Alexandria University
Faculty of Engineering
Computer and Systems Engineering Department
CSE 233: Computer Organization

Microcontrollers - Lab 3

Team Members

1. ID: 20011574 – محمد رفيق محمد السيد ابراهيم
2. ID: 20011923 – مصطفى خالد كمال احمد زايد

First: Problem Statement

Designing a Voltage Threshold system using an Arduino kit that acts as a simple voltmeter with an alarm (buzzer) to indicate that the voltage has exceeded a certain limit.

A potentiometer should be connected to the system to act as a variable voltage input.

By varying the value of the potentiometer, the value of the voltage on the analog pin varies.

The Arduino should be able to print the current analog input voltage on the Serial Monitor. If this voltage exceeds 3 volts, the buzzer and the built in LED should turn ON and remain ON as long as the voltage remains above the threshold (3 volts). If the voltage drops below 2.5 volts, both the buzzer and LED should turn OFF and remain OFF as long as the voltage is below the threshold (2.5 volts).

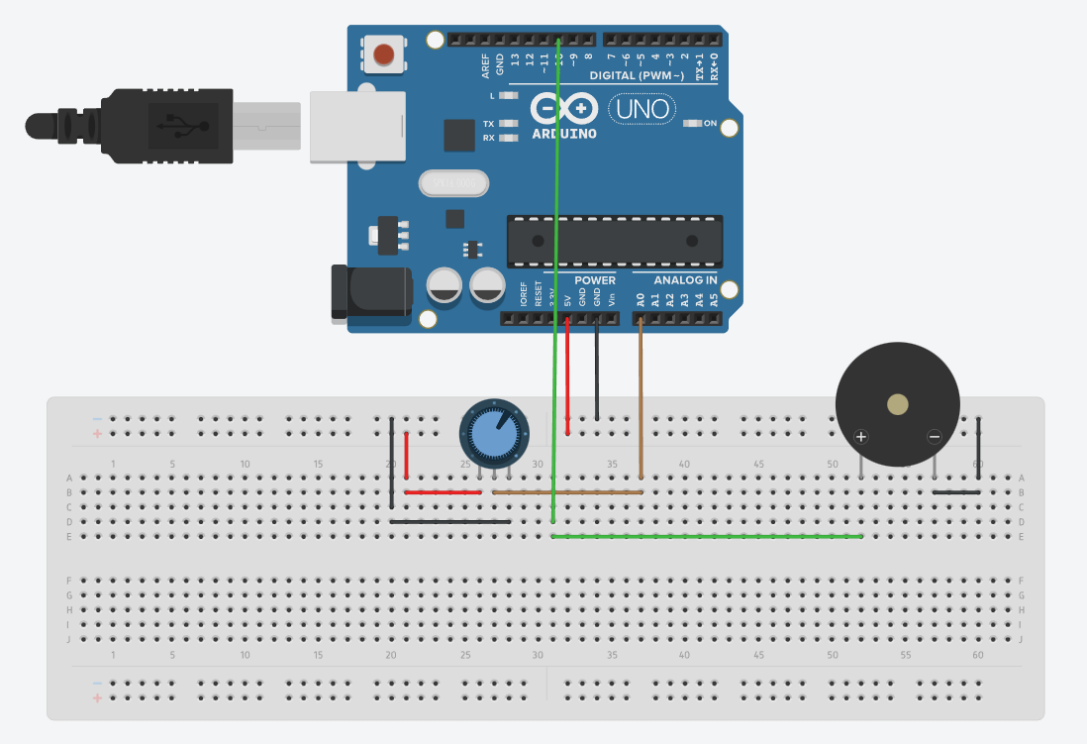
Second: Tools and Procedures

Tools: Arduino Uno kit, a buzzer, a potentiometer, a breadboard, wires.

Procedures:

- The buzzer is connected to the breadboard and to the Arduino board (grounded and connected to digital pin 10).
- The potentiometer is connected to the breadboard and to the Arduino board (the two outer pins to the ground and the 5-volt Arduino ports, and the middle pin to analog pin A0)
- The Arduino board is supplied with power from a laptop.
- The code is written as follows:
    - The setup function: assigning the built in LED, the output pins, and defining the serial on which we write the resulting voltage.
    - Two Boolean values are assigned to help with turning the buzzer on and off when certain voltages are crossed.
    - The loop function reads the current value from pin A0, and to calculate the voltage we multiply that value by 5 and divide it by 1023 (since the read value ranges from 0 to 1023, and we want to calculate the voltage that ranges from 0 to 5 volts), then it turns the buzzer ON or OFF according to that voltage (ON if voltage exceeds 3 volts, and OFF if it is reduced below 2.5 volts).

Third: Circuit diagram



Fourth: Code Snippets

```
1  void setup() {
2    Serial.begin(9600);
3    pinMode(10, OUTPUT);
4    pinMode(LED_BUILTIN, OUTPUT);
5
6  }
```

Setup Function

```
bool flag1 = false, flag2 = false;

void loop() {
  int sensorValue = analogRead(A0);
  float voltage = sensorValue * (5.0 / 1023.0);
  if(voltage > 3){
    flag1 = true;
    flag2 = false;
  }
  if(voltage < 2.5){
    flag1 = false;
    flag2 = true;
  }
  if(flag1){
    tone(10, 1500, 10);
    digitalWrite(LED_BUILTIN, HIGH);
  }else if(flag2){
    tone(10, 0, 10);
    digitalWrite(LED_BUILTIN, LOW);
  }
  Serial.println(voltage);
  delay(1);
}
```

Loop Function (+ flags)