Lab 3. Intruder Alarm

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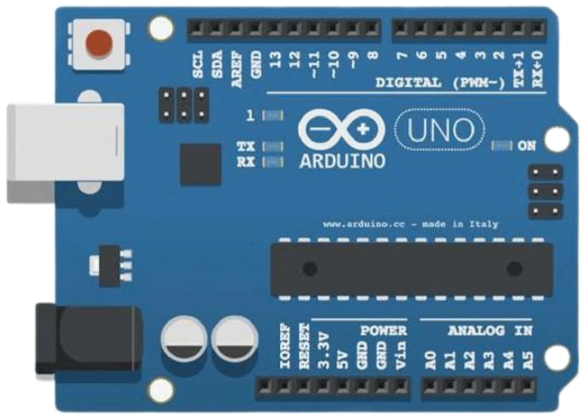
1. Introduction

- Keeping your valuables safe from wrongdoers can be a difficult task, but with the help of this experiment, you will be able to create your own alarm system that alerts you of any intrusions.
- This circuit produces a sound using a buzzer when an object passes near the sensor. The distance at which the object is detected can be easily adjusted in the program.

2. Required Components

- Arduino Uno Board

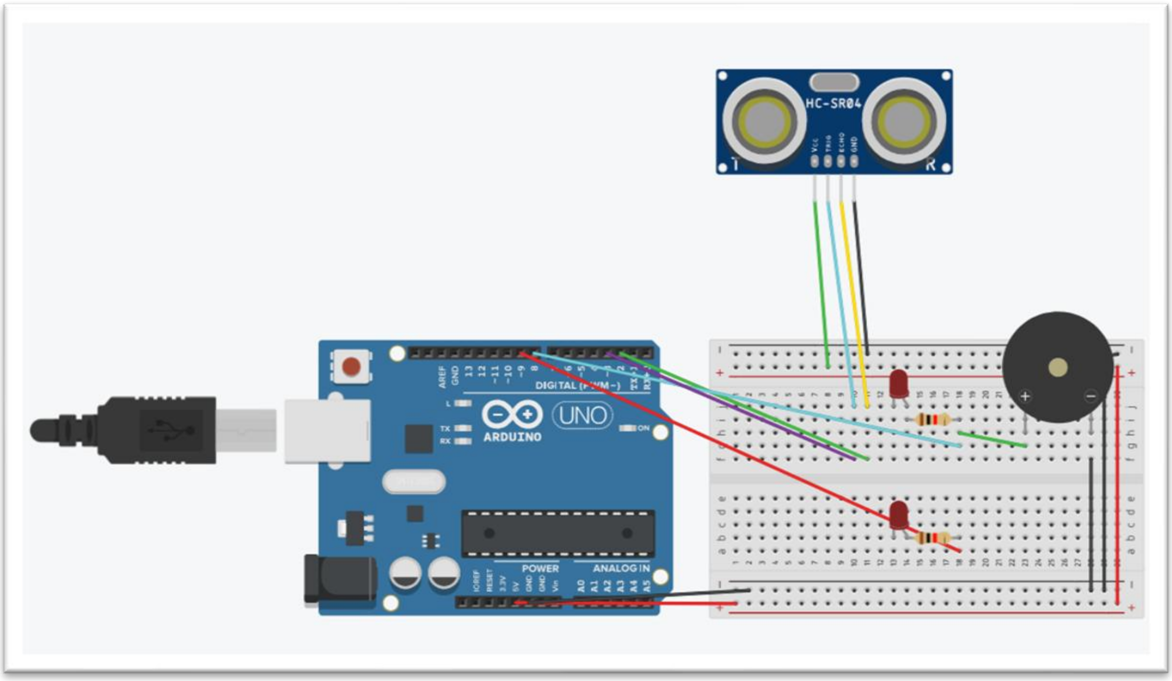


- Electronic components used: LED x2, Rezistors (220 Ohmi) x2, Buzzer, Breadboard

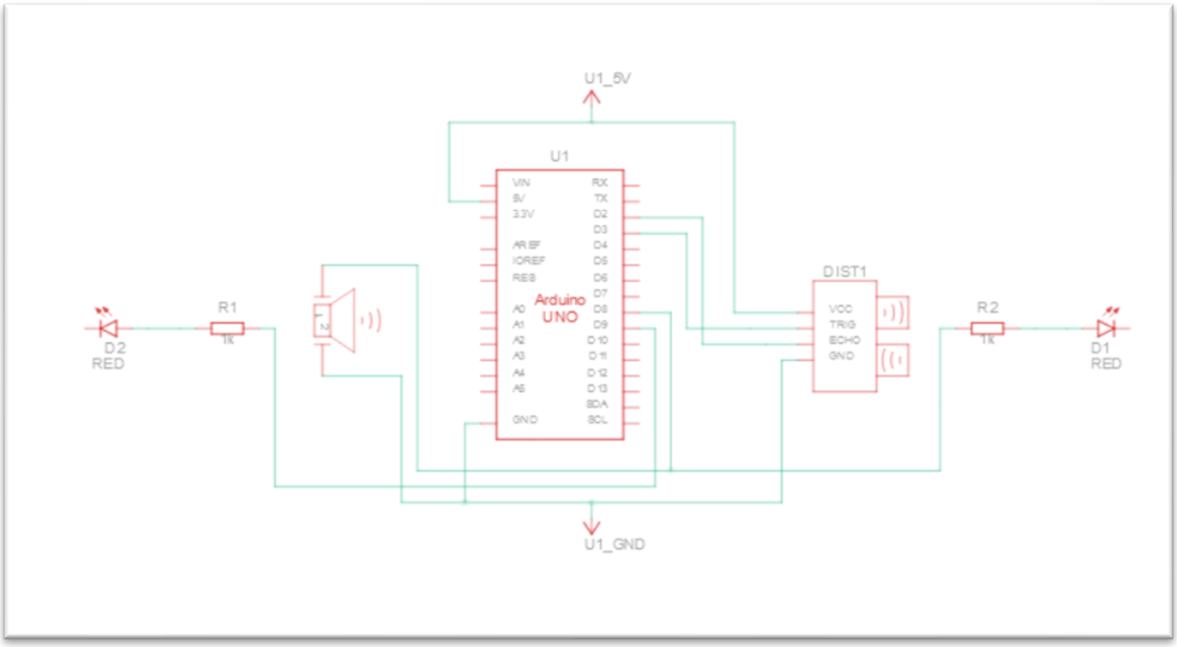



- Senzor: ultrasonic (distance)

3. Circuit Diagram



4. Wiring Diagram



5. Instructions

Step 1： Place all components on the workbench

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Step 3： Connect the wires as shown in the schematic

Step 4： Write the code in Arduino IDE, connect the Arduino board to the computer, and press “Upload”

6. Programming

- Software used: Arduino IDE

```
// Created by The Electronic Guy
// www.youtube.com/theelectronicguy

#define echo 2
#define trig 3
#define outA 8  // Red LED
#define outB 9  // Green LED
#define outC 10 // Buzzer

float duration;                     // time taken by the pulse to return back
float distance;                     // oneway distance travelled by the pulse
const int intruderDistance = 10; // the minimum distance
                                    // upto which the sensor is able
                                    // to sense any object
void setup()
{
  pinMode(trig, OUTPUT);
  pinMode(echo, INPUT);
  pinMode(outA, OUTPUT);
  digitalWrite(outA, LOW);
  pinMode(outB, OUTPUT);
  digitalWrite(outB, LOW);
  pinMode(outC, OUTPUT);
  digitalWrite(outC, LOW);
  Serial.begin(9600);
}
void loop()
{
  time_Measurement();
  distance = (float)duration * (0.0343) / 2; // calculate the oneway distance
travelled by the pulse
  Serial.println(distance);
  alarm_condition();
}
void time_Measurement()
{ // function to measure the time taken by the pulse to return back
  digitalWrite(trig, LOW);
  delayMicroseconds(2);
  digitalWrite(trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(trig, LOW);

  duration = pulseIn(echo, HIGH);
}
void alarm_condition()
{ // function to execute the output commands based on the sensor input
  if (distance <= intruderDistance)
```

```
  {
    digitalWrite(outA, HIGH);
    digitalWrite(outB, LOW);
    analogWrite(outC, 200);
  }
  else
  {
    digitalWrite(outA, LOW);
    digitalWrite(outB, HIGH);
    analogWrite(outC, 0);
  }
}
```

7. Conclusions

Through this experiment, I created a simple alarm system using an ultrasonic sensor and an Arduino Uno board. The system detects nearby objects and activates a buzzer to indicate the presence of a potential intruder. I learned how to build a basic electronic circuit and program the sensor to respond to customizable distances. This project demonstrates the effectiveness of simple security solutions and provides a solid foundation for future improvements.

8. References

- https://www.etechnophiles.com/5-arduino-ultrasonic-sensor-projects-with-code-circuit-diagram-and-more/#distance-measurement-project
- https://www.tinkercad.com