



Lab Report Sheet

Experiment Title:	Building an Obstacle Detection System.		
Experiment No:	5	Date of Submission:	16 March 2022
Course Title:	Microprocessor And Embedded Systems		
Course Code:	00499	Section:	F
Semester:	Spring	2021-22	Course Teacher: Dr. Nadia Anam

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Group Name/No.: 7

No	Name	ID	Program	Signature
1	Adety Sarkar	19-41653-3	BSc [CSE]	
2	Sheikh Talha Jubayer Rahman	19-41468-3	BSc [CSE]	
3	Abid Hassan Emon	19-41207-2	BSc [CSE]	
4	MD Kamrujjaman	19-40665-1	BSc [CSE]	
5	Mazharul Islam	18-37368-1	BSc [CSE]	
6			Choose an item.	
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FACULTY COMMENTS	Marks Obtained	
	Total Marks	

Title: Building an Obstacle Detection System.

Introduction: In this experiment, we are going to learn about 8086 microprocessors. We got familiarized with the emulator EMU8086 by using some simple programs. First, we got the basic knowledge about microprocessor 8086 which was developed by Intel (2.5 MIPS, 1MB memory, and 6-byte instructions caches/queue). After that, we learned the basic architecture of the microprocessor 8086. After that to implement the basic learning, we solved some sample problems by using EMU8086 and learned how to write assembly programs through the instructions.

Objectives: In this lab, we will learn –

- (i)How to code a simple Obstacle Detection System in Arduino IDE.
- (ii)Implement a simple Obstacle Detection System in Hardware.
- (iii)How to simulate the code in Proteus/Tinkercad and observe the results.

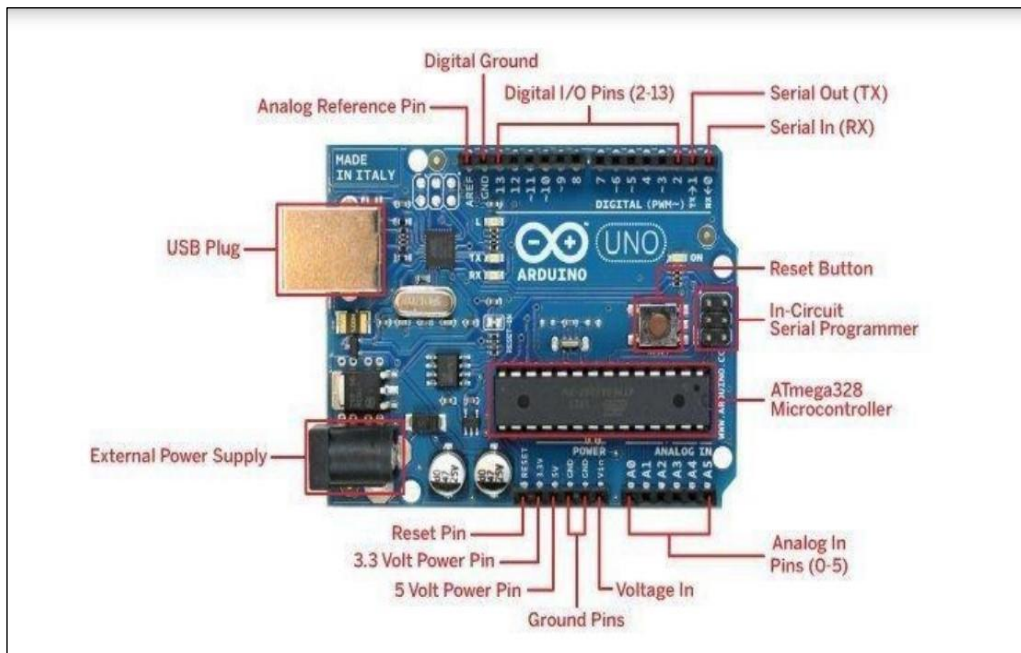
Theory and Methodology:

Arduino is a open source software IDE(Integrated Development Environment) which runs into the computer makes it easy to write code and upload it to the board. This software can be used in any Arduino board. Arduino board doesn't need any hardware circuit to load. It can be easily connected with USB cable and by using Arduino IDE where the code is written in C++)

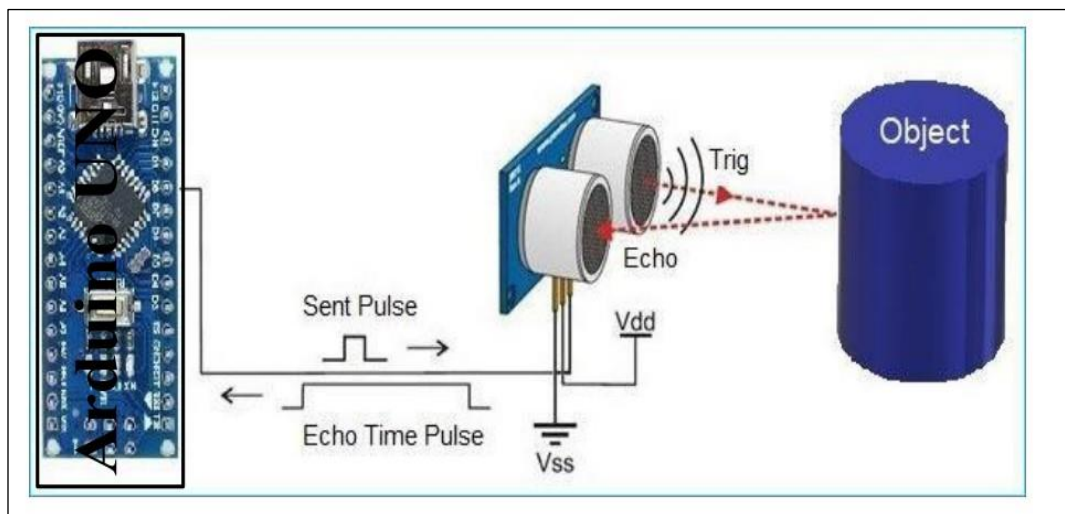
Apparatus:

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

Overview of the Board (Arduino UNO R3):



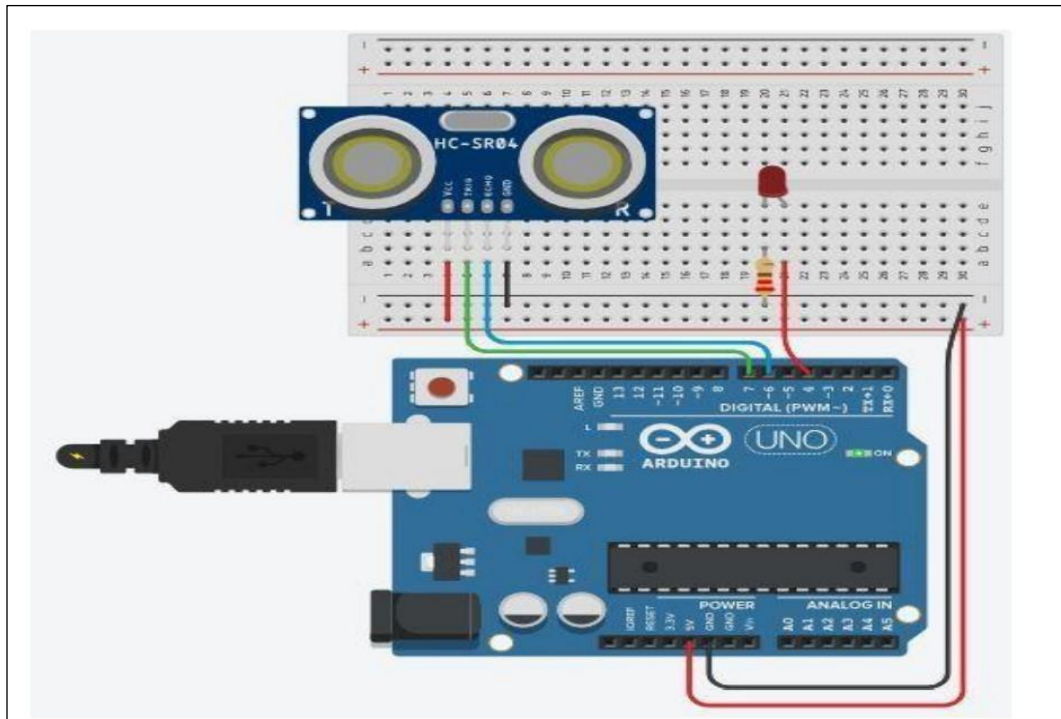
Overview of Sonar Sensor:



Experimental Procedure:

Setting up the Circuit:

The main task of our lab is to use a sonar sensor to detect the distance of an obstacle.



How it works:

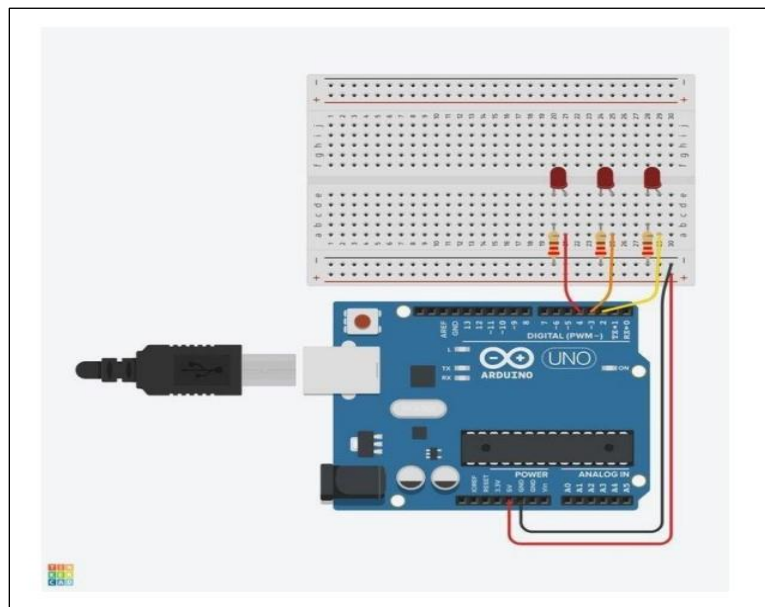
Here, we are using a sonar sensor is used to detect an obstacle which will glow an LED as soon as the obstacle comes near the sonar sensor. The ultrasonic ranging module which consists of a transmitter, receiver and control circuit and four pins for VCC, GND, trigger and echo are used. The trigger pin of the has 3 pin which echo in the 2 pins are connected to the Arduino Uno R3 board wire. The LED is connected to the 13 pin to show the obstacle is detected. Here pin 3 and 13 will act as output pins because triggers will be generated from the Arduino and LED state. As the ping generated from the Arduino board travels out from the trigger and comes back to the echo, so to find the distance of the object we take half of

the distance travelled. The speed of sound is 5 seconds per centimeter. This are the steps through which the Obstacle Detection System is built.

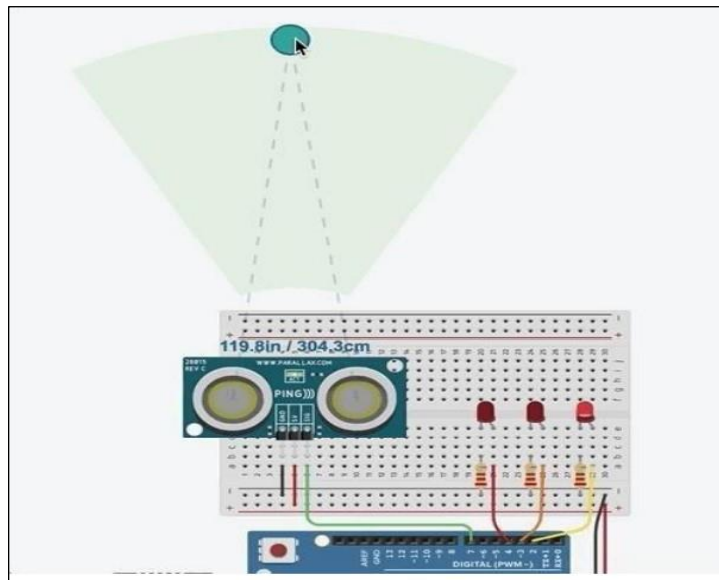
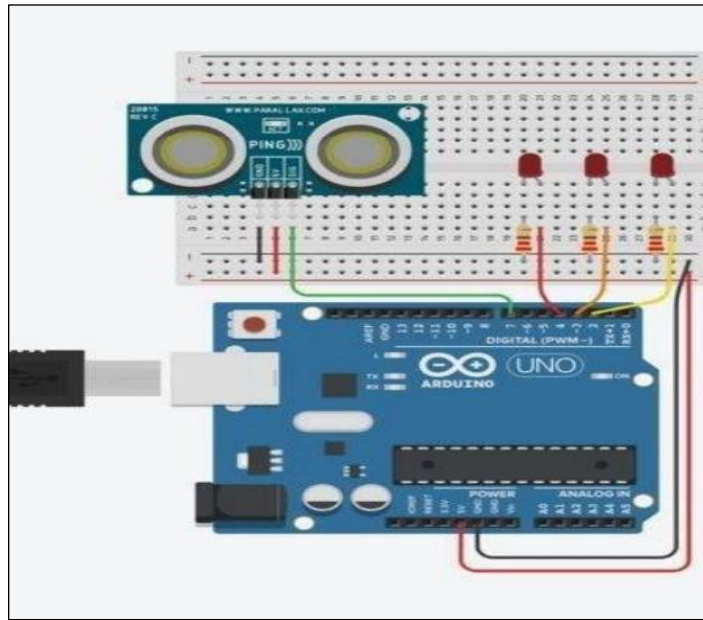
Ultrasonic Distance Sensor in Arduino using Arduino IDE:

Here, we are measuring the distances by using ultrasonic rangefinder and Arduino's digital inputs. To measure this distance we will connect some circuits to the breadboard and use some code to control single LED. Ultrasonic rangefinder use sound wave to reflect objects in front of them. The proximity signal sends signal to measure how long it takes to return.

Step1: Build the LED circuit



Step2: Add proximity sensor



Discussion: In this experiment, we have used Arduino IDE software and we got to see how the sensor works by keeping our hand nearer to the sonar sensor and the LED turns on and it gets off when the hand gets far away from the sonar sensor. How the LED works from high to low could be observe through this experiment. When the sensor crosses the distance the LED doesn't work in its state.

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.