

Arduino Based Project For Distance Measurement

PRESENTED BY : BATCH NO. 22

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Objective

- Our objective is based on the concept of ultrasonic waves transmitted by the ultrasonic sensor and received from obstacle.
- The main objective is to measure the distance of an obstacle from the ultrasonic sensor.
- The ultrasonic sensor measures shorter distance precisely.

INTRODUCTION

- Nowadays, measurement systems are used in motor vehicles like cars, buses, and trucks for auto-braking systems to avoid road accidents and to assist drivers when parking their vehicles.
- Industries are also using this system in machines like robots, forklifts, trolleys, etc., for moving materials. This operation is done with the help of a distance measurement system.
- We created a distance measuring system using Arduino UNO R3 & HC-SR04 ultrasonic sensor which measures the distance between an obstacle & ultrasonic sensor.

Components Used

ARDUINO

- Arduino Uno R3 is one kind of ATmega328P based microcontroller board.
- It includes the whole thing required to hold up the microcontroller; just attach it to a PC with the help of a USB cable, and give the supply using AC-DC adapter or a battery to get started.
- The term UNO means “one” in the language of “Italian” and was selected for marking the release of Arduino’s IDE 1.0 software.
- The R3 Arduino Uno is the 3rd as well as most recent modification of the Arduino Uno. Arduino board and IDE software are the reference versions of Arduino and currently progressed to new releases.
- The Uno-board is the primary in a sequence of USB-Arduino boards, & the reference model designed for the Arduino platform.

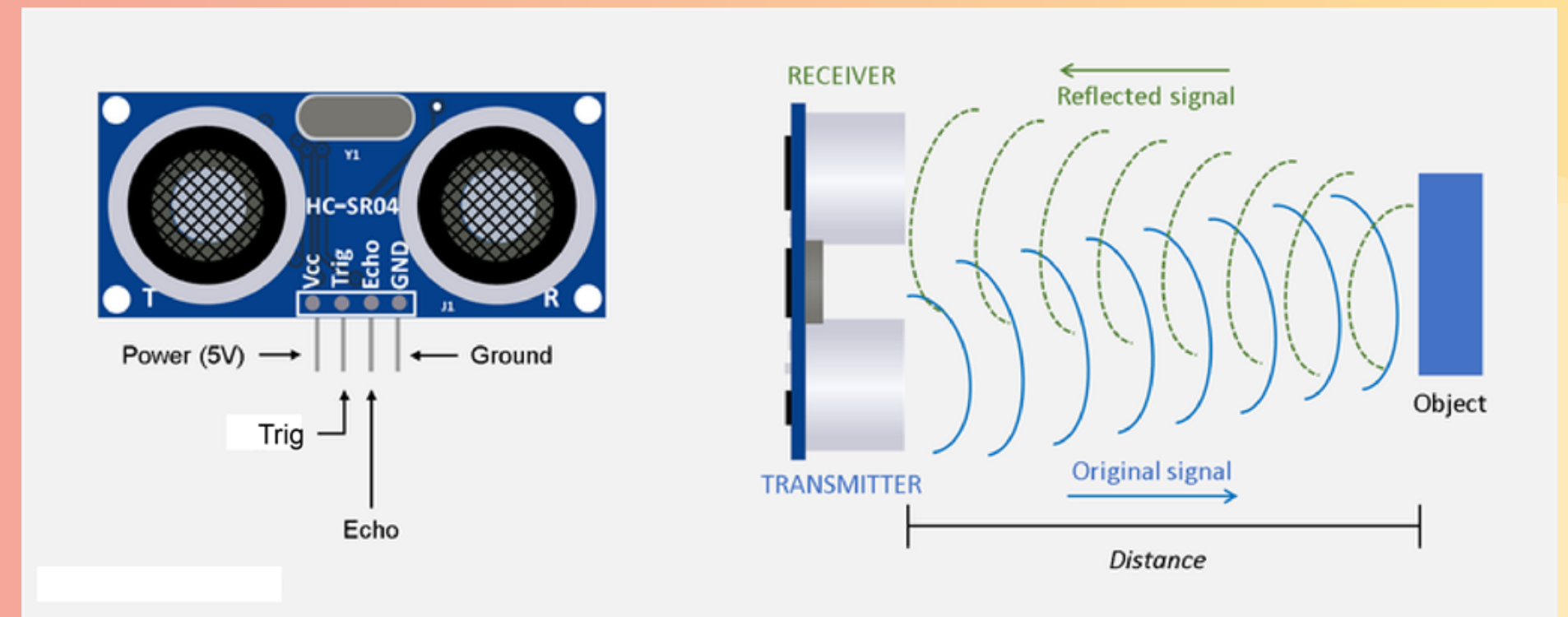


Components Used

ULTRASONIC SENSOR

The ultrasonic sensor (or transducer) works on the same principles as a radar system. An ultrasonic sensor can convert electrical energy into acoustic waves and vice versa. The acoustic wave signal is an ultrasonic wave traveling at a frequency above 18kHz. The famous HC SR04 ultrasonic sensor generates ultrasonic waves at 40kHz frequency.

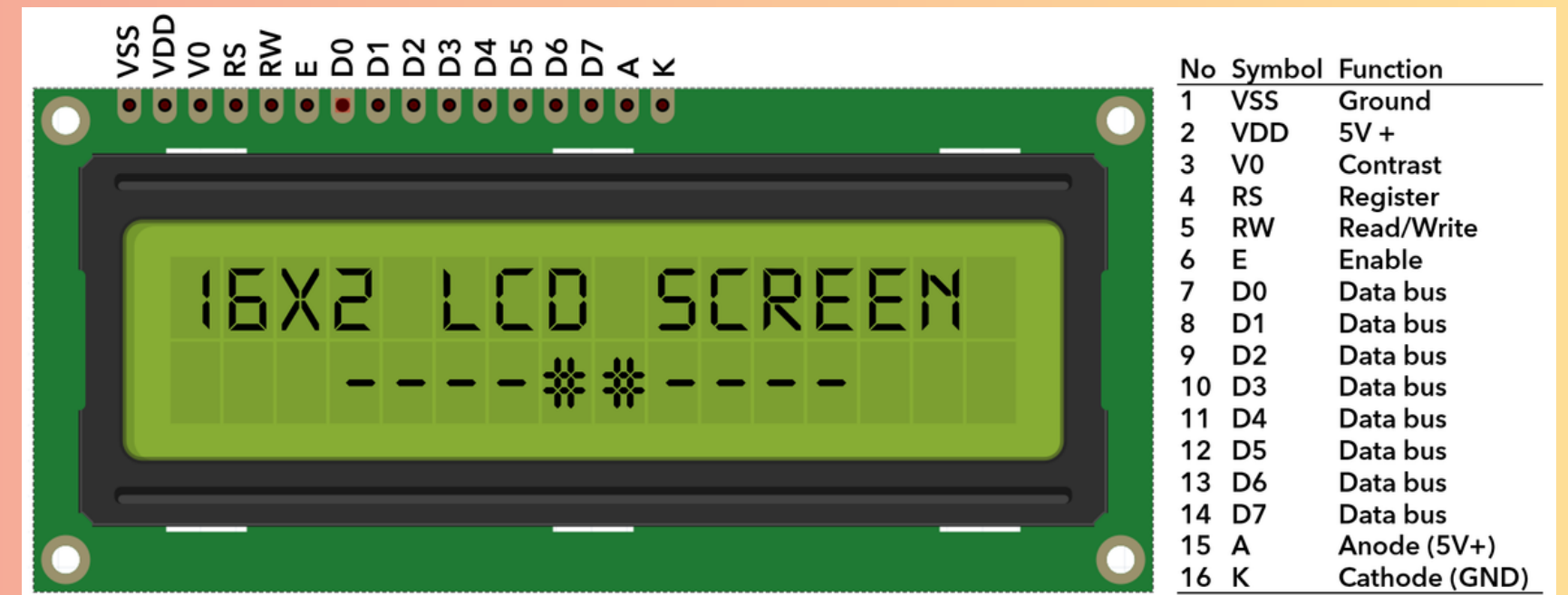
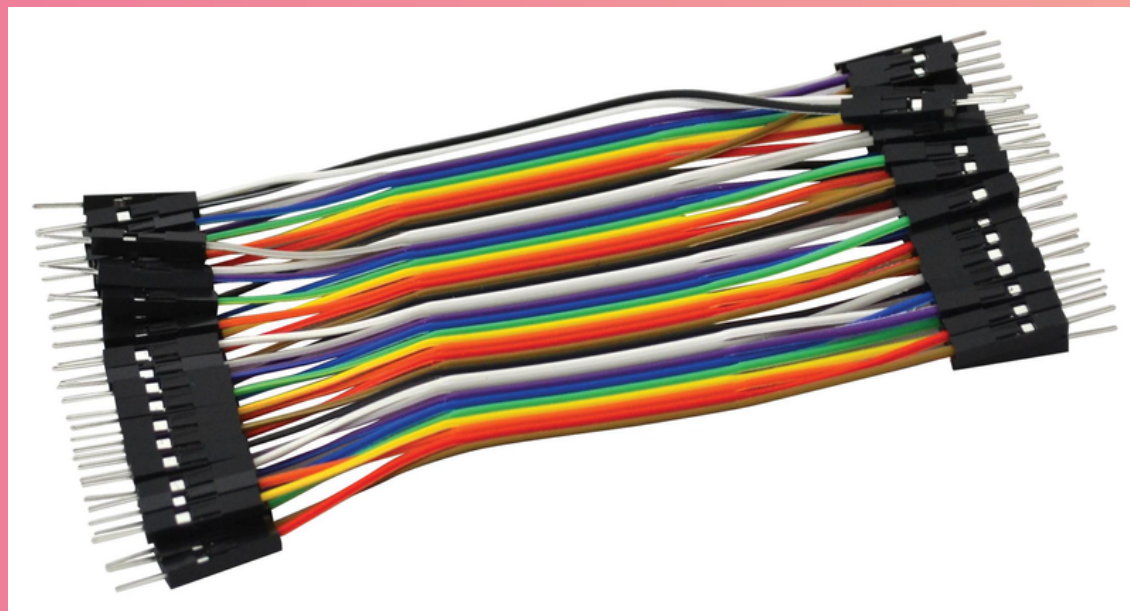
Typically, a microcontroller is used for communication with an ultrasonic sensor. To begin measuring the distance, the microcontroller sends a trigger signal to the ultrasonic sensor. The duty cycle of this trigger signal is $10\mu\text{s}$ for the HC-SR04 ultrasonic sensor. When triggered, the ultrasonic sensor generates eight acoustic (ultrasonic) wave bursts and initiates a time counter. As soon as the reflected (echo) signal is received, the timer stops. The output of the ultrasonic sensor is a high pulse with the same duration as the time difference between transmitted ultrasonic bursts and the received echo signal.



Components Used

LCD DISPLAY (16X2)

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.



JUMPER WIRES

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.

Aurdino Code

HC-SR04 Ultrasonic Sensor with LCD display

HC-SR04 Ultrasonic Sensor

VCC to Arduino 5V
GND to Arduino GND
Echo to Arduino pin 12
Trig to Arduino pin 13

LCD Display (I used JHD162A)

VSS to Arduino GND
VCC to Arduino 5V
VEE to Arduino GND
RS to Arduino pin 11
R/W to Arduino pin 10
E to Arduino pin 9
DB4 to Arduino pin 2
DB5 to Arduino pin 3
DB6 to Arduino pin 4
DB7 to Arduino pin 5
LED+ to Arduino 5V
LED- to Arduino GND

```
#include <LiquidCrystal.h> //Load Liquid Crystal Library
LiquidCrystal LCD(11,10,9,2,3,4,5); //Create Liquid Crystal Object called LCD
```

```
#define trigPin 13 //Sensor Echo pin connected to Arduino pin 13
#define echoPin 12 //Sensor Trip pin connected to Arduino pin 12
```

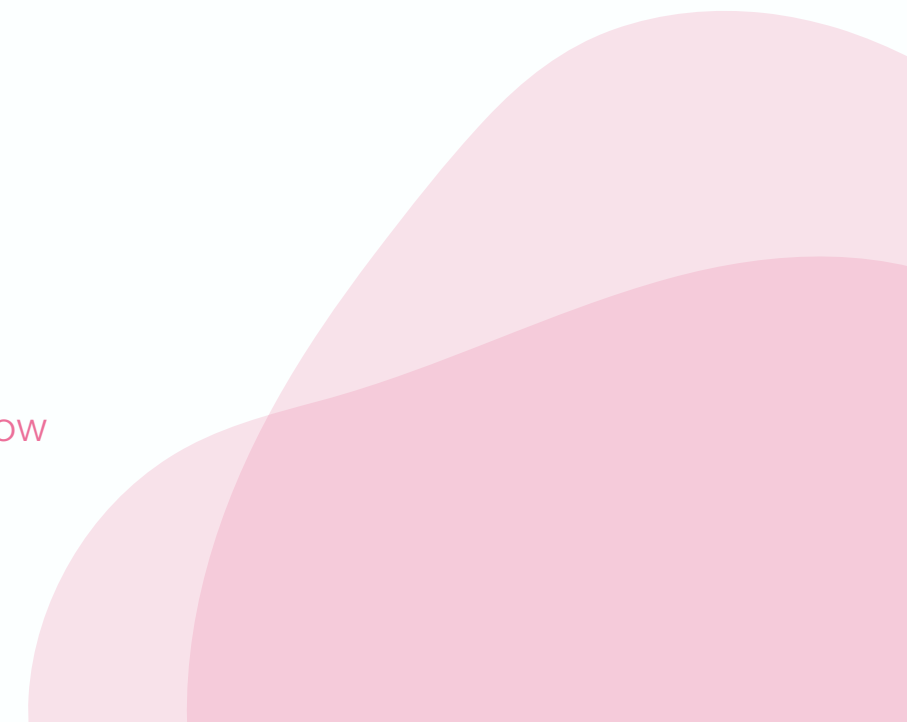
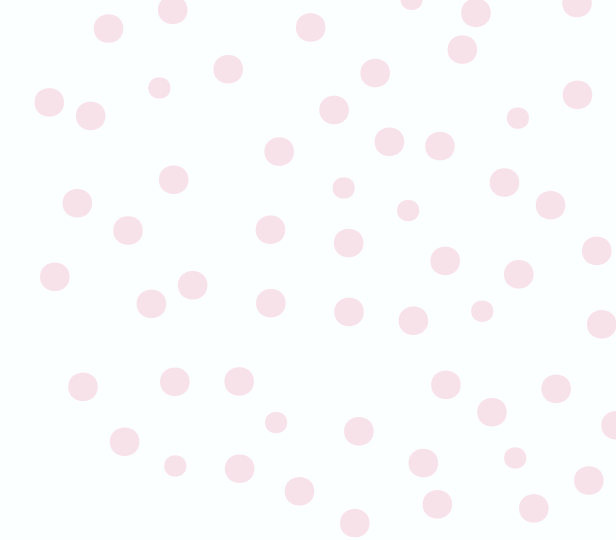
```
//Simple program just for testing the HC-SR04 Ultrasonic Sensor with LCD display
//URL:
```

```
void setup()
{
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
```

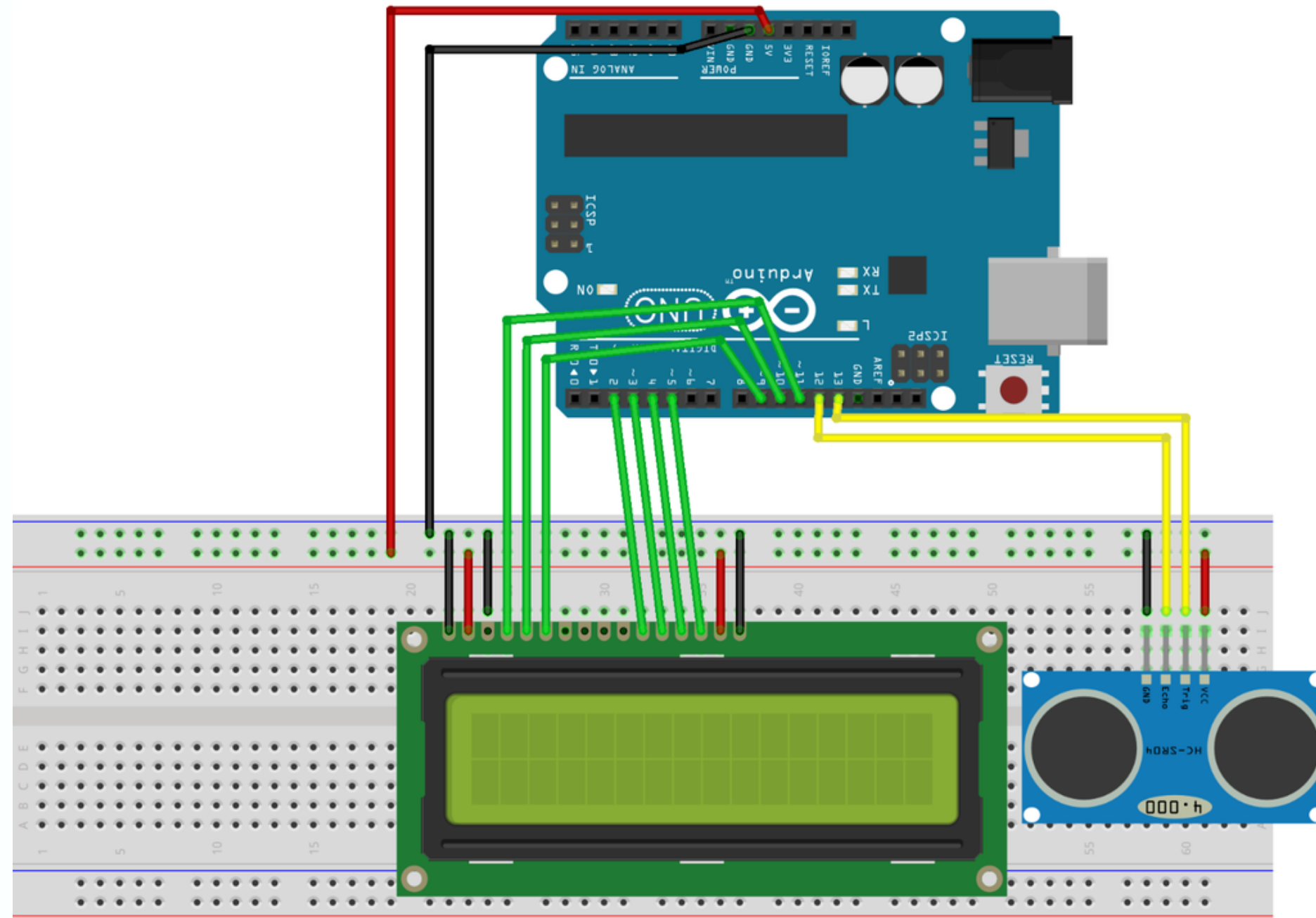
```
  LCD.begin(16,2); //Tell Arduino to start your 16 column 2 row LCD
  LCD.setCursor(0,0); //Set LCD cursor to upper left corner, column 0, row 0
  LCD.print("Target Distance:"); //Print Message on First Row
}
```

```
void loop() {
  long duration, distance;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = (duration/2) / 29.1;
```

```
  LCD.setCursor(0,1); //Set cursor to first column of second row
  LCD.print(" "); //Print blanks to clear the row
  LCD.setCursor(0,1); //Set Cursor again to first column of second row
  LCD.print(distance); //Print measured distance
  LCD.print(" cm"); //Print your units.
  delay(250); //pause to let things settle
}
```



Circuit Diagram



Roles & Responsibilities

HITESH DHANRAJ

Components Organizer
Circuit Designer
Content Explorer

PRASHANT BAIRAGI

Circuit Designer
Powerpoint Presentation
Content Explorer

PRANSHU JAIN

Powerpoint Presentation
Components Organizer
Circuit Designer

UMESH KUMAR BHATIYA

Components Organizer
Circuit Designer
Video Editor