**Contents**

1. Tittle ……………………………………………………………………………………………2

2. [Abstract 3](#_Toc85491917)

3. [Objectives 3](#_Toc85491918)

4. [Results 3](#_Toc85491919)

4.1 [Simulation Environment 3](#_Toc85491920)

4.2 [Simulation Result (Process: 1) 4](#_Toc85491921)

4.3 [Simulation Result (Process: 2) 6](#_Toc85491922)

5. [Discussion 9](#_Toc85491923)

6. [Lab Task 10](#_Toc85491924)

7. [Conclusion 10](#_Toc85491925)

[References 10](#_Toc85491926)

**A picture containing calendar

Description automatically generated**

**AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)**

**FACULTY OF ENGINEERING**

**MICROPROCESSOR AND EMBEDDED SYSTEMS**

**Fall 2021-2022**

**Section: M**

**Group: B**

**Lab Report No: 05**

## **1.Title**: **Building an Obstacle Detection System.**

**Supervised By**

**DR. FERDOUS JAHAN SHAUN**

**Submitted By:**

|  |  |
| --- | --- |
| **Name** | **ID** |
| 1. **Sazid Al Farabi (Author)** | **19-39478-1** |
| 1. **Joy Karmakar (Author)** | **18-39263-3** |
| 1. **Nurul Huda Bhuiyan Rokon** | **18-38983-3** |
| 1. **Tonima Hossain Pia** | **18-38892-3** |
| 1. **Durjoy Dey** | **18-39013-3** |
| 1. **Ananya Chowdhury** | **18-39028-3** |
| 1. **Sharika Parvin Joba** | **18-38721-3** |
| 1. **Salma Jahan Sahara** | **18-38788-3** |

Date of Submission: **November 1**

## **2. Abstract:**

This experiment is about an obstacle avoidance system that uses an ultrasonic sensor to control it. The device is controlled by an Arduino microcontroller and is created with an ultrasonic sensor. The Arduino microcontroller is linked to the ultrasonic sensor. The sensor uses an ultrasonic sensor to collect data from the surrounding region. The impediment is detected by the sensor. The sensor will feed data to the controller, which will then be displayed on the display attached to the microcontroller. The ultrasonic sensor is mostly used for measuring distance. These sensors are capable of detecting obstacles in their path.

## **3. Objective:**

The main objectives of this experiment are:

* Building an obstacle detection system by Arduino IDE.
* To get familiarized with the ultrasonic sensor for detect the obstacle.
* Proteus and the Arduino IDE are used to calculate distances.
* And learn how to implement code a simple Obstacle Detection System in Arduino IDE.

# **4. Results:**

**4.1 Simulation Environment:**

We have used Proteus professional software of 8.12 to perform the simulation. The most exciting and important feature of Proteus 8.12 is its ability to simulate the interaction between software running on a microcontroller and any analogue or digital electronics connected to it. The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. We select one Arduino Uno (328), Grove Ultrasonic Ranger, Arduino LED, and Grove OLED display for this experiment. Then we use assignment block for type casting and put "Obstacle is at "+toString(cm)+"Centimeters" in assignment block. For these reasons, we used Proteus Professional Software of 8.12. By using these tools, we have designed the simulation. And another simulation using tinkercad online.

**4.2 Simulation Result (Process-1): (**Sazid Al Farabi**)**

|  |
| --- |
| Connect all components as shown in simulation figure. |
|  |
| **Figure 1: Structure of measuring distance using Ultrasonic Sensor Library with Arduino Library in Proteus.** |

|  |
| --- |
| Implementation of design a flowchart Arduino Uno (R3) in Proteus 8.12 |
|  |
| **Figure 2: Design a flow chart on visual designer** |

|  |
| --- |
| The simulation after running, we can show the current object distance from the previous object at grove OLED display. |
|  |
| **Figure 3: Display a message on grove OLED display** |

|  |
| --- |
| The distance between two objective less than 6 cm, the Yellow Led turning on. and also, different output show on the glove OLED display. |
|  |
| **Figure 4: Yellow LED on when distance between two object less than 6 cm** |

4.3 Simulating the Code in Tinker cad (Process-2): (JOY KARMOKAR)

Ultrasonic Distance Sensor in Arduino With Tinker cad

|  |
| --- |
|  |
| **Figure 5: Build the LED Circuit with adding Proximity Sensor** |

|  |
| --- |
| Ultrasonic Rangefinder Arduino Code Explained |
|  |
|  |
| **Figure 6: Code editor after applying the specific code** |

|  |
| --- |
| Step by step simulation after running the code |
|  |
| **Figure 7: When object is near then three red led on and also show the distance using an ultrasonic sensor** |

|  |  |
| --- | --- |
|  | |
| **Figure 8: When object is middle then two red led on and also show the distance using an ultrasonic sensor** |

|  |
| --- |
|  |
| **Figure 9: When object is far then one red led on and also show the distance using an ultrasonic sensor** |

|  |
| --- |
|  |
| **Figure 10: When object is out of range then three red led off and also doesn’t show the distance.** |

# 

# **5. Discussion:**

We will be able to detect the distance of an obstruction using a sonar sensor in this experiment. We have utilized a sonar sensor to calculate the distance to an obstruction, which will also light up an LED when it's detected. The ultrasonic range module features four pins for VCC, GND, trigger, and echo, as well as a transmitter, receiver, and control circuit. As a result, it's simple to link it to Arduino boards. So, by connecting wire, we've linked the sensor's trigger pin to digital pin 3 and the echo pin to digital pin 2 of the Arduino Uno R3 board, and an LED is attached to pin 13 to indicate that an obstruction has been detected. As a result, if the distance is less than 6 cm, the LED will light up, and the distance traversed will be displayed in the Arduino IDE's "Serial Monitor." We demonstrated this method in the simulation results, and for this experiment, we used proteus, Arduino IDE software and tinker cad, and we completed our experiment this way.

# **6. Lab Task**

Include all codes with explanations into lab report by following the writing template mentioned in appendix A of Laboratory Sheet Experiment 5.

**Answer:** All the code includes in given lab task part.

# **7. Conclusion:**

This experiment taught us how to make an Obstacle Detection System with an Arduino UNO R3. The findings show that, under specific conditions, the imaging technology has been able to provide direction cues, detect both stationary and moving obstacles, and properly calculate depth information in order to deliver timely warning information. This experiment aids us in identifying an impediment and hence avoiding it. This technology has a wide range of uses around the world. With the support of each group member, we completed the job. We followed our professor's instructions. We gave it our all-in order to obtain the finest possible results from the experiment. After a few attempts, we were able to complete the task.

# **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.