



CCIT FTUI
FAKULTAS TEKNIK

PROJECT

“Simulation of Ultrasonic Range Meter Using Arduino and Proteus”

Arranged by : Group 4

- | | |
|-------------------------------------|--------------|
| 1. Gafrilatif Aviandi Putra Adnanta | (2120010053) |
| 2. Muhamad Farhan Budiana | (2120010203) |
| 3. Muhammad Zidan Satrio | (2120010105) |

Faculty :

Riza Muhammad Nurman

**Continuing Education Program Center for Computing and
Information Technology**

Faculty of Engineering, University of Indonesia

2021

PROJECT ON

Simulation of Ultrasonic Range Meter Using Arduino and Proteus

Developed by

Name : Gafrilatif Aviandi Putra Adnanta
Muhamad Farhan Budiana
Muhammad Zidan Satrio

Faculty : Riza Muhammad Nurman



SIMULATION OF ULTRASONIC RANGE METER USING ARDUINO AND PROTEUS

Batch Code	: 2ISA3
Start Date	: 20 May 2022
End Date	: 24 May 2022
Name of the Coordinator	: Riza Muhammad Nurman
Name of Developer	: Gafrilatif Aviandi Putra Adnanta Muhammd Farhan Budiana Muhammad Zidan Satrio
Date of Submission	: 24 May 2022



CERTIFICATE

This is to certify that this report, titled *SIMULATION OF ULTRASONIC RANGE METER USING ARDUINO AND PROTEUS*, embodies the original work done by *Gafrilatif Aviandi Putra Adnanta, Muhammd Farhan Budiana, and Muhammad Zidan Satrio* in partial fulfillment of his/her courcerequisite at NIIT.

Coordinator :

Riza Muhammad Nurman

ACKNOWLEDGEMENT

Thank you, the author wishes to God the Almighty for His blessings and grace, we can complete this project task both in the form of presentation and paper in a timely manner.

The author also delivers him gratitude to Mr. Kevin Harada faculty and other faculty for all guidance to complete it. Thank you to fellow students who have supported, and also thank you to fellow workers in the education at CCIT-FT UI. The Project paper entitled “Simulation of Ultrasonic Range Meter Using Arduino and Proteus” the author submits as a requirement for the Project assignment in 2022.

Finally, the authors hope this paper can be useful for all and also gain a better insight into the operating system. The author realizes that it is still imperfect. Therefore, the authors really expect all suggestions and criticisms from readers who are constructive in order for the perfection of this paper. Hopefully, this paper can provide many benefits for the readers.

SYSTEM ANALYSIS

In this Project we are using Proteus Software, Proteus 8 Professional is an electronic software that is used to assist designers in designing and simulating electronic circuits.

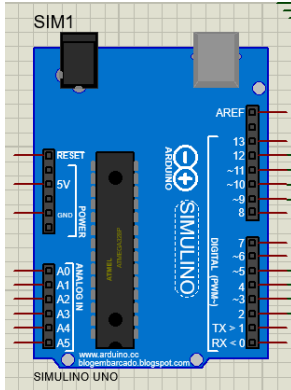
Sound is a phenomena that is a result of vibration of materials. Sound is characterized as a mechanical wave that carries mechanical energy. For the transmission of this energy between transmitter and receiver, presence of a medium is necessary. The medium can be solids, liquids or gases. The sound energy travels by causing disturbance in the medium it is travelling and this is called propagation of sound waves.

SONAR or Sound Navigation and Ranging is a non-contact distance measuring technique generally used in submarines. In this technique, a high frequency sound wave is transmitted by a transmitter and the reflected echo from a target is captured by a receiver. As the velocity of the sound wave is known, by measuring the time of travel, the distance between the source and the target can be calculated.

In this project, Ultrasonic Range Meter is designed which can be used to measure distance of a target in non-contact fashion. The project is based on Arduino, Ultrasonic Sensor and an LCD display.

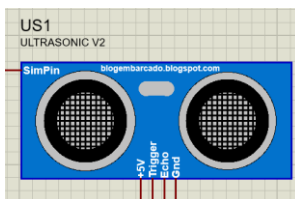
COMPONENT

1. Arduino Uno



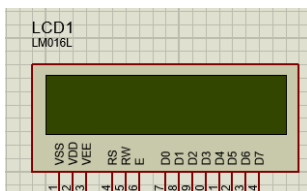
Arduino Uno is a type of microcontroller board based on the ATmega328, and Uno is an Italian term which means one. Arduino Uno was chosen for the upcoming launch of the microcontroller board namely Arduino Uno Board 1.0. The board includes digital I/O pin-14, power jack, analog i/p-6, A16 MHz ceramic-resonator, USB connection, RST button, and ICSP header. All of these can support the microcontroller for further operation by connecting this board to the computer. The power supply of this board can be done with the help of an AC to DC adapter, a USB cable, or a battery. This article discusses what the Arduino Uno microcontroller is, pin configuration, Arduino Uno specifications or features, and applications.

2. Ultrasonic Sensor



An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns.

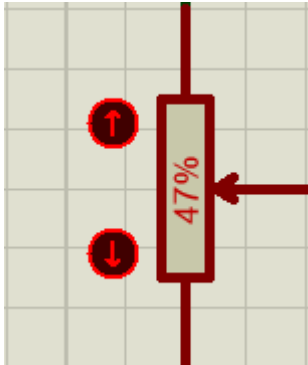
3. LCD



LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

COMPONENT

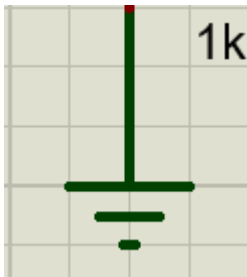
4. POT-HG



Potentiometer (POT) is a type of resistor whose resistance value can be adjusted according to the needs of the electronic circuit or the needs of the user. Potentiometer is a family of resistors belonging to the Variable Resistor Category. Structurally, the potentiometer consists of 3 terminal legs with a shaft or

lever that functions as a regulator.

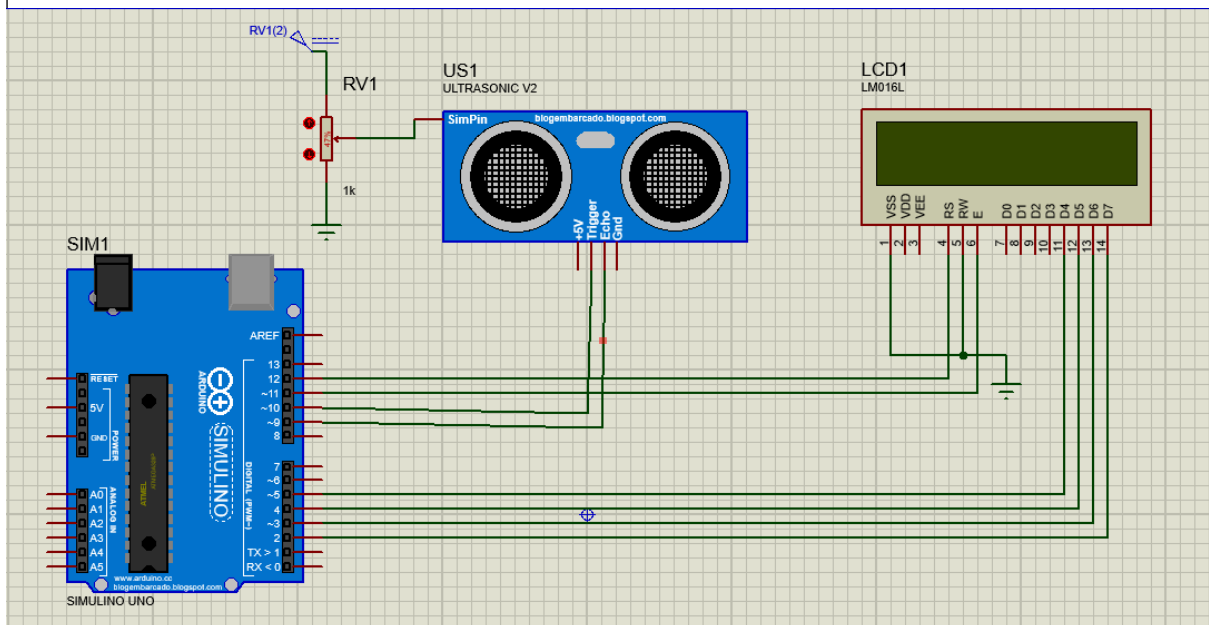
5. Ground



grounding in electronics is different from the earth connection in wall outlets (although they sometimes are connected). As the name implies, the ground wire is a cable that is connected to the ground / earth which will dump the leakage current to the ground. Because it functions as

protection, electric current can still flow only with phase and neutral wires.

PROJECT DESIGN



ARDUINO CODE

```
#include <LiquidCrystal.h>

const int echoPin = 9;
const int pingPin = 10;
const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

void setup()
{
  lcd.begin(16, 2);
  lcd.print("Range Meter");
  pinMode(pingPin, OUTPUT);
  pinMode(echoPin, INPUT);
}

void loop()
{
  long duration, inches, cm;

  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);

  digitalWrite(pingPin, HIGH);
  delayMicroseconds(10);

  digitalWrite(pingPin, LOW);
```

ARDUINO CODE

```
duration = pulseIn(echoPin, HIGH);
    inches = microsecondsToInches(duration);
    cm = microsecondsToCentimeters(duration);

    lcd.setCursor(0, 1);
    lcd.print(inches);
    lcd.print("in, ");
    lcd.print(cm);
    lcd.print("cm");
    lcd.println();

    delay(100);
}

long microsecondsToInches(long microseconds)
{
    return microseconds / 74 / 2;
}

long microsecondsToCentimeters(long microseconds)
{
    return microseconds / 29 / 2;
}
```

RESULT OF ANALYSIS

Based on the results obtained, it can be concluded that the author has managed to make ultrasonic range meter using arduino and proteus. This system is used to measure distance of a target in non-contact fashion. The project is based on Arduino, Ultrasonic Sensor and an LCD display.

When the simulation is run, the LCD display will display the distance of a target, it will display the distance in inch and cm .

Ultrasonic sensor is the main module in the range meter circuit. An ultrasonic sensor consists of an ultrasound transmitter and a receiver. The transmitter sends a sonic burst of 8 pulses at 40 KHz frequency. This signal hits the target and the echo is received by the receiver module. By measuring the time between the events of sending the pulse and receiving the echo, the distance can be calculated.

