Al-Mustaqbal University
Medical of Instrumentation Techniques Engineering Department
Class: four
Advanced digital design lab
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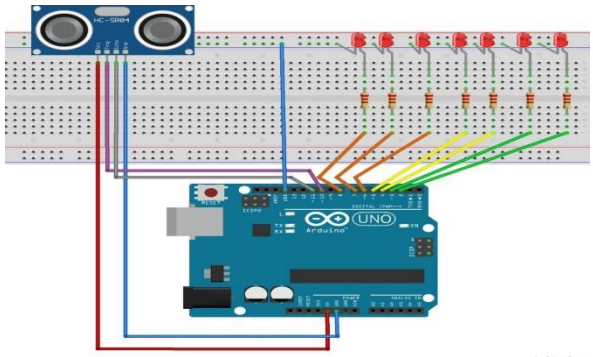
EXP.NO: 3

" Arduino with an alarm device(Altrasonic sensor)"

Objective: Measuring distances between objects and obstacles using audio frequencies

Materials:

1. Arduino board (e.g., Arduino Uno)
2. Light sensor (LDR)
3. Resistor (around 10k ohms)
4. Buzzer or LED
5. Jumper wires
6. **Altrasonic sensor**



Wiring:

1. Connect one leg of the LDR to the 5V on the Arduino.
2. Connect the other leg of the LDR to one leg of the resistor.
3. Connect the other leg of the resistor to the A0 (analog input) on the Arduino.
4. Connect the junction of the LDR and resistor to the GND on the Arduino.
5. Connect the positive leg of the buzzer (or the anode of the LED) to pin 8 on the Arduino.
6. Connect the negative leg of the buzzer (or the cathode of the LED) to the GND on the Arduino.

Arduino Code:

```
int ledPins[3] = { 2, 3,4};
int numberOfLeds = 3;
int trigPin = 10;
int echoPin = 11;
int travelTime;
int distance;

void setup() {
  for (int i = 0; i < numberOfLeds; i++)
{
    pinMode(ledPins[i], OUTPUT);
  }
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
}

void loop() {

  sendSoundWave();                    //Send a sound Wave
  travelTime = pulseIn(echoPin, HIGH);   //Get Travel Time
  distance = travelTime * 0.034 / 2;     //Calculate Distance in
cm
```

```
  if (distance <= 20)
{
    int n = map(distance, 0, 20, numberOfLeds, 0);
    for (int i = 0; i < n; i++) {
      digitalWrite(ledPins[i], HIGH);
    }
    for (int i = n + 1; i < numberOfLeds; i++)
{
      digitalWrite(ledPins[i], LOW);
    }

  } else {
    for (int i = 0; i < numberOfLeds; i++)
{
      digitalWrite(ledPins[i], LOW);
    }
  }
  delay(500);
}
void sendSoundWave() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
 digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
digitalWrite(trigPin, LOW);
}
```

Explanation:

1. The LDR is used to detect light levels. The threshold (300 in this example) determines when the alarm should be triggered.

2. If the LDR value falls below the threshold, indicating darkness, the buzzer will sound for one second.

Upload the Code:

1. Open the Arduino IDE on your computer.

2. Copy and paste the code into a new sketch.

3. Connect your Arduino to your computer using a USB cable.

4. Select your Arduino board and port in the Arduino IDE.

5. Click the upload button to upload the code to the Arduino.

Discussion:

1. How does the ultrasonic sensor work in accurately measuring distances, and what factors may affect its readings?

2. What is the effect of changing the resistor value connected to the LDR on the circuit's sensitivity to light levels?

3. How could this circuit be used in practical applications, such as obstacle avoidance or alarm systems, and what modifications would make it more effective?