



**American International University-  
Bangladesh**

**Department of Computer Science**

**Lab Report Cover Sheet**

<b>Course Name</b>	<b>MICROPROCESSOR AND EMBEDDED SYSTEMS</b>
<b>Lab Report No.</b>	05
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<b>Section</b>	0
<b>Group No.</b>	03

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# Title:

Building an Obstacle Detection System.

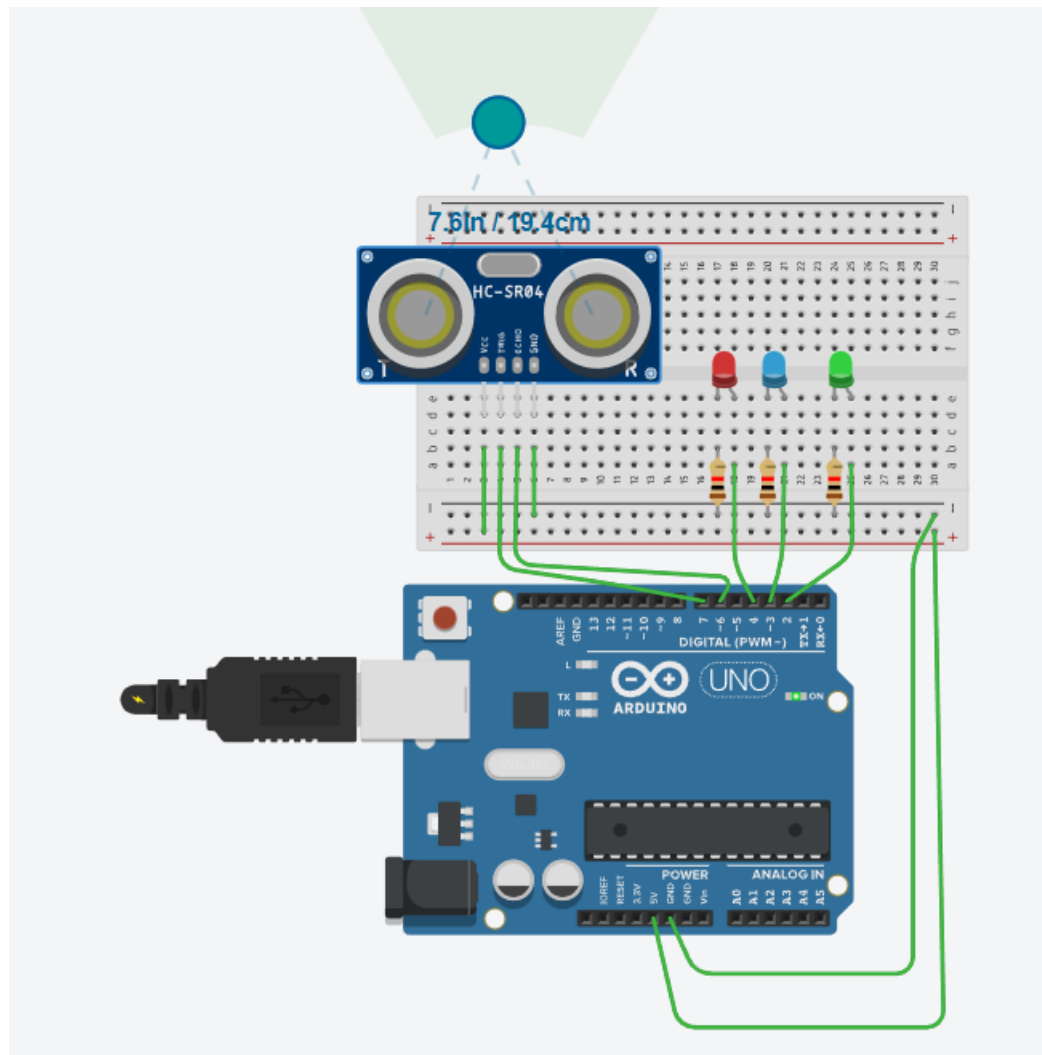
## Theory and Methodology:

Arduino is an open-source platform used for creating interactive electronics projects. Arduino consists of both a programmable microcontroller and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the microcontroller board. Arduino Uno also doesn't need a hardware circuit (programmer/ burner) to load a new code into the board. We can easily load a code into the board just using a USB cable and the Arduino IDE (that uses an easier version of C++ to write a code)

## Apparatus:

1) Arduino IDE (any version)	Software
2) Arduino Uno (R3) board	
3) Sonar Sensor (HCSR04)	
4) LED	

## Result and Simulation:



## Code

```
// C++ code
int distanceThreshold = 0;
int cm = 0;
int inches = 0;
long readUltrasonicDistance(int triggerPin, int echoPin)
{
  pinMode(triggerPin, OUTPUT); // Clear the trigger
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
  // Sets the trigger pin to HIGH state for 10 microseconds
  digitalWrite(triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin, LOW);
  pinMode(echoPin, INPUT);
  // Reads the echo pin, and returns the sound wave travel time in microseconds
  return pulseIn(echoPin, HIGH);
}

void setup ()
{
  Serial.begin(9600);
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
}

void loop()
{
  // set threshold distance to activate LEDs
  distanceThreshold = 350;
  // measure the ping time in cm
  cm = 0.01723 * readUltrasonicDistance(7, 6);

  // convert to inches by dividing by 2.54
  inches = (cm / 2.54);
  Serial.print(cm);
```

```
Serial.print("cm, ");
Serial.print(inches);
Serial.println("in");

    if (cm > distanceThreshold) {
digitalWrite(2, LOW);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
    }
    if (cm <= distanceThreshold && cm > distanceThreshold - 100) {
digitalWrite(2, HIGH);
digitalWrite(3, LOW);
digitalWrite(4, LOW);
    }
    if (cm <= distanceThreshold - 100 && cm > distanceThreshold - 250) {
digitalWrite(2, HIGH);
digitalWrite(3, HIGH);
digitalWrite(4, LOW);
    }

    if (cm <= distanceThreshold - 250 && cm > distanceThreshold - 350) {
digitalWrite(2, HIGH);
digitalWrite(3, HIGH);
digitalWrite(4, HIGH);
    }
    if (cm <= distanceThreshold - 350) {
digitalWrite(2, HIGH);
digitalWrite(3, HIGH);
digitalWrite(4, HIGH);
    }
    delay (100); // Wait for 100 millisecond(s)
}
```

## **Discussion:**

In the Implementation and effects in Microcontroller by using Arduino UNO. For this experiment we used tinkercad, It's a free online 3D design program. Then a complete circuit designed in tinkercad into the Arduino Uno. Everything we have done so far is hardware design. It was quite easy because all the works in visual designer was done step by step which can be understood by anyone related to engineering field. Finally, the simulation was run and the result was observed everywhere.

## **Conclusion:**

we learned from this experiment, how to create a System using Arduino UNO R3. The results indicate that under certain constraints, the system is working properly every time. For confirm that this circuit work properly used a obstacle . This technology has various applications in the world. We followed the instruction of our faculty and try our best for getting appropriate experiment result. After trying, we are successfully done it.

## **References:**

- [1] Arduino IDE, <https://www.arduino.cc/en/Main/Software> accessed on May 3, 2019.
- [2] Arduino and Proteus Library, <https://etechnophiles.com/add-simulate-ultrasonic-sensorproteus-2018-edition/> accessed on May 3, 2019.
- [3] Ultrasonic Distance Sensor in Arduino With Tinkercad <https://www.instructables.com/id/Ultrasonic-Distance-Sensor-Arduino-Tinkercad/> accessed on May 3, 2019.