

*Total duration
20 mins*

Ultra Sonic – Ping Test

Ultrasonic HC-SR04 Sensor Interfacing with UNO



Overview



Ultrasonic HC-SR 04 Sensor

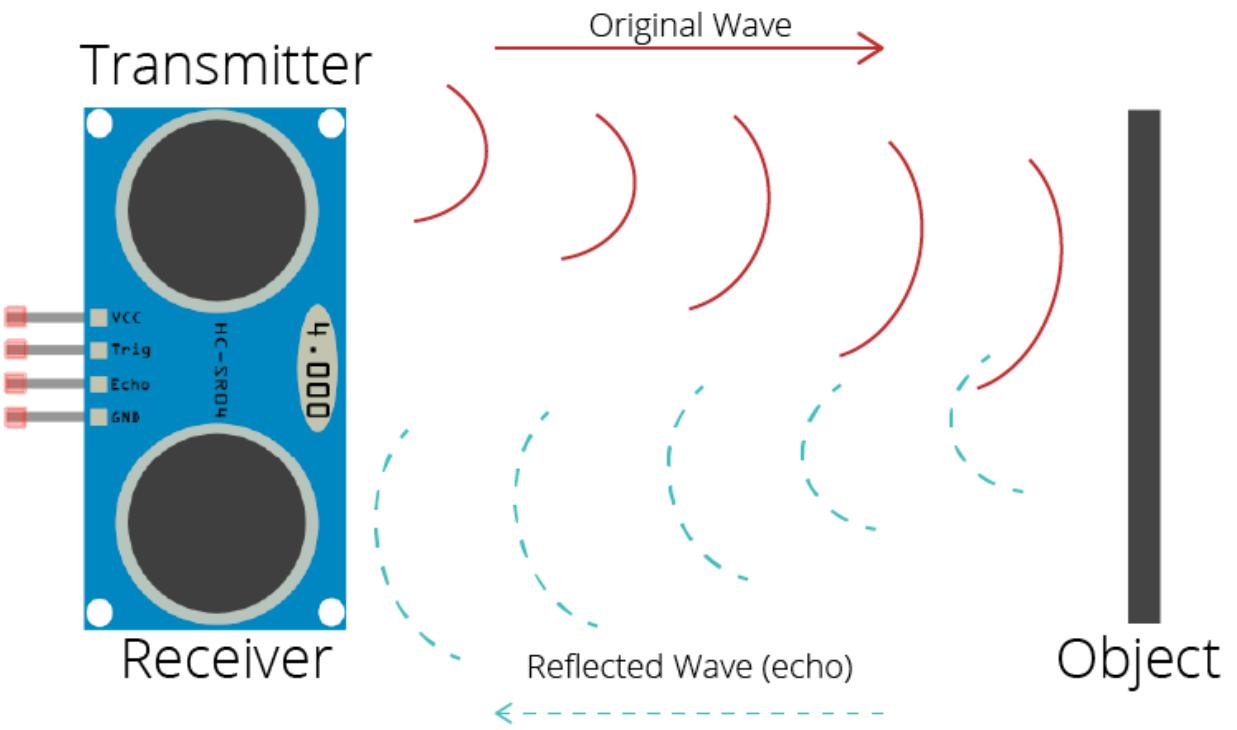
- Ultrasonic Module HC-SR04 works on the principle of SONAR and RADAR systems. It can be used to determine the distance of an object in the range of 2 cm – 400 cm.



How HC-SR04 Sensor Works?

An HC-SR04 ultrasonic distance sensor actually consists of two Ultrasonic Transducers.

- One acts as a transmitter that converts the electrical signal into 40 KHz ultrasonic sound pulses. The other acts as a receiver and listens for the transmitted pulses.
- When the receiver receives these pulses, it produces an output pulse whose width is proportional to the distance of the object in front.



Assignment

Measuring Distance of an Object – Part I



1. Classroom Activity

- Let us interface the Ultrasonic sensor with Arduino UNO and display the distance in Centimeter or Inch on the serial monitor.

2. Homework

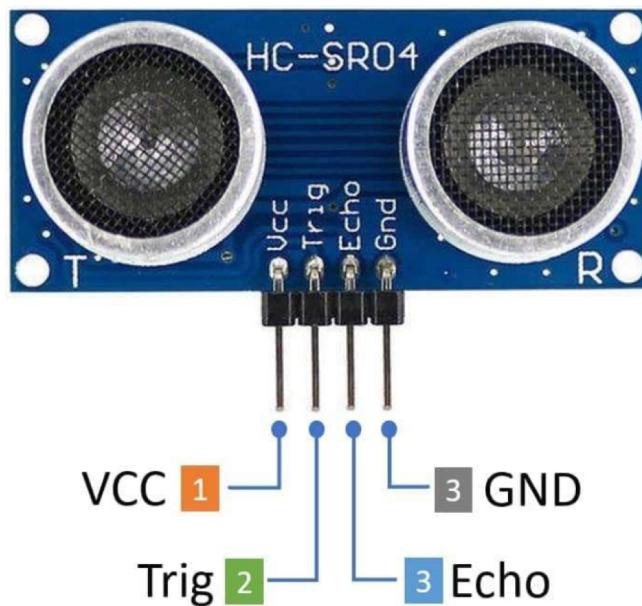
Problem: You are going to set up and use a Ultrasonic Sensor with the Arduino UNO Microcontroller. You must design a product that will use the ultrasonic sensors to provide a service to others or to help the community. You will design and build your product according to your plan, test out your product, and present it to the class. Remember to think about the purpose it will serve: *how will your sensor product help people?*

Remember:

1. In a chart paper plan your design with details to address constraints
2. Design and build your product according to your plan
3. Test your product
4. Present your product to the class



HC-SR04 Ultrasonic Sensor Pinout



Pin description and specification:

- VCC: It operated on +5V DC
- GND: Connect to the ground
- Trig: Trigger as an input Pin
- Echo: Echo Pin as an output pin
- Working current: 15mA
- Ranging Distance: 2-400 cm
- Measuring Angle: 30°
- Trigger Input Pulse width: 10uS

Hardware Required



Arduino UNO

Ultrasonic Sensor –HC-SR04

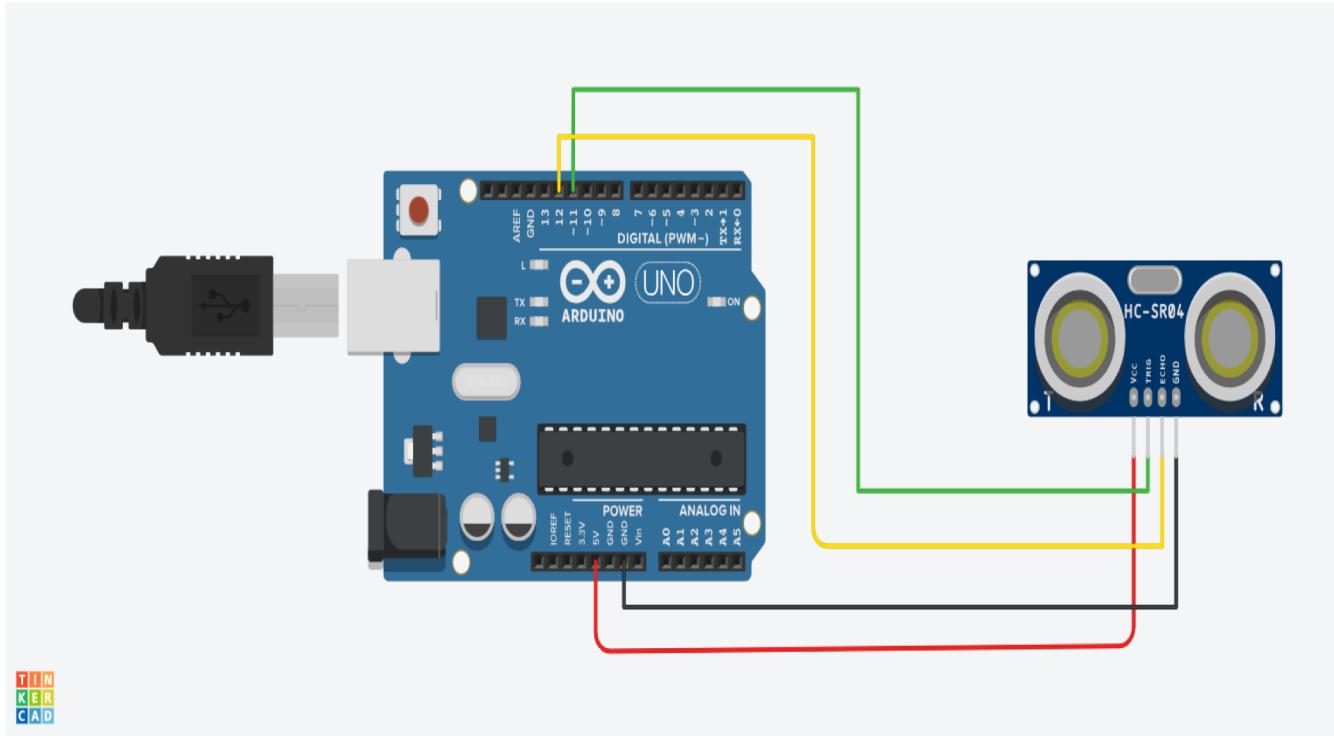


USB Cable



Jumper wires

Connection Diagram of HC-SR04 Ultrasonic Sensor with UNO



Connection Diagram

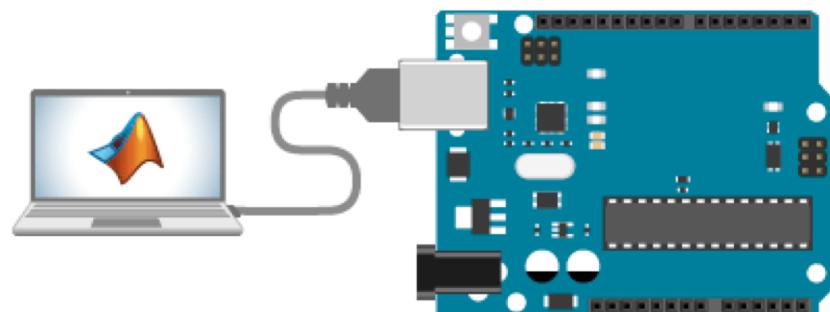
Ultrasonic HC-SR04	Arduino UNO
VCC	5v
TRIG	~11
ECHO	12
GND	GND

Connection Chart

Now, the follow the instructions to complete assignment

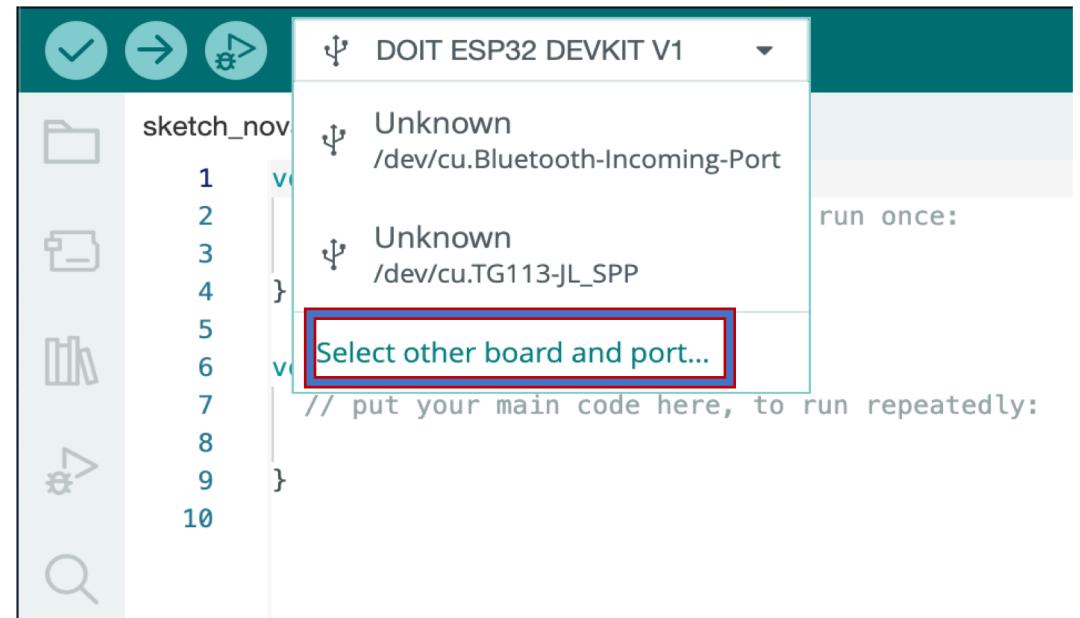
1

Connect UNO board with USB cable



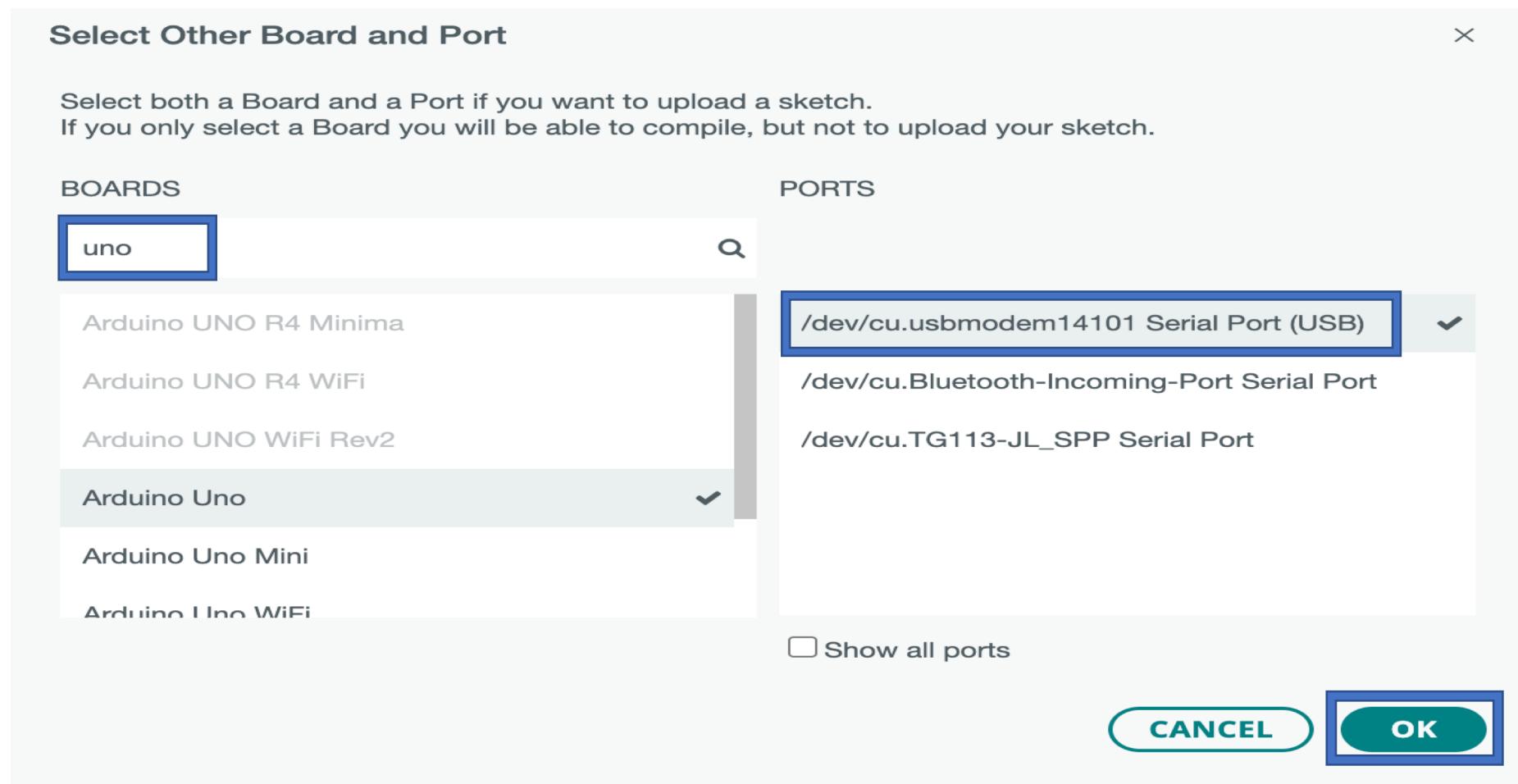
2

Open Arduino IDE and click “Select other board and port”



3

At the following screen type “UNO” under BOARDS and then select the USB port for communication

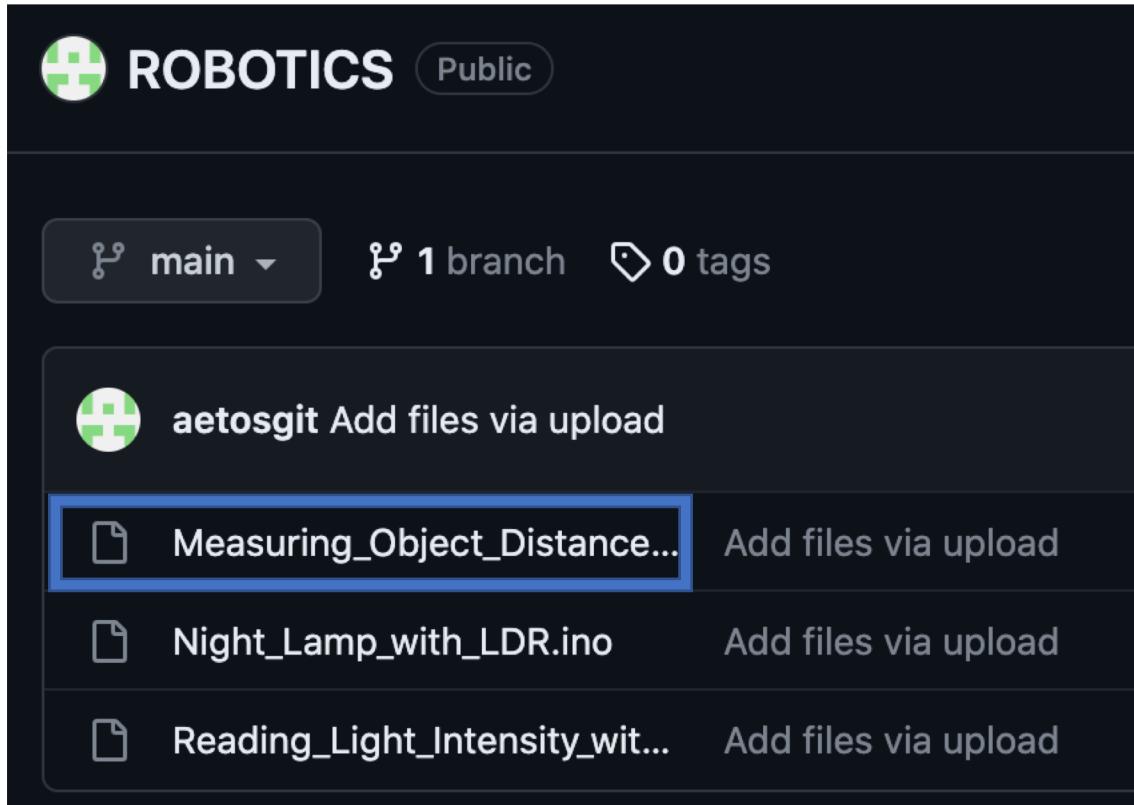


4

Open Google Chrome browser type the following URL (Uniform Resource Locator) <https://github.com/aetosgit/ROBOTICS> at the address bar

5

Open “Measuring_Object_Distance.ino” sketch among the list the codes

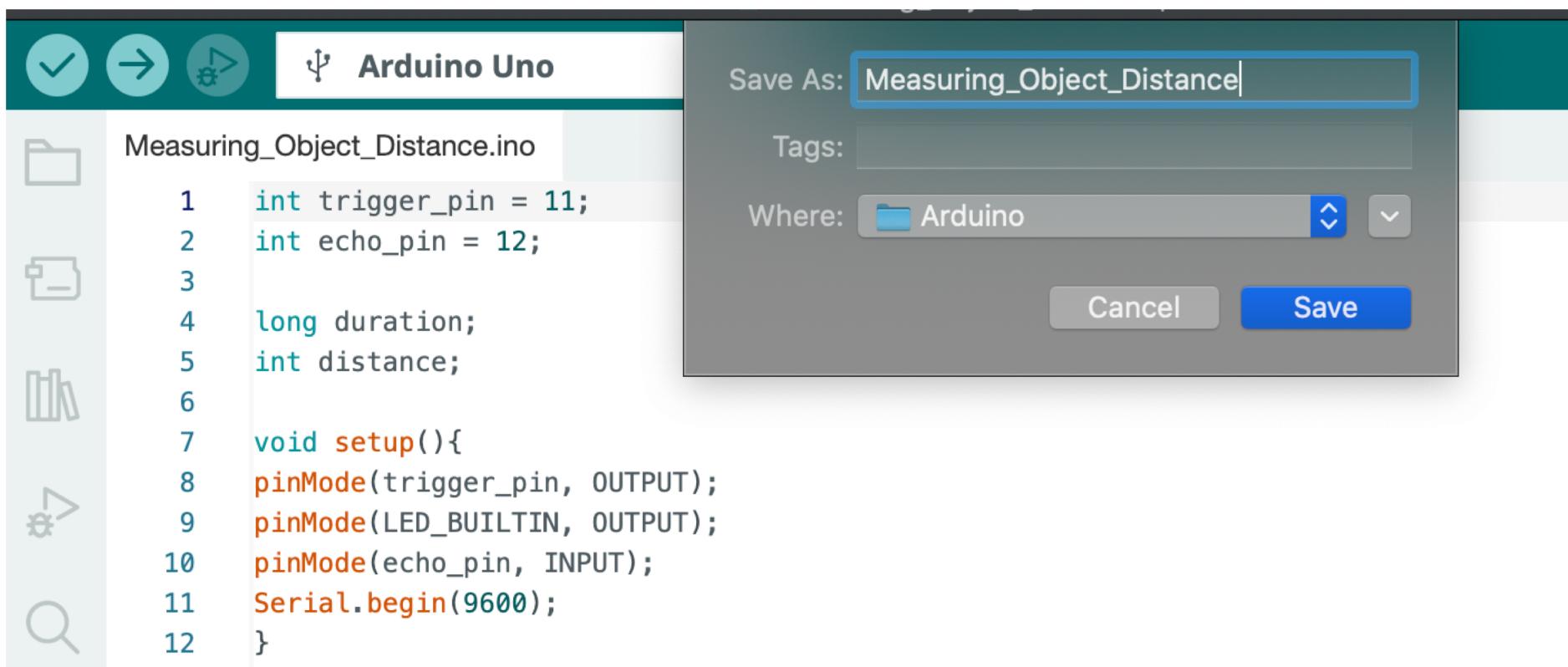


6

Copy “Measuring_Object_Distance.ino sketch from GitHub

7

Paste sketch on to the new Arduino IDE and click *File -> Save as...* name sketch as “Measuring_Distance” and click “Save”



8

Upload the sketch

9

After successful upload (without any errors) click “Serial Monitor”



10

Follow “testing tips” given below to understand functionality

Testing tips:

- *Move any object in front of the ultrasonic sensor, both forward and backward.*
- *Make sure to keep an eye on the Serial Monitor for the Output as you move the object.*
- *The object's movement's distance is shown in "Centimeter – CM."*
- *Additionally, if the object is closer than 15 cm, a blue LED alerts us.*

