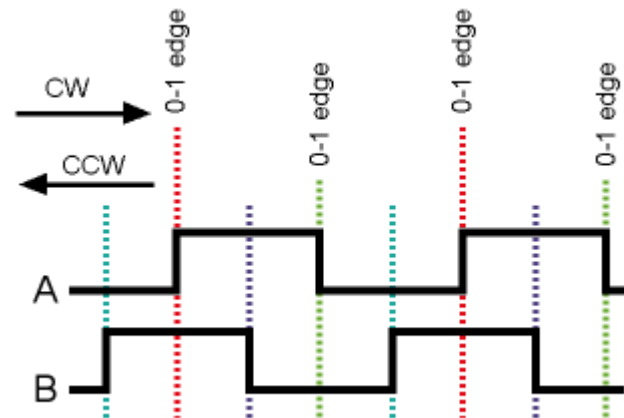
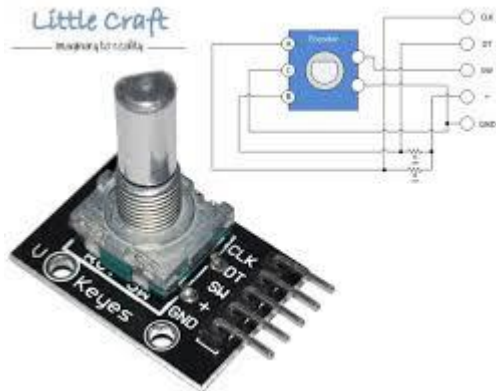
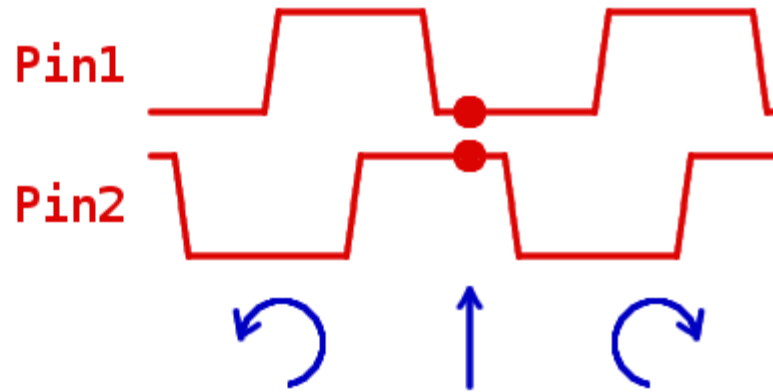
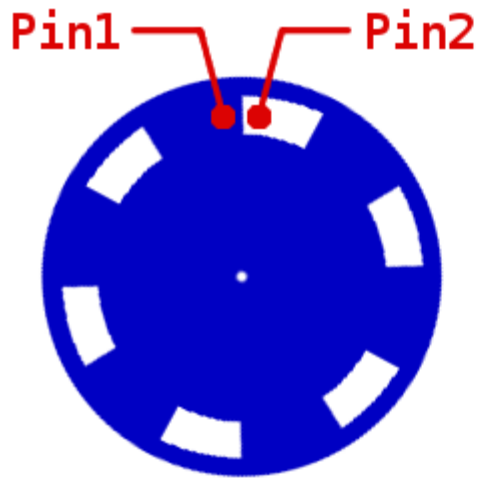


03 Arduino

Encoder, Sonar

Encoder



Encoder

```
1  int pinA = 3; // Connected to CLK
2  int pinB = 4; // Connected to DT|
3  int encoderPosCount = 0;
4  int pinALast;
5  int aVal;
6  boolean bCW;
7
8  void setup() {
9      pinMode (pinA, INPUT);
10     pinMode (pinB, INPUT);
11
12     pinALast = digitalRead(pinA);
13     Serial.begin (9600);
14 }
15
```

Encoder

```
16 void loop() {
17   aVal = digitalRead(pinA);
18   if (aVal != pinALast){ // Means the knob is rotating
19     // if the knob is rotating, we need to determine direction
20     // We do that by reading pin B.
21     if (digitalRead(pinB) != aVal) { // Means pin A Changed first - Rotating Clockwise
22       encoderPosCount ++;
23       bCW = true;
24     } else { // Otherwise B changed first and we're moving CCW
25       bCW = false;
26       encoderPosCount--;
27     }
28     Serial.print ("Rotated: ");
29     if (bCW){
30       Serial.println ("clockwise");
31     }else{
32       Serial.println("counterclockwise");
33     }
34     Serial.print("Encoder Position: ");
35     Serial.println(encoderPosCount);
36
37   }
38   pinALast = aVal;
39 }
```

Sonar

- 1. lépés?



Sonar

- Datasheet!!!!!!!



Sonar

Wire connecting direct as following:

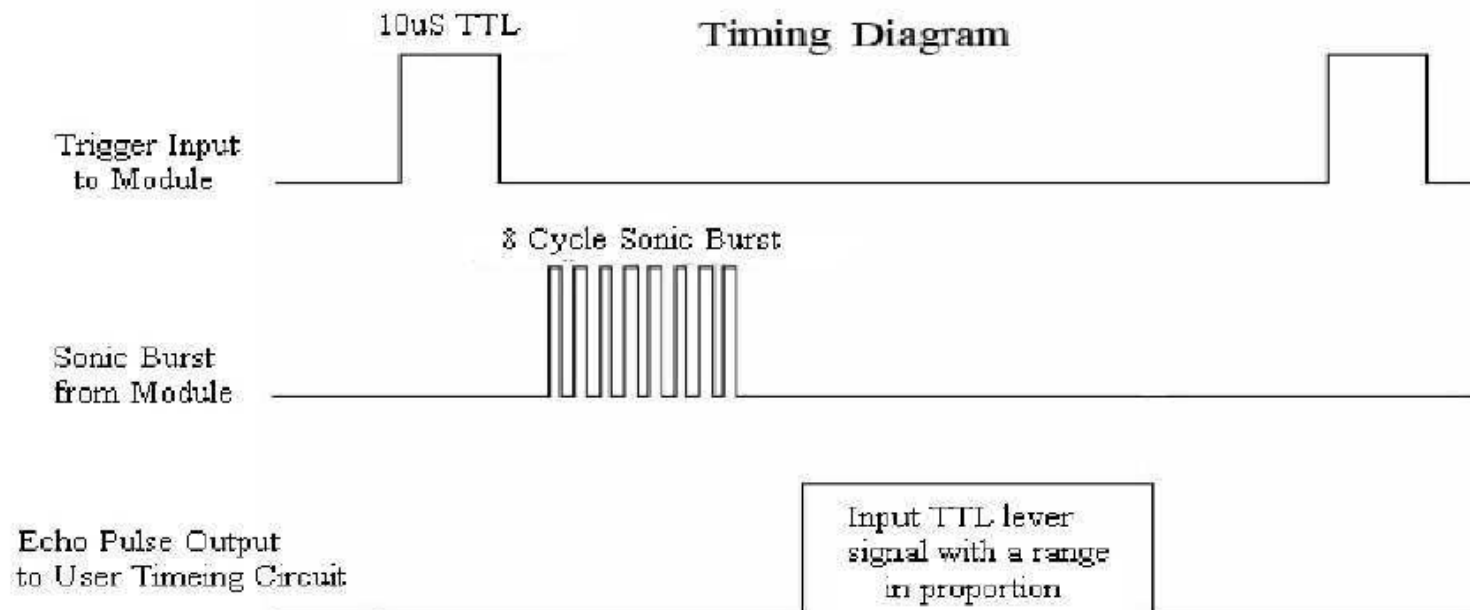
- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

Electric Parameter

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
MeasuringAngle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion
Dimension	45*20*15mm

Sonar

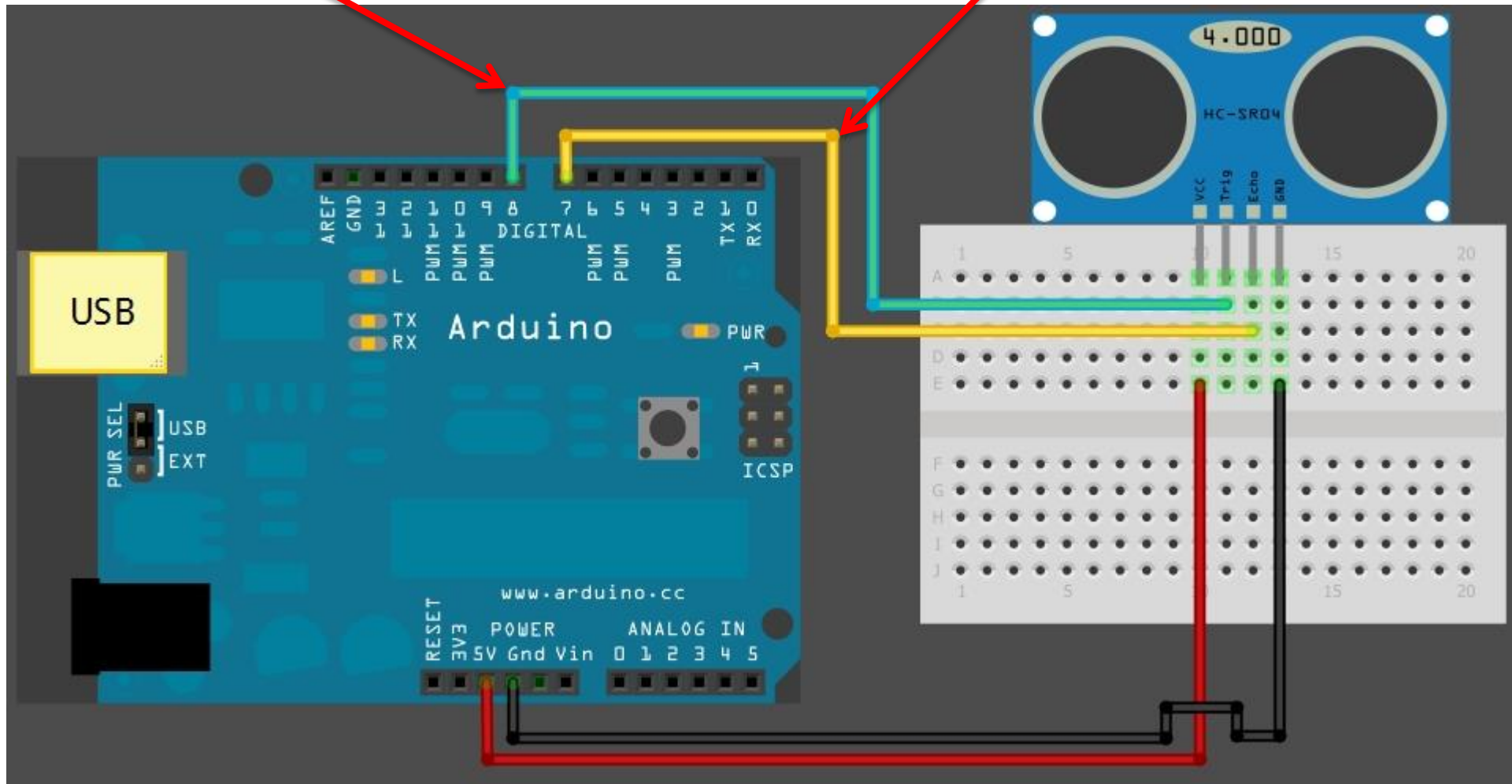
The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion. You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: $\mu\text{S} / 58 = \text{centimeters}$ or $\mu\text{S} / 148 = \text{inch}$; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



Sonar

Trig – pin8

Echo – pin7



Sonar

```
1 #define echoPin 7 // Echo Pin
2 #define trigPin 8 // Trigger Pin
3
4 int maximumRange = 200; // Maximum range needed
5 int minimumRange = 0; // Minimum range needed
6 long duration, distance; // Duration used to calculate distance
7
8 void setup() {
9     Serial.begin (9600);
10    pinMode(trigPin, OUTPUT);
11    pinMode(echoPin, INPUT);
12 }
```

Sonar

```
14 void loop() {
15 /* The following trigPin/echoPin cycle is used to determine the
16 distance of the nearest object by bouncing soundwaves off of it. */
17 digitalWrite(trigPin, LOW);
18 delayMicroseconds(2);
19
20 digitalWrite(trigPin, HIGH);
21 delayMicroseconds(10);
22
23 digitalWrite(trigPin, LOW);
24 duration = pulseIn(echoPin, HIGH); //measure PWM width
```

Sonar

```
26 //Calculate the distance (in cm) based on the speed of sound.
27 distance = duration/58.2; //datasheet
28
29 if (distance >= maximumRange || distance <= minimumRange){
30 /* Send a negative number to indicate "out of range" */
31 Serial.println("-1");
32 }
33 else {
34 /* Send the distance to the computer using Serial protocol
35 |to indicate successful reading. */
36 Serial.println(distance);
37 }
38
39 //Delay 50ms before next reading.
40 delay(50);
41 }
```
