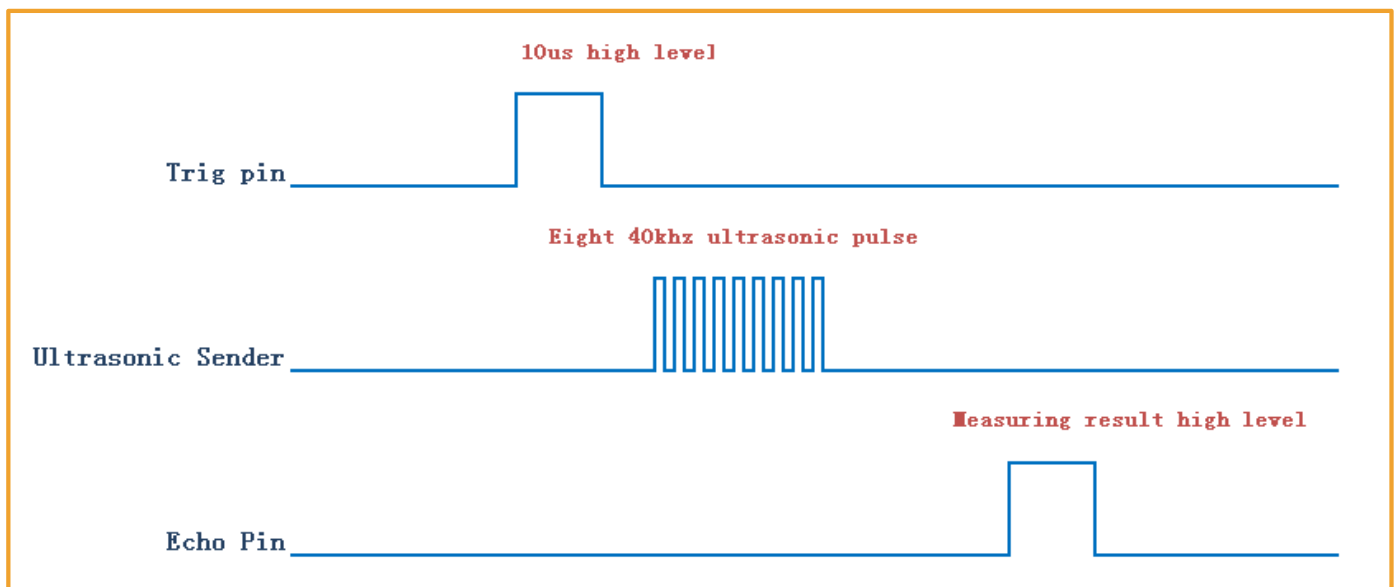# Ultrasonic Experiment

Introduce to Ultrasonic ranging

Ultrasonic transmitter launches ultrasonic to a certain direction and we start timing at the same time. When the ultrasonic in the air runs into obstacles, it will return immediately, ultrasonic receiver receives the reflected wave, then we stop timing. Sound waves in the air are at the rate of 340 m/s, according to the recorded time t, the distance s between launch spot and the obstacles can be calculated, that is: s = 340m / s * t / 2. So we can get the distance.

Ultrasonic ranging module has four pins, they are Vcc, Trig, Echo, GND, among the Trig is distance measuring trigger pin, as long as the Trig pin are at least 10μs high level, ultrasonic sending module will automatically send eight 40KHZ ultrasonic pulse, and automatically detect whether there is a returned signal . This step will be done automatically by the inside module. If there is any returned signal, the Echo pin will output high level, the duration of the high level is the time of ultrasonic wave from launch to return. At this point, we can use pulseIn () function to obtain the result of distance measuring, and calculate the actual distance.
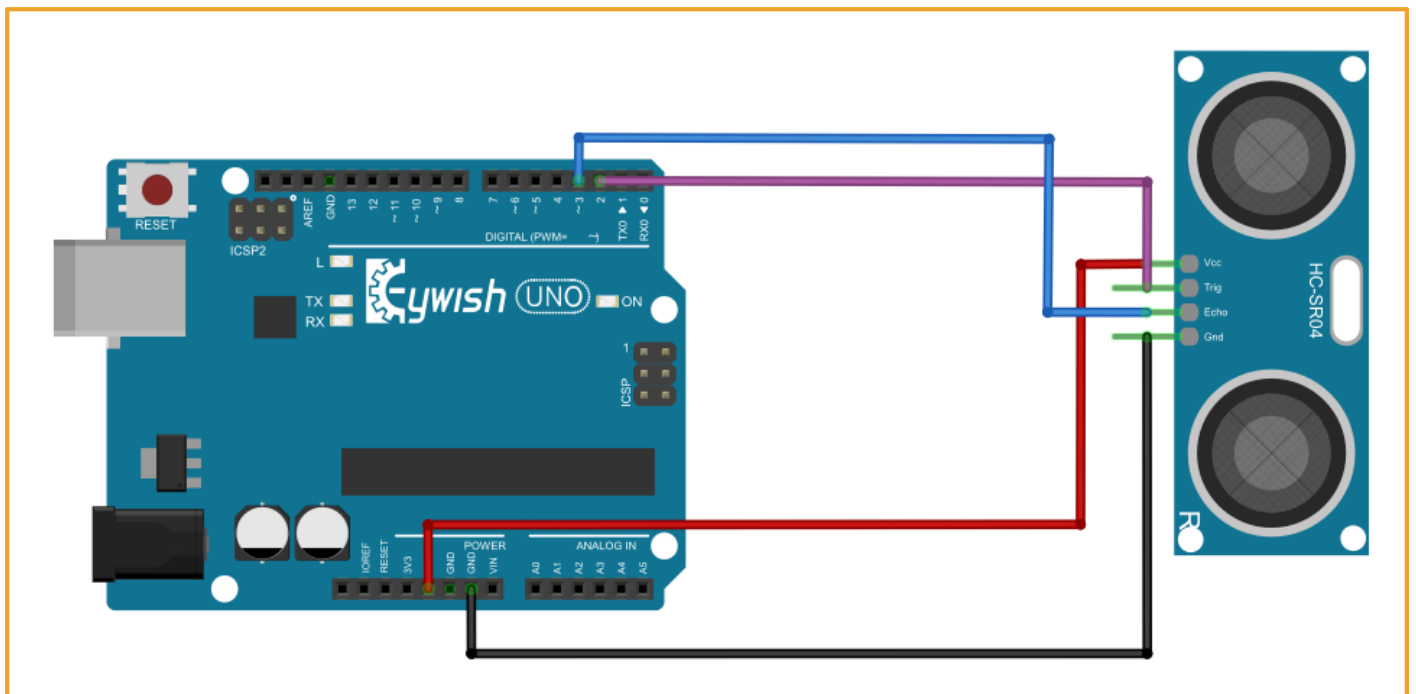

Experiment Purpose

The purpose is to type ultrasonic ranging module distance through a serial port.

Component List

◆ Keywish Arduino UNO R3 mainboard

◆ Breadboard

◆ USB cable

◆ Ultrasonic module* 1

◆ Several jumper wires

Wiring of Circuit

Arduino Uno	Ultrasonic
VCC	1Vcc)
2	2 (Trig)
3	3(Echo)
GND	4 (Gnd)

Code

```
const int TrigPin = 2; // define TrigPin to pin 2
const int EchoPin = 3;  // Define EchoPin to pin 3
float distance;
void setup()
{
    Serial.begin(9600); // Set the serial port baud rate to 9600
    pinMode(TrigPin, OUTPUT); // Set the TrigPin pin to output mode
    pinMode(EchoPin, INPUT); // Set the EchoPin pin to output mode
    Serial.println("Ultrasonic sensor:");  // Print character Ultrasonic sensor:
}
void loop()
{

    digitalWrite(TrigPin, LOW); // Set the TrigPin pin to low level
    delayMicroseconds(2); // Delay 2 microseconds
    digitalWrite(TrigPin, HIGH);   // Set the TrigPin pin to high level
    delayMicroseconds(10); // Delay 10 microseconds
    digitalWrite(TrigPin, LOW);  // Set the TrigPin pin to low level
    distance = pulseIn(EchoPin, HIGH) / 58.00; // Calculate distance
    Serial.print("distance is :");  // print character distance is:
    Serial.print(distance); // print distance value
    Serial.print("cm"); // print character cm
    Serial.println();
    delay(1000); // Delay 1 second
}
```
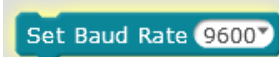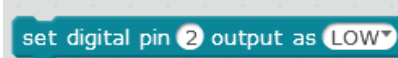
Experiment Result
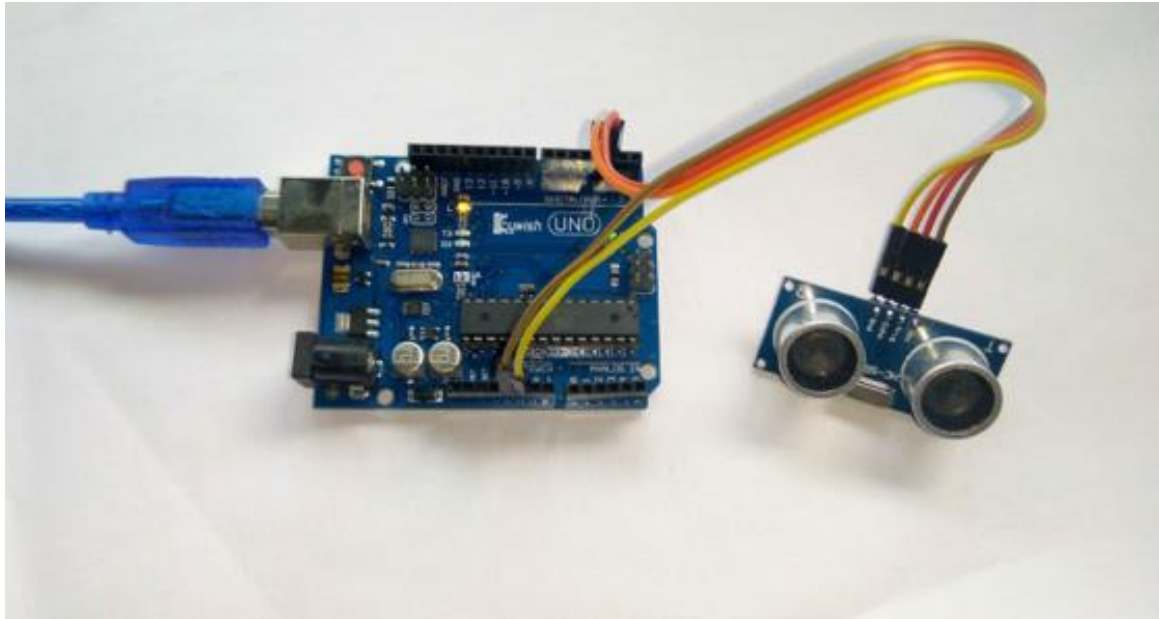

```
COM27 (Arduino/Genuino Uno)                              —    □    ×

                                                              [发送]

Ultrasonic sensor:
distance is :119.64cm
distance is :8.57cm
distance is :4.40cm
distance is :114.98cm
distance is :124.98cm
distance is :120.93cm
distance is :243.98cm
distance is :7.48cm




☑自动滚屏 ☐Show timestamp      换行符  ∨  9600 波特率  ∨   清空输出
```
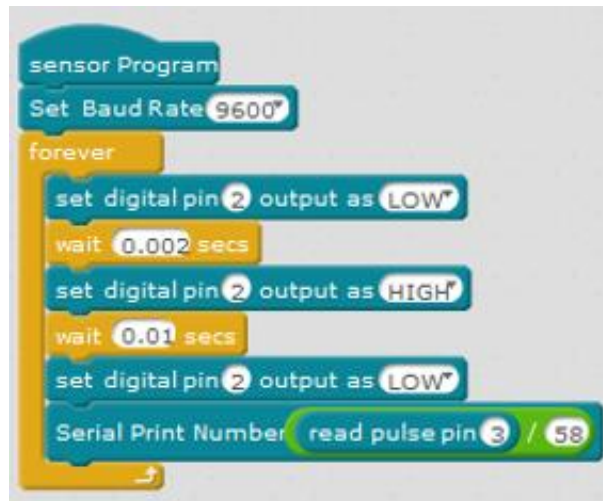
Mblock programming program

The program prepared by mBlock is shown in the figure below:

- Set Baud Rate 9600 -- Set baud rate
- set digital pin 2 output as LOW -- Control digital pin output to high or low level

Mixly graphical programming

Mixly compiles the ultrasonic distance measurement program as shown below:

MagicBlock graphical programming program

MagicBlock writes the ultrasonic distance measurement program as shown below