Vhodno-izhodne naprave

Project – Calculate the length of an object using an Ultrasonic Sensor

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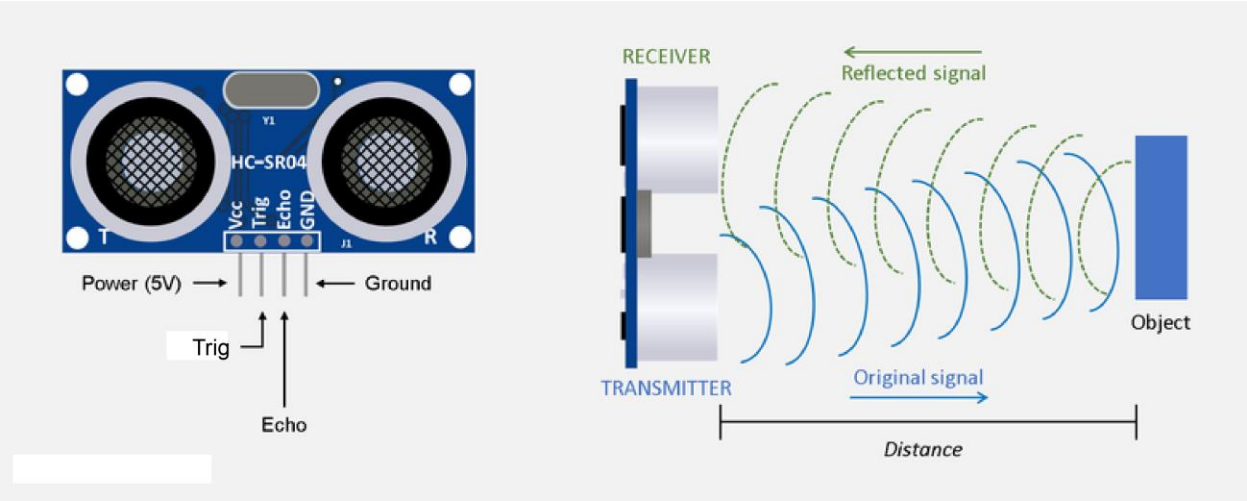
Idea and goal

The idea of the project is:

> *"Using an ultrasonic sensor measure the length of an object,*
>
> *and find a portion of it."*

In this documentation the portion will be half of the object length. An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. The theory of operation is that the ranger works by transmitting a pulse of sound outside the range of human hearing. This pulse travels at the speed of sound (roughly 0.9 ft/msec) away from the ranger in a CONE shape. The sound reflects back to the ranger from any object in the path of this sonic wave. The ranger pauses for a brief interval after the sound is transmitted and then awaits the reflected sound in the form of an echo. The controller driving the ranger then requests a ping, the ranger creates the sound pulse, and waits for the return echo. If received, then this can be computed back to the distance to the object based on the elapsed time.

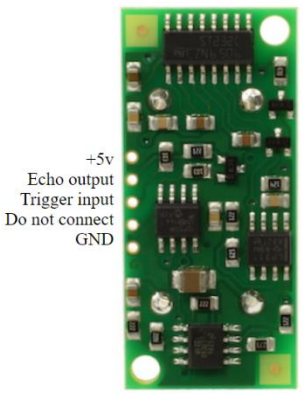


In my case I am using the SRF04 ULTRASONIC RANGE FINDER.

It is almost if not the same.

as HC-SR04 witch is shown

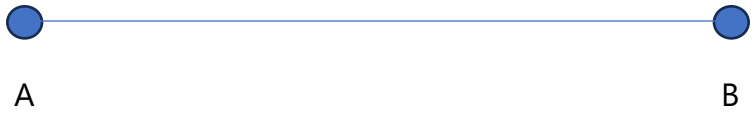
In the picture above.



➔ SRF04 model

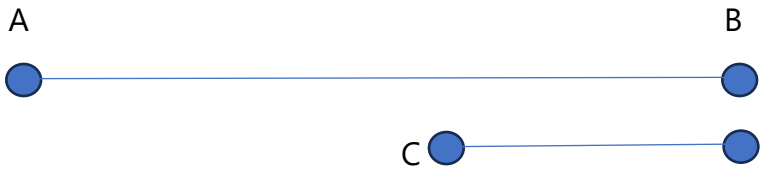
How this idea will be played out.

First, we need to set up a start and an end point. In the zone between these two points the sensor will measure the distance.



We put the sensor on one end, A, and we but a panel on the other side, B. The panel must be a flat surface to get the bets reflection possible.

Second, we will put an object in front of the panel and let the ultrasonic distance measure the distance to the newly put object.



Third, we have calculated the distance between point A and point B so now we take the newly calculated distance between A and C, and we subtract it from the original distance. In mathematical terms this will be equal to:

$$\overline{CB} = \overline{AB} - \overline{CB}$$

The result is the length of the object. As for the second part. I am doing a basic calculation by dividing the result by 2.

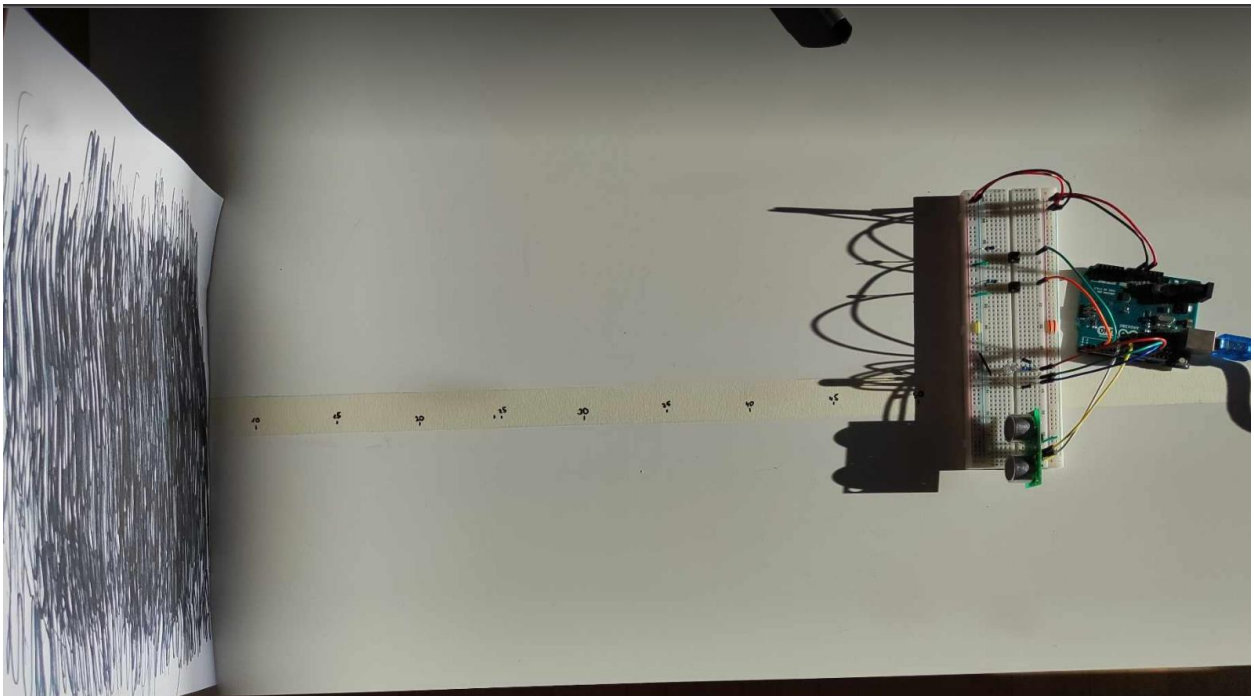
$$middle = \frac{\overline{CB}}{2}$$

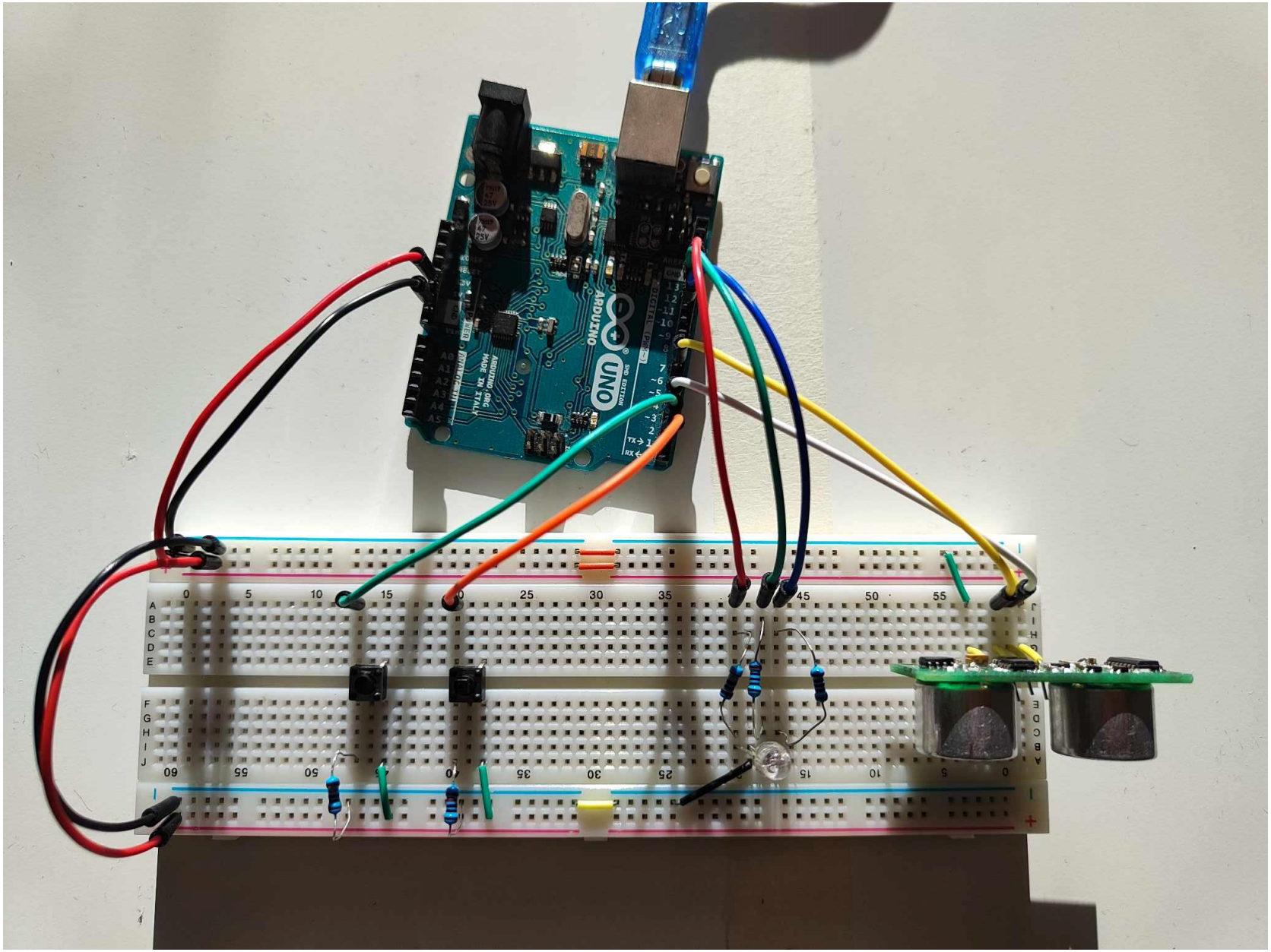
Set up and Connections

The components:

- Panel/Some smooth surface
- Breadboard
- 5 resistors
- Ultrasonic sensor (SRF04)
- RGB led light.
- 2 buttons
- Arduino Uno
- Wires

Everything put together should look like this.



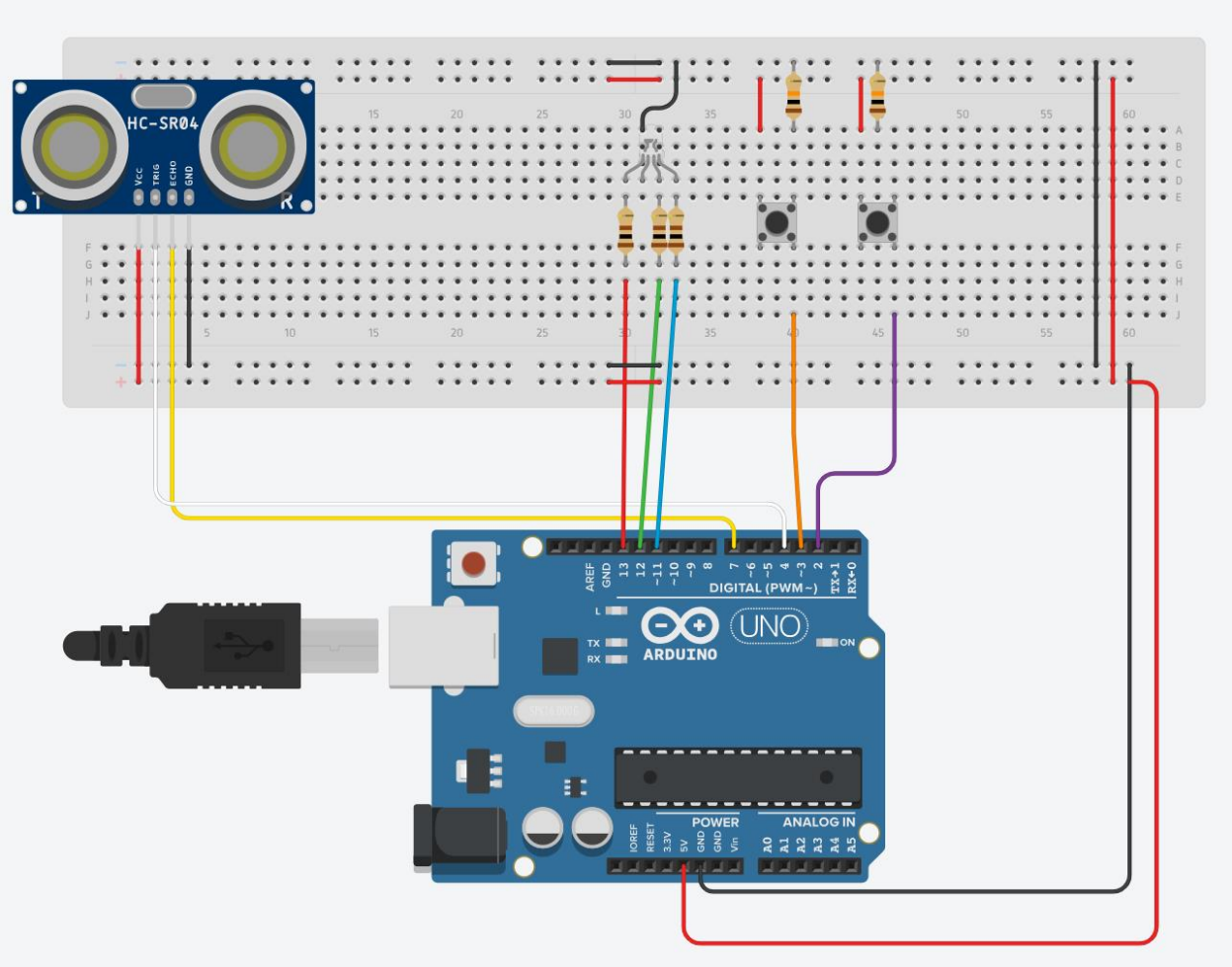

ARDUINO
UNO

NOTE*: While setting this up. You must pay attention to the angle you set up the:

- **breadboard with the table**
- **panel with the table**
- **sensor with the breadboard**

all these relationships must be at a 90 degrees angle in order to return the most precise results of the calculations.

Set up in tinkercad:

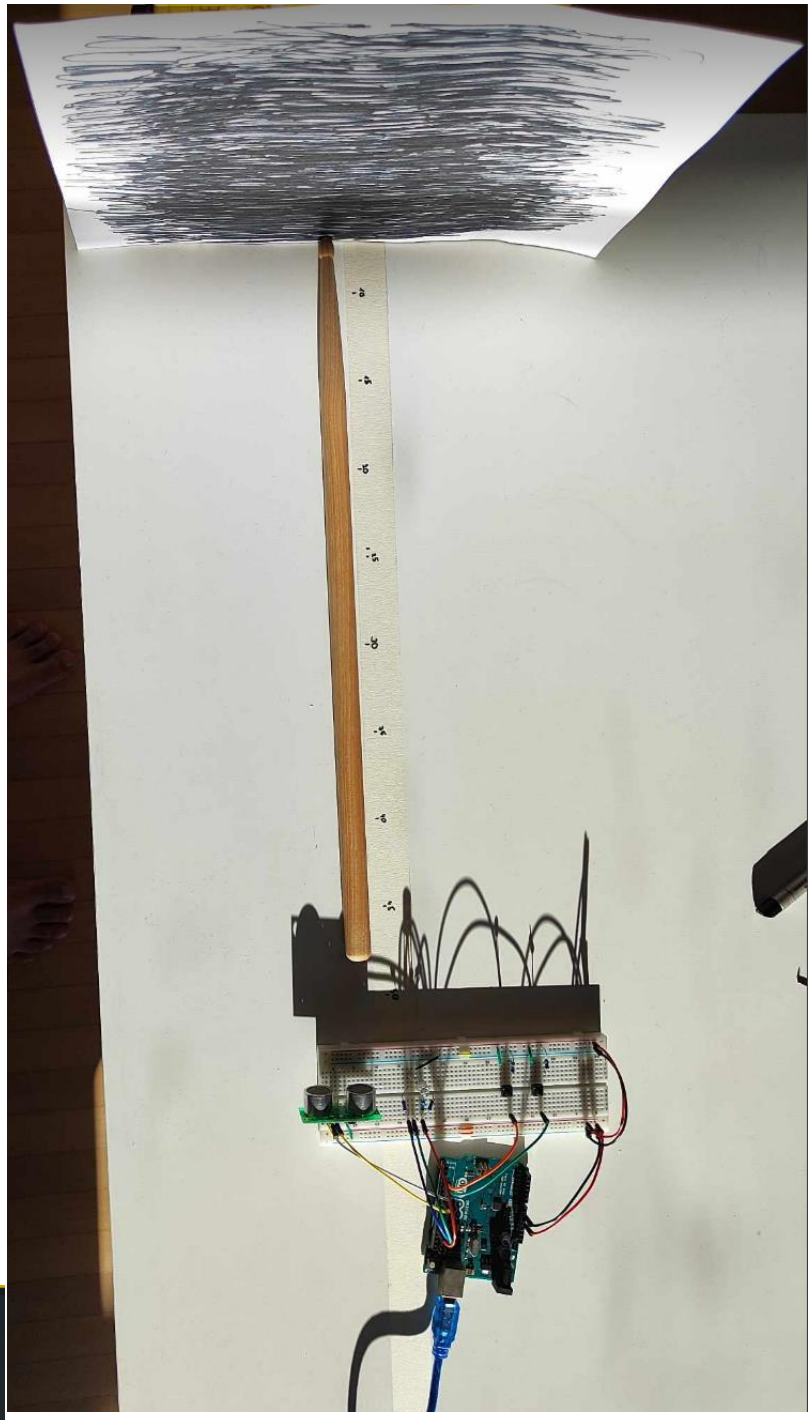


How it works?

The math behind this I explain in the idea section. After you set this up:

First, we need to press the reset button. This will calculate the initial distance between the sensor and the panel.

Second, we take an object that we would like to measure and place it sideways touching the panel. NOTE* This also must be at a 90-degree angle to get the precise length.



Third, we will press the calculate button that will print out the length as well as the middle of the object.

After this if you chose to mark the middle, you can move your hand/or a sheet of paper and if you are below the middle of the object the LED will be BLUE if you're above the middle of the object the LED will be RED. When you hit the middle, it will turn GREEN.

Example of how you would measure an object. ->

```
Max distance reset to:47.54

Lenght of object in cm: 38.42
Middle: 19.21

Max distance reset to:47.65
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