Ultrasonic Range Finder: HOW TO !

(Using Sound to Find Distance from Objects)

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USES

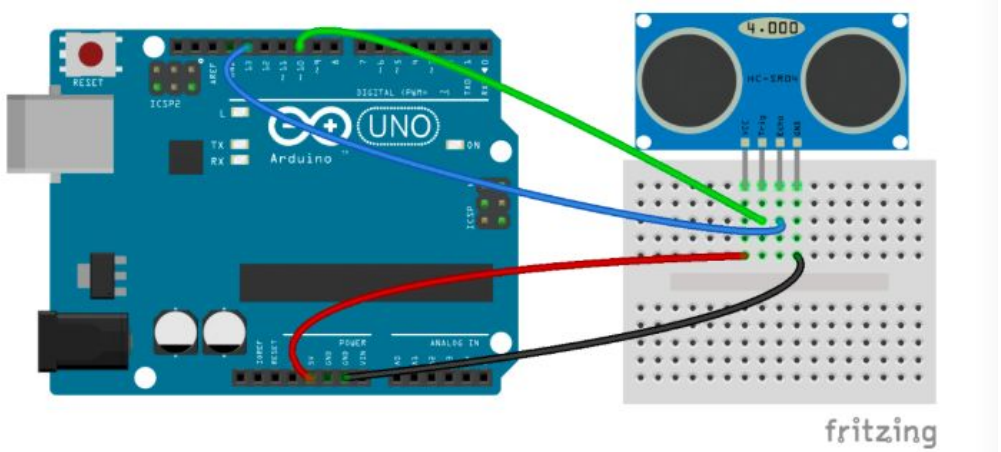
- Measuring distance using sound
- Finding range of nearby objects (2 to 400 cm noncontact)
- Ideal projects:
    - Navigation
    - Object avoidance
    - Night navigation (use of sound therefore not light specific)

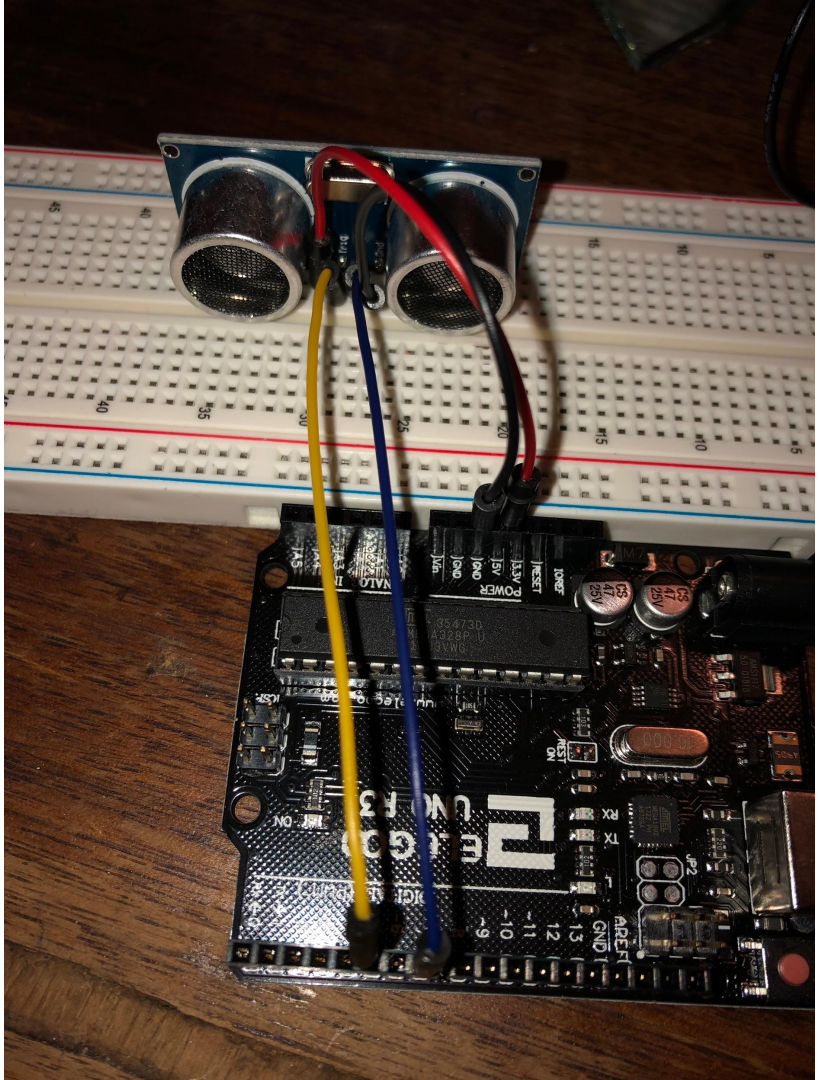
BASIC STRUCTURE

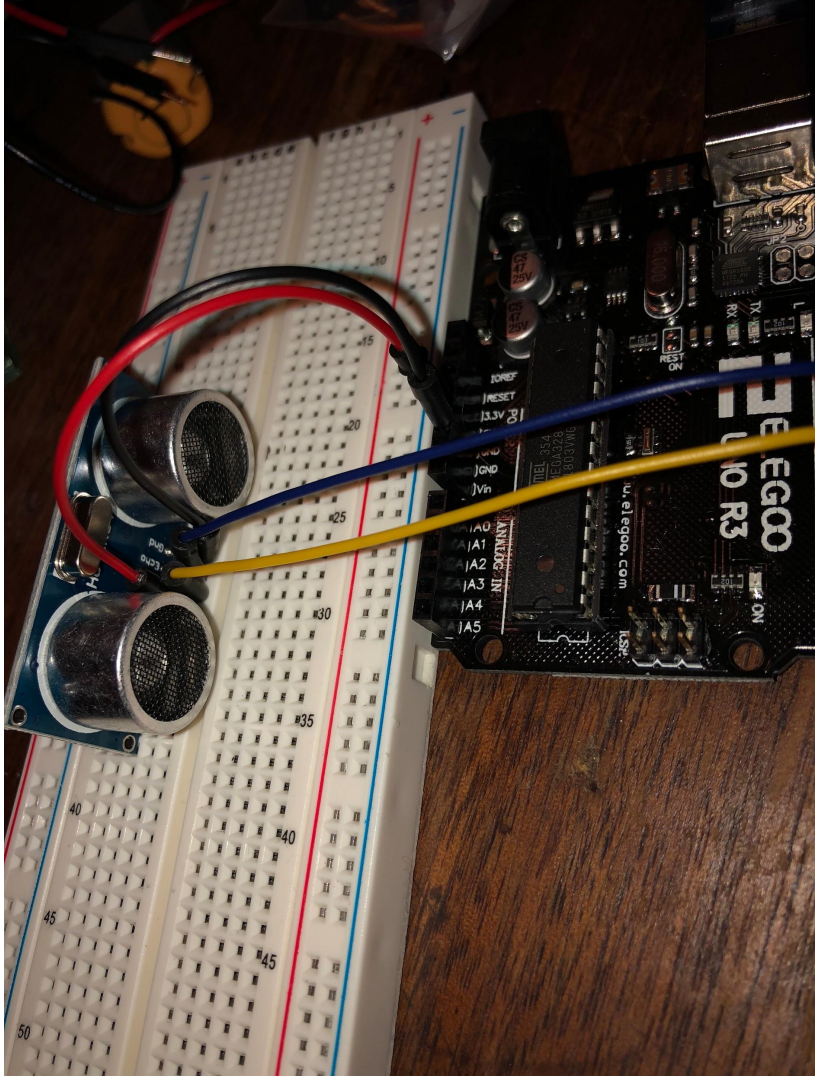
- The ultrasonic range finder is comprised of two *transducers*, the left one that transmits and the right one that receives signals.
- The range finder converts physical forces into electrical signals

SETTING IT UP

- This component uses four pins on the Arduino, labeled:
  - Vcc - connection to power to run the range finder
  - Trig - where the component connects and Arduino can send it the signal to run
  - Echo - where the range finder sends the information from the converted signals back to the Arduino
  - GND - Ground



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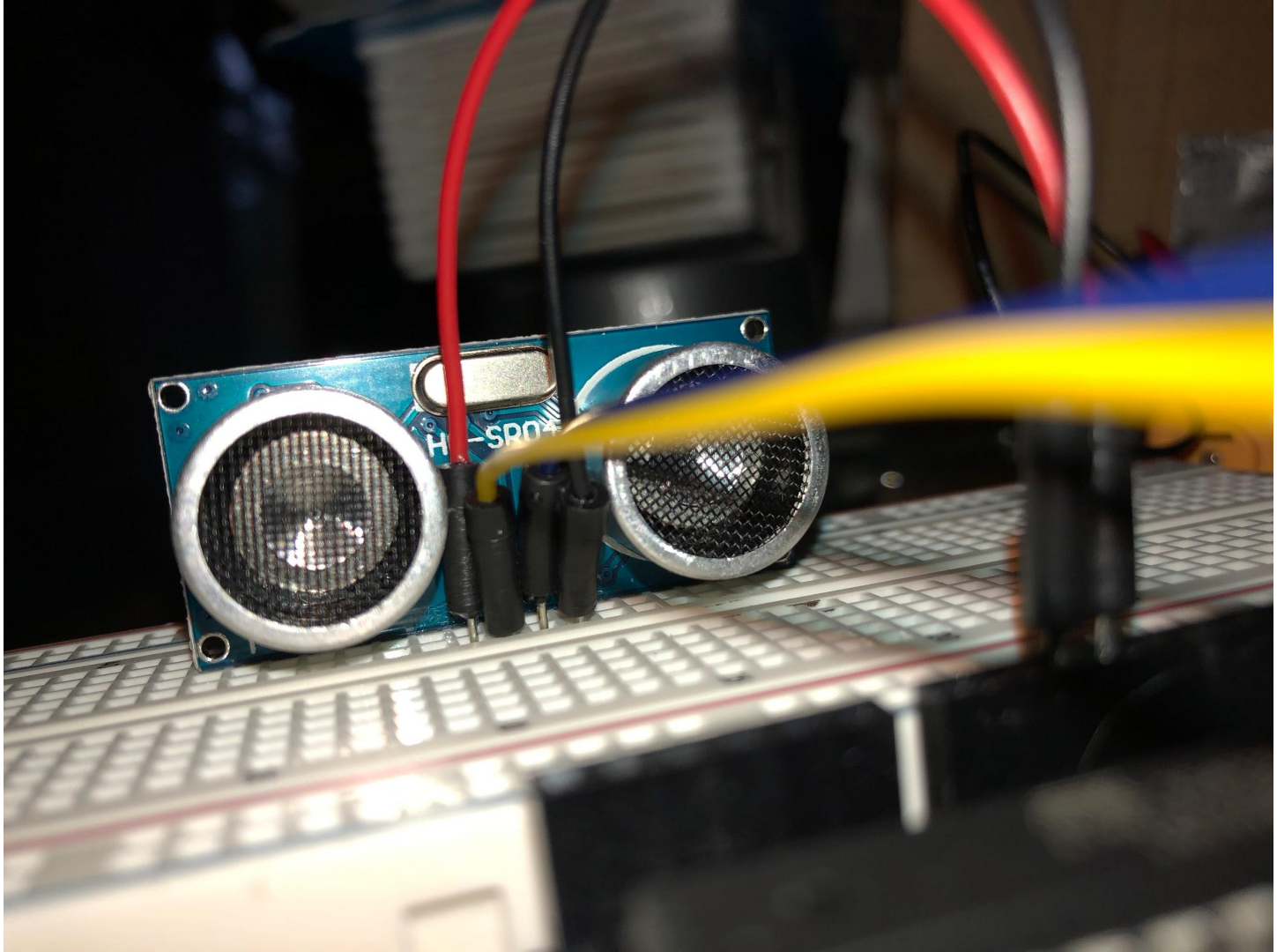

HOW IT WORKS(Getting a Distance Measurement)

- When the range finder receives the high voltage signal from the Vcc, it will emit 8 pulses of ultrasonic sound from the transmitting transducer.
- If an object is in range of this emission, the 8 pulses will then be reflected back and picked up by the receiving transducer.
- When that pulse is receive by the receiving transducer, the Echo pin outputs a high voltage signal

SAMPLE CODE - SIMPLE VERSION (With Comments and some explanation)

```
#define trigPin 10
#define echoPin 13
Void setup() {
        Serial.begin(9600);
        pinMode(trigPin,OUTPUT);
        pinMode(echoPin,INPUT);
}

Void loop() {
        Float duration, distance;
                //LOW signal to trigPin – makes sure its turned off at
beginning of loop
        digitalWrite(trigPin,LOW);
        delayMicroseconds(2);

                //sends HIGH signal to trigPin, initiates sending out of 8
pulses from transmitting transducer
        digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin,LOW);

//EchoPin output is the time it takes the transmitted pulse to travel to the
object and back to the receiving transducer
duration = pulseIn(echoPin,HIGH);

        //this is the distance variable – (finding the duration is d = s x t) or the
duration multiplied by the speed of sound converted from meters per second
to cm à (0.0344)
distance = (duration/2)*0.0344;

if(distance >=400 l l distance <= 2) {
        Serial.print("Distance =");
        Serial.println("Out of range");
} else {
        Serial.print("Distance =");
        Serial.print(distance);
        Serial.println(" cm");
}
        //displays the distance in the serial monitor for 500 ms
Delay(500);

}
```

Sources

http://www.circuitbasics.com/how-to-set-up-an-ultrasonic-range-finder-on-an-arduino/

https://github.com/prismspecs/art-tech/raw/master/KitPDF.zip