

## Ultrasonic distance measurement

### The purpose of the experiment:

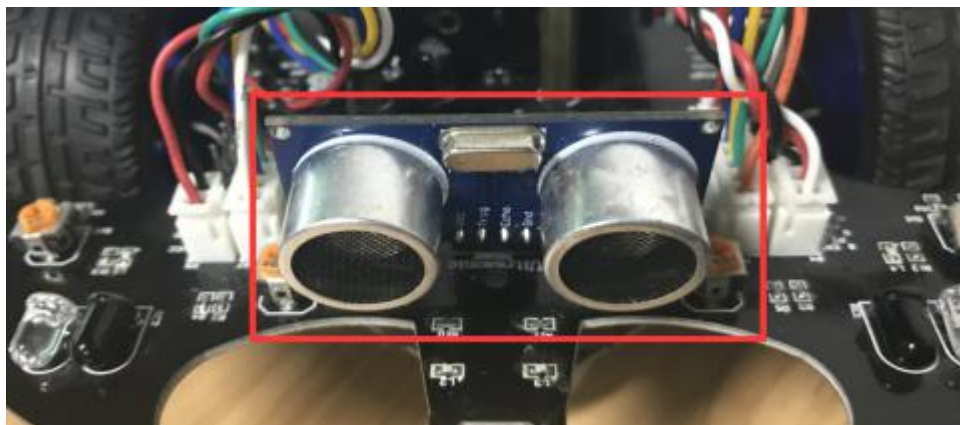
When the program upload is complete, open the serial monitor and you can see the distance measured by the ultrasonic sensor.

### List of components required for the experiment:

BatCar\*1

USB data cable\*1

Ultrasonic sensor\*1



### Experimental code analysis:

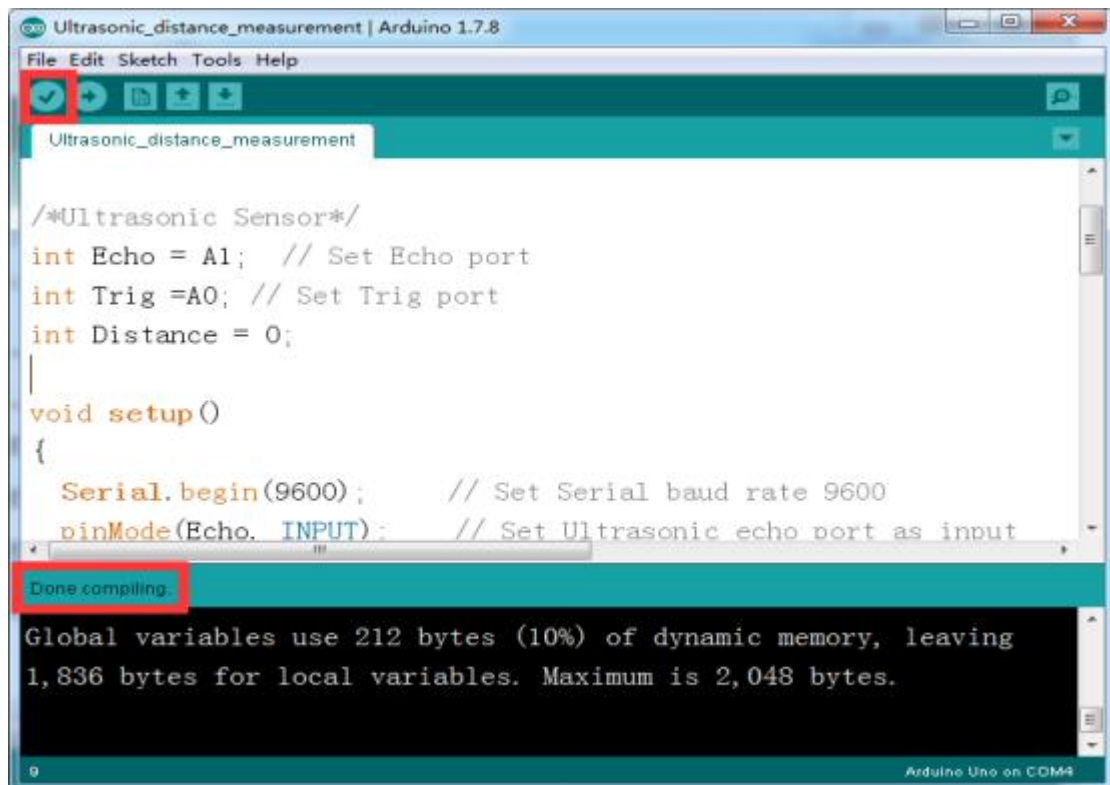
```
int Echo = A1; // Set Echo port
int Trig =A0; // Set Trig port
int Distance = 0;
void setup()
{
  Serial.begin(9600); // Set Serial baud rate 9600
  pinMode(Echo, INPUT); // Set Ultrasonic echo port as input
  pinMode(Trig, OUTPUT); // Set Ultrasonic trig port as input
}
void Distance_test() // Measuring front distance
```

```
{
  digitalWrite(Trig, LOW);    // set trig port low level for 2µs
  delayMicroseconds(2);
  digitalWrite(Trig, HIGH);  // set trig port high level for 10µs(at least 10µs)
  delayMicroseconds(10);
  digitalWrite(Trig, LOW);    // set trig port low level
  float Fdistance = pulseIn(Echo, HIGH); // Read echo port high level
  time(unit:µs)
  Fdistance= Fdistance/58;      // Distance(m) =(time(s) * 344(m/s)) /
  2  /***** The speed of sound is 344m/s.*****/
      // ==> 2*Distance(cm) = time(µs) * 0.0344(cm/µs)
      // ==> Distance(cm) = time(µs) * 0.0172 = time(µs) / 58

  Serial.print("Distance:");    //Output Distance(cm)
  Serial.println(Fdistance);     //display distance
  Distance = Fdistance;
}
/*main loop*/
void loop()
{
  Distance_test();//Measure and display distance
  delay(200);
}
```

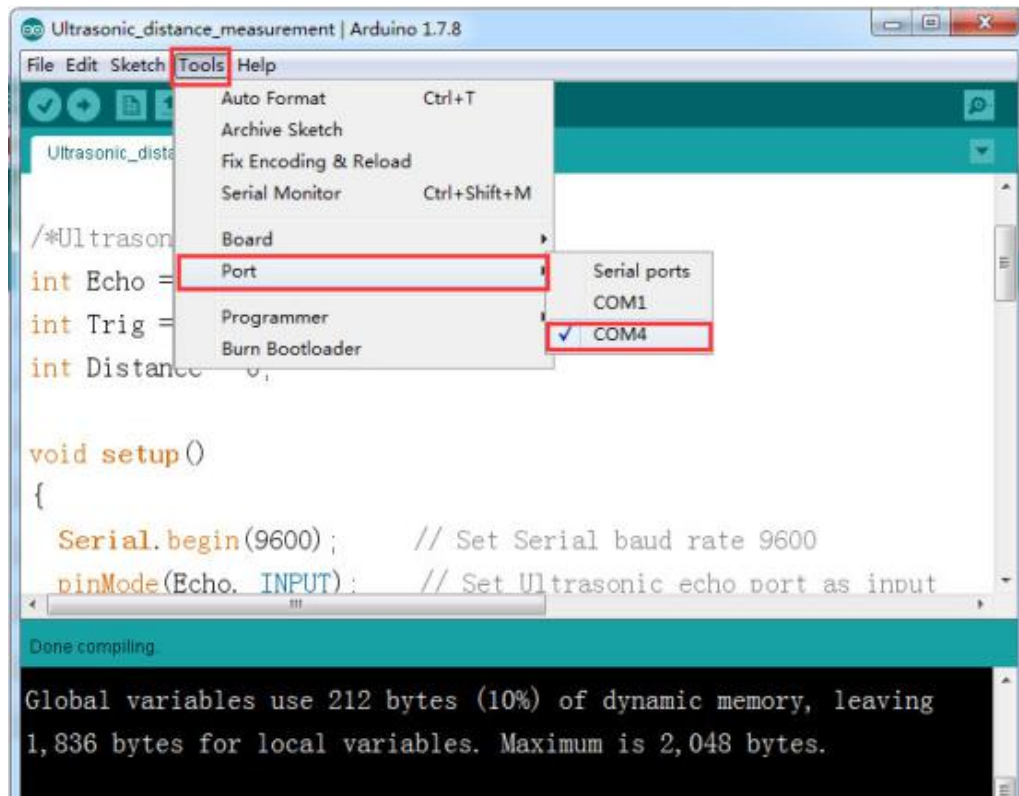
### Experimental steps:

1. We need to open the code of this experiment: **Ultrasonic\_distance\_measurement.ino**, click “✓” under the menu bar to compile the code, and wait for the word “**Done compiling**” in the lower right corner, as shown in the figure below.

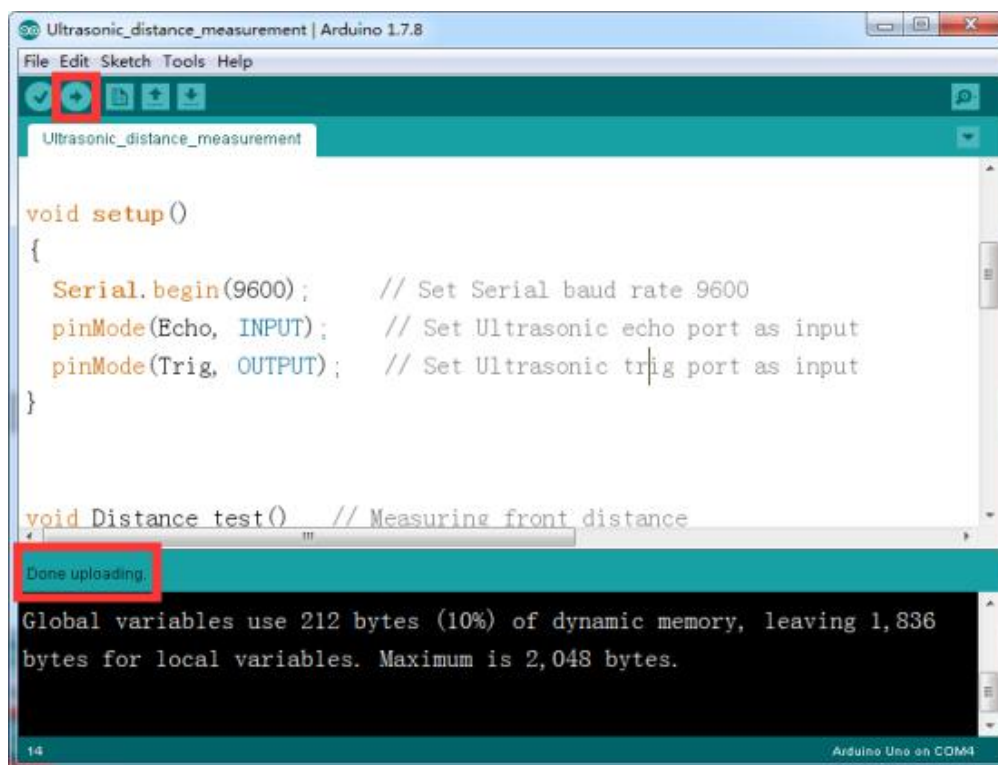


2. In the menu bar of Arduino IDE, we need to select **【Tools】** --- **【Port】** --- selecting the port that the serial number displayed by the device manager just now, as shown in the figure below.

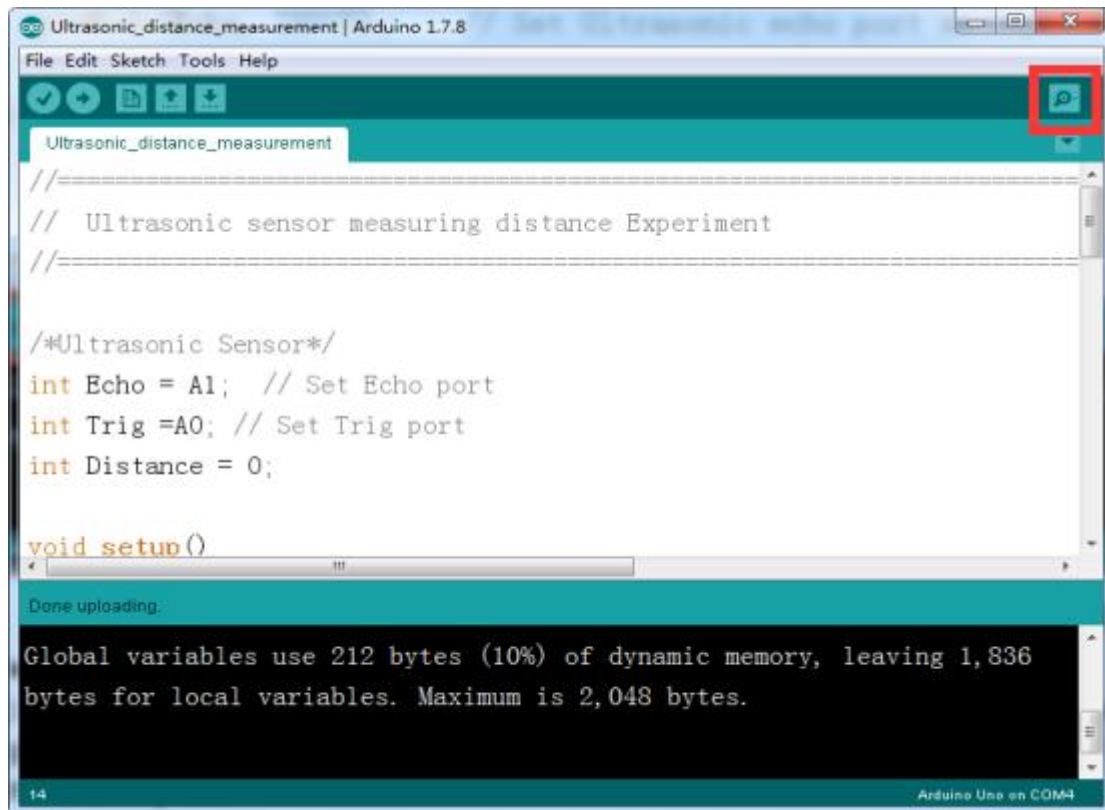




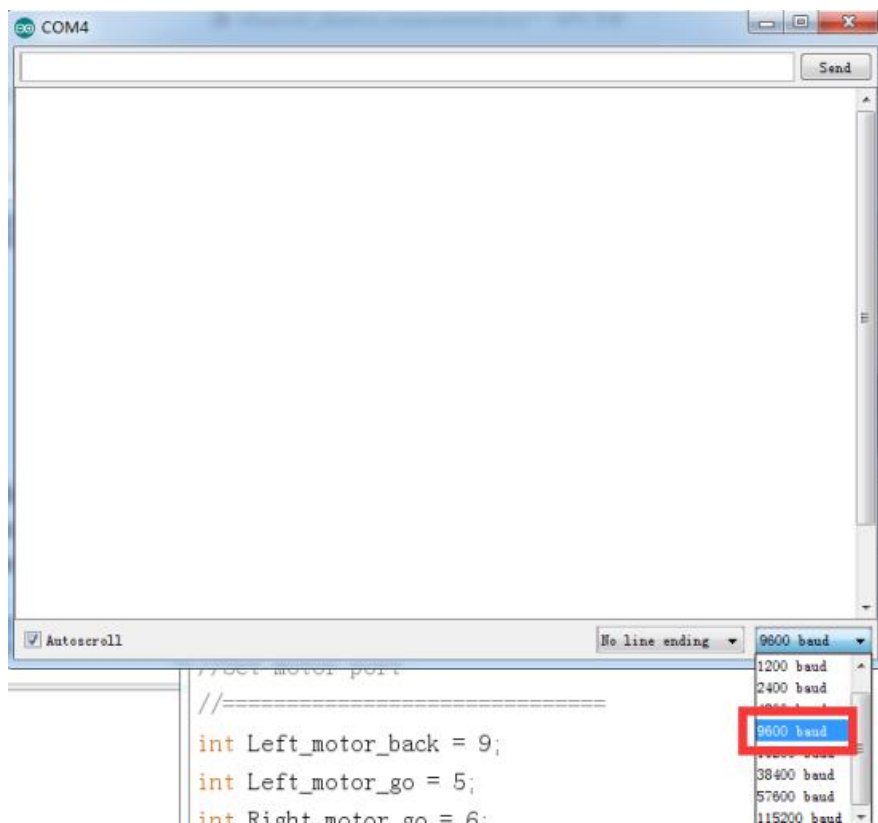
3. After the selection is completed, you need to click “→” under the menu bar to upload the code to the Arduino UNO board. When the word “**Done uploading**” appears in the lower left corner, the code has been successfully uploaded to the Arduino UNO board, as shown in the figure below.



4. After the program is successfully uploaded, do not unplug the USB cable. Click on the serial port monitor as shown below.



5. The serial port baud rate is 9600 as shown below.



6. It can be seen that the data measured by the ultrasonic sensor is refreshed every 200 milliseconds in the serial monitor, and the data is slowly moved forward by the hand in front of the ultrasonic sensor, and the data measured by the ultrasonic is gradually reduced.

