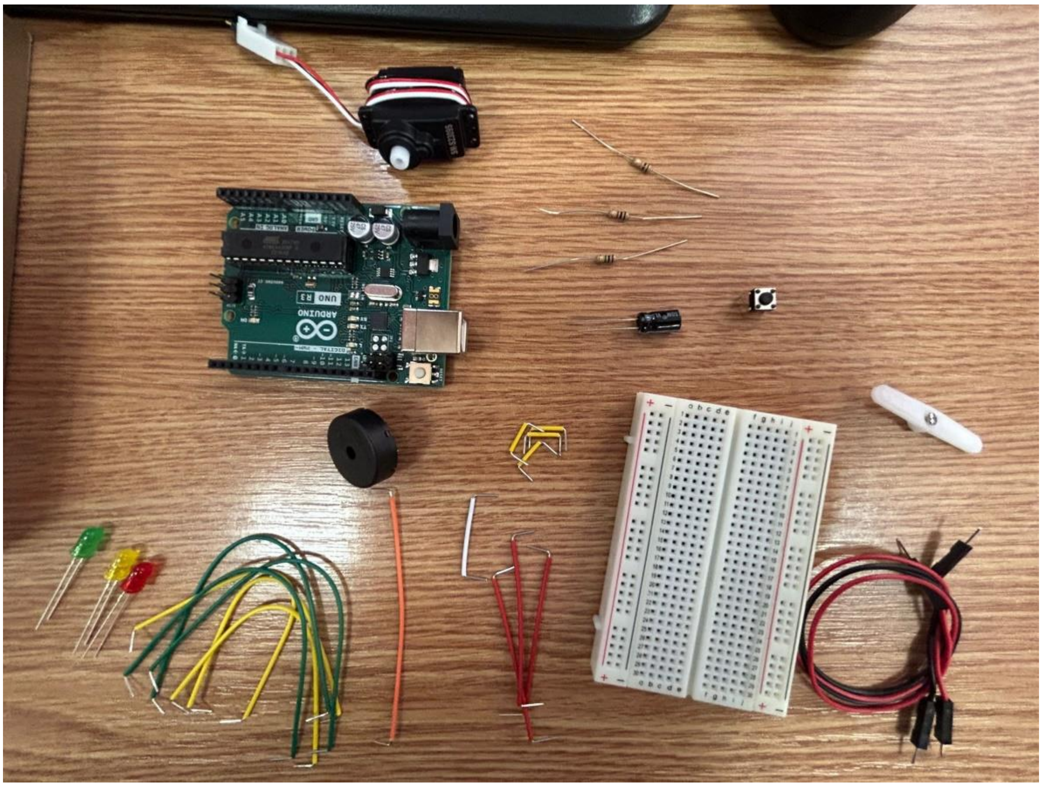


Wiring diagram

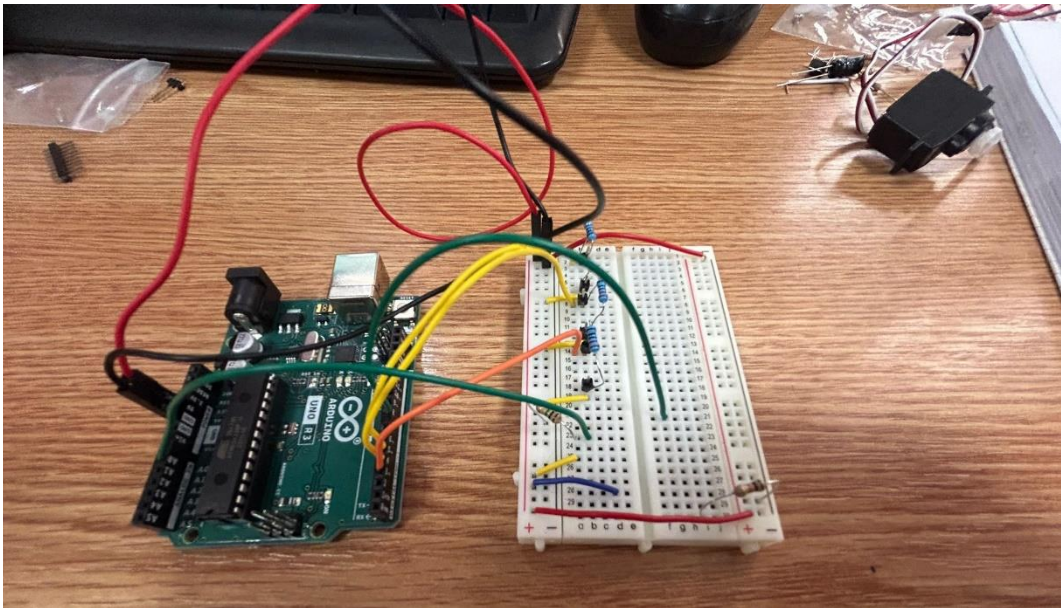


Working mode

Step 1. We have chosen the necessary components for the circuit.



Step 2. I put the cables and the resistors.



Step 3. I put the piezoelectric sensor, the servo motor sensor, the switch and the capacitor.

Step 4. I wrote the software part.

Programming

The software used is the Arduino IDE.

Code:

```
#include <Servo.h>
myServo servo;
const int piezo = A0;
const int switchPin = 2;
const int yellowLed = 3;
const int greenLed = 4;
const int redLed = 5;
int knockVal;
int switchVal;
const int quietKnock = 10;
const int loudKnock = 100;
boolean locked = false;
int numberOfKnocks = 0;

void setup()
{
put your setup code here, to run once:
  myServo.attach(9);
  pinMode(yellowLed, OUTPUT);
  pinMode(redLed, OUTPUT);
  pinMode(greenLed, OUTPUT);
  pinMode(switchPin, INPUT);
  digitalWrite(greenLed, HIGH);
  myServo.write(0);
  Serial.println("The box is unlocked!");
}

void loop()
{
  if (locked == false)
{
    switchVal = digitalRead(switchPin);

    if (switchVal == HIGH)
{
      locked = true;
      digitalWrite(greenLed, LOW);
      digitalWrite(redLed, HIGH);
      myServo.write(90);
      Serial.println("The box is locked!");
      delay(1000);
```

```
}
}
  if (locked == true)
{
    knockVal = analogRead(piezo);
    if (numberOfKnocks < 3 & knockVal > 0)
{
      if (checkForKnock(knockVal) == true)
{
        numberOfKnocks++;
}
      Serial.print(3 - numberOfKnocks);
      Serial.println("several blows to give");
}
    if (numberOfKnocks >= 3)
{
      locked = false;
      myServo.write(0);
      delay(20);
      digitalWrite(greenLed, HIGH);
      digitalWrite(redLed, LOW);
      Serial.println("The box is unlocked!");
      numberOfKnocks = 0;
}
}
}
boolean checkForKnock(int value)
{
  if (value > quietKnock & value < loudKnock)
{
    digitalWrite(yellowLed, HIGH);
    delay(50);
    digitalWrite(yellowLed, LOW);
    Serial.print("Collision valid for value");
    return true;
}
  else
{
    Serial.print("Poor value of the collision");
    Serial.println(value);
    return false;
}
}
```

Conclusions

In conclusion, the KnockLock project demonstrated the efficiency and versatility of Arduino technology in implementing an innovative security system. Knock lock uses sensors to detect specific sequences of blows, providing a unique and interactive security method. This project provides a solid basis for the development of similar applications in the field of security and automation.