Lesson 4 Controlling the Servo Motor
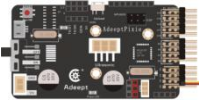
In this lesson, we will learn how to control the Servo Motor.

4.1 Components used in this course

Components	Quantity	Picture
AdeeptPixie Drive Board	1	
Micro USB Cable	1	
Servo	1	

4.2 The introduction of the Servo Motor

4.2.1 Servo Motor

Servo motor refers to the engine that controls mechanical component operation in the servo system. It is a kind of auxiliary motor indirect transmission device. The servo motor is a gear motor that can rotate only 180 degrees. It is controlled by sending pulses from the microcontroller. These pulses tell the server where to move. The servo motor system includes housing, circuit board, non-core motor, gearing and position detection. Servo motor is shown in the figure:
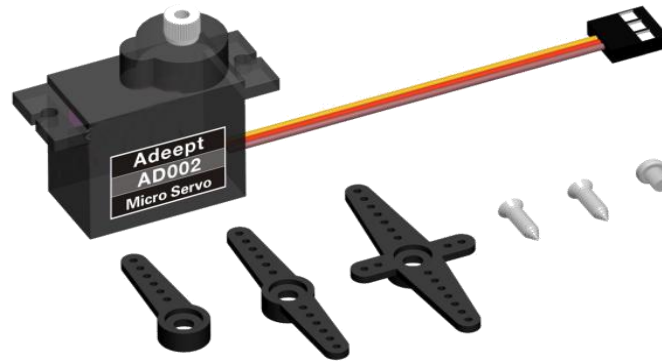
4.2.2 The working principle of the Servo Motor

The servo mechanism is an automatic control system that enables the object's position, orientation, state and other output controlled quantities to follow arbitrary changes in the input target (or given value). The servo mainly depends on Pulsefor location. Basically, it can be understood that the servo motor receives an impulse and rotates the angle corresponding to the impulse to realize displacement. Because the servo motor itself has the function of sending out pulses, the servo motor rotates every time at an angle, and a corresponding number of pulses will be sent out. In this way, the pulses received by the servo motor form a response, or a closed loop. In this way, the system will know how many pulses are sent to the servo motor and how many pulses are received. In this way, it is possible to precisely control the rotation of the motor, thereby achieving precise positioning

The Drive Board sends the PWM signal to Servo, and then the IC on the circuit board processes the signal to calculate the rotation direction of the drive motor, and then transmits the drive force to the swing arm with the reduction gear. At the same time, the position detector returns a position signal to determine whether it has reached the set position.

| pulse width (frequency=50Hz)	Rotation angle
0.5ms	0°
1ms	45°
1.5ms	90°
2ms	135°
2.5ms	180°
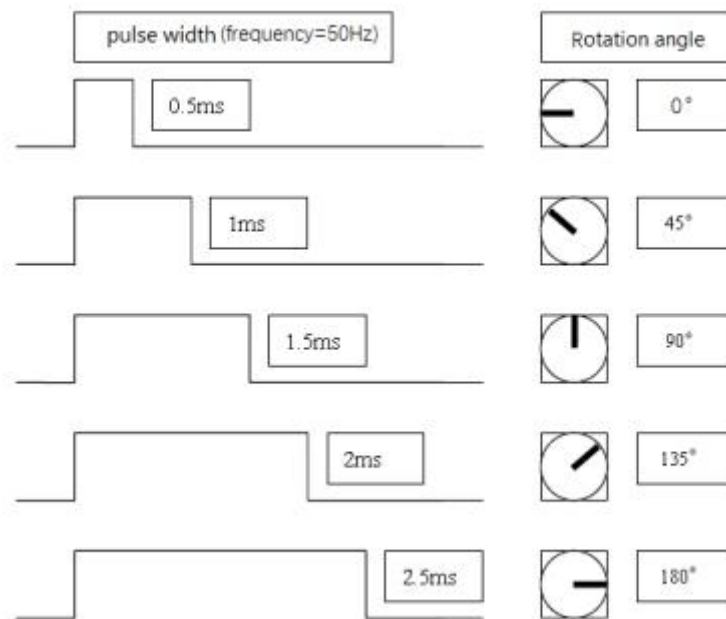
2.2.3 Principle of write() function

In the program, we use the write() function to control the rotation of the servo. For standard servos, the write() function will rotate the servo axis to the corresponding angular position. For the continuous rotation type of servo, the write() function can set the rotation speed of the servo (0 indicates that the servo rotates at full speed in one direction, 180 indicates that the servo rotates at full speed in the other direction, and 90 indicates that the servo is stationary. The servo used this time is a standard servo)

attach() is the port for setting the servo.
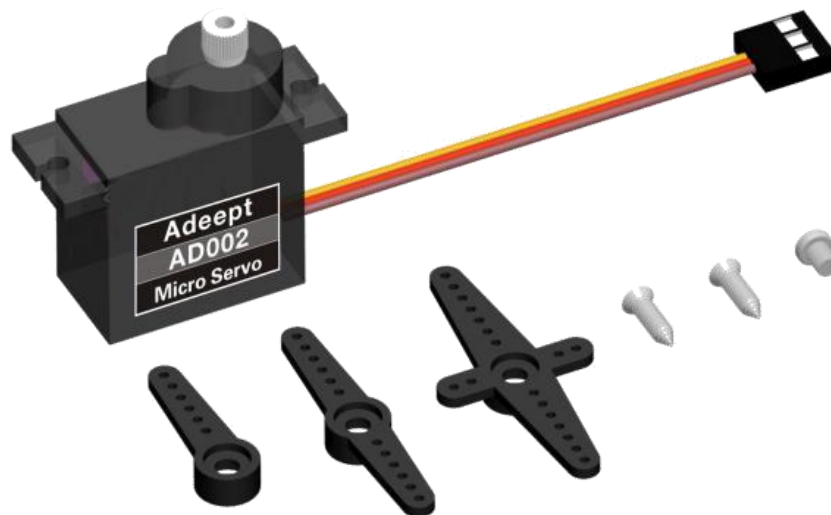
4.3 Wiring diagram (Circuit diagram)

In this lesson, we use AD002 servo to connect the AdeeptPixie driver board, only need to connect the AD002 servo cable to the Servo interface of the AdeeptPixie driver board as shown below:
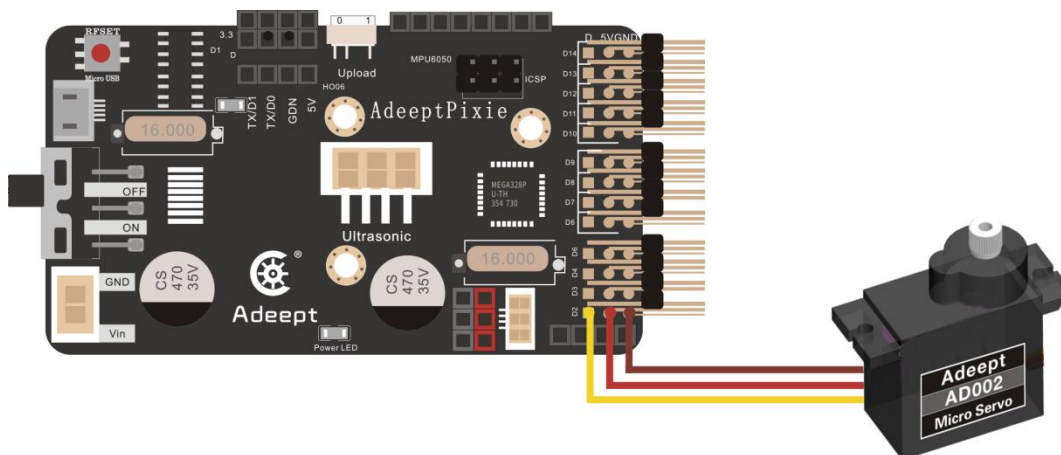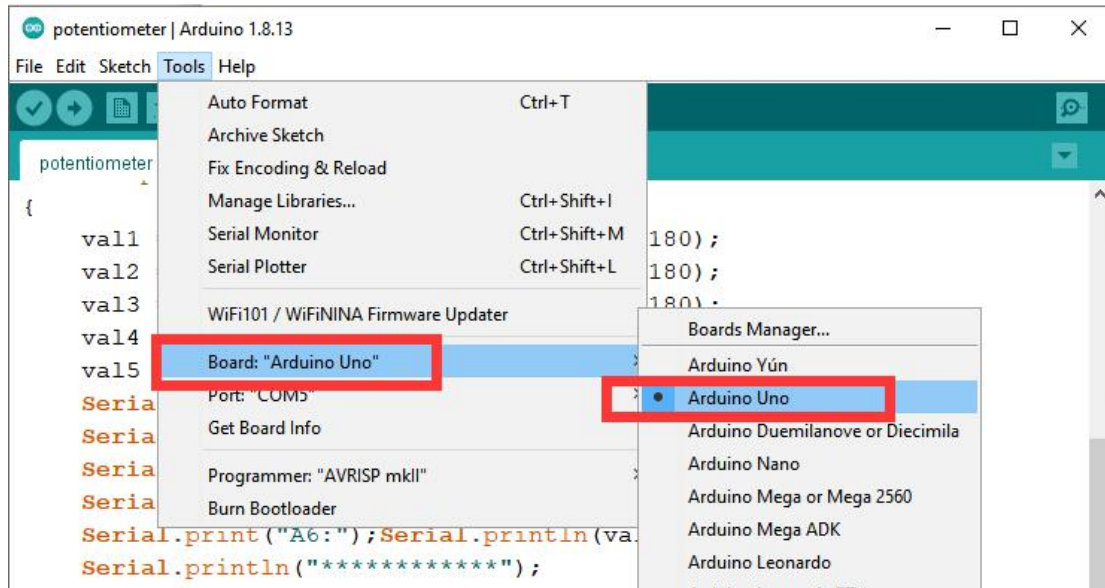

4.4 How to control Servo

4.4.1 Compile and run the code program of this course

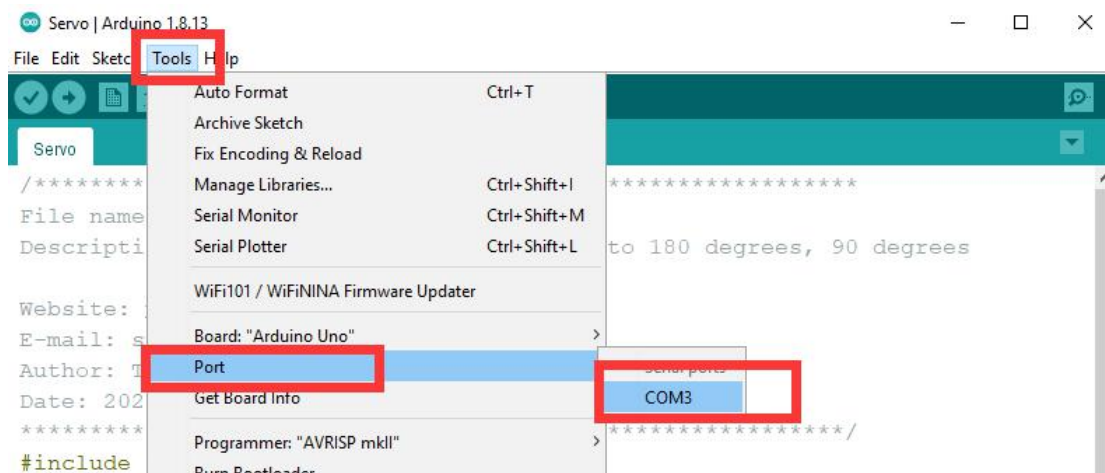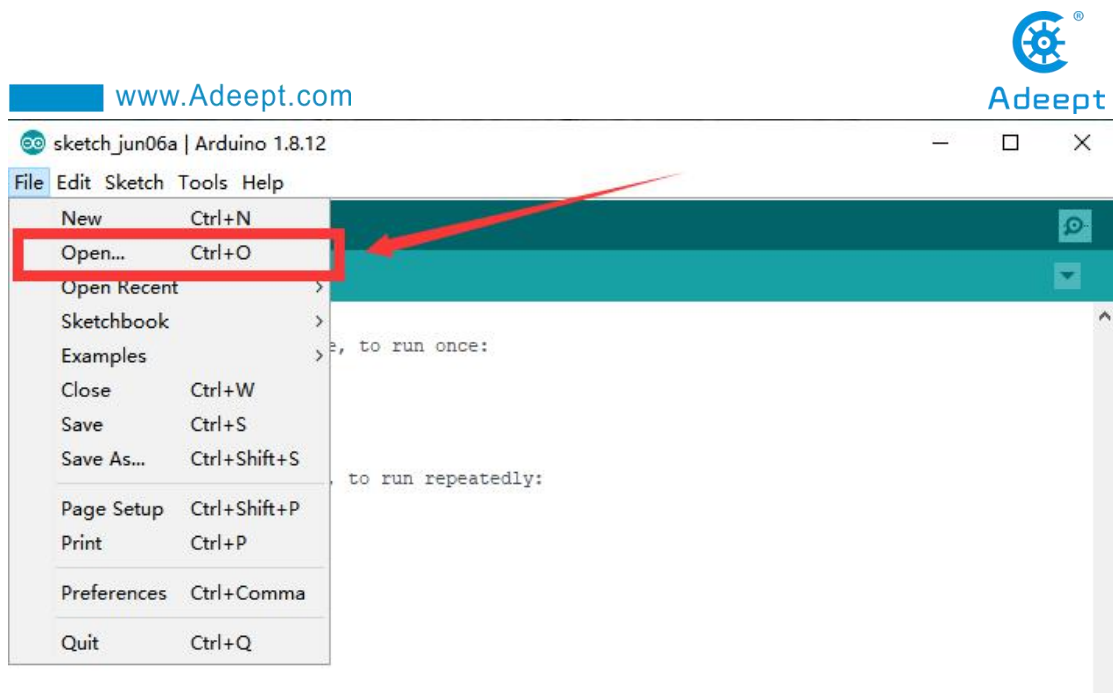1.Open the Arduino IDE software, as shown below:

2. In the Tools toolbar, find Board and select Arduino Uno, as shown below:
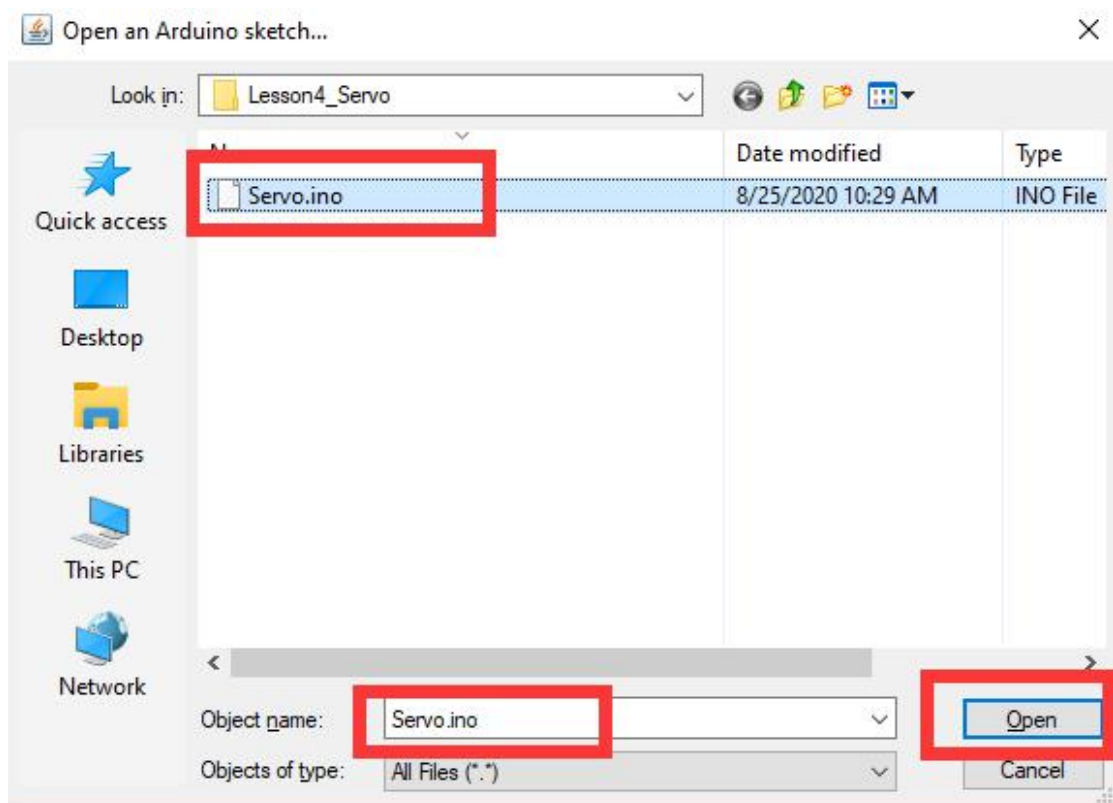

3. In the Tools toolbar, find Port, select the port number of the AdeeptPixie driver board, as shown below:


4. Click Open under the File drop-down menu:

5. Find the folder Hexapod 6 Legs Spider Robot Kit for Arduino\03Course code we provide for users, open the Lesson4_Servo folder, select Servo.ino, this file is the code program we need to use in this lesson, and then click Open.
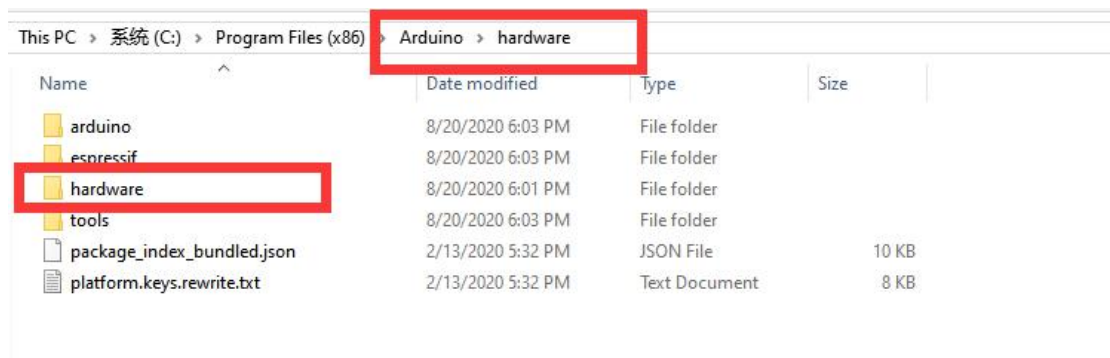

6. After opening, click to Upload the code program to the driver board, the following error message may appear:
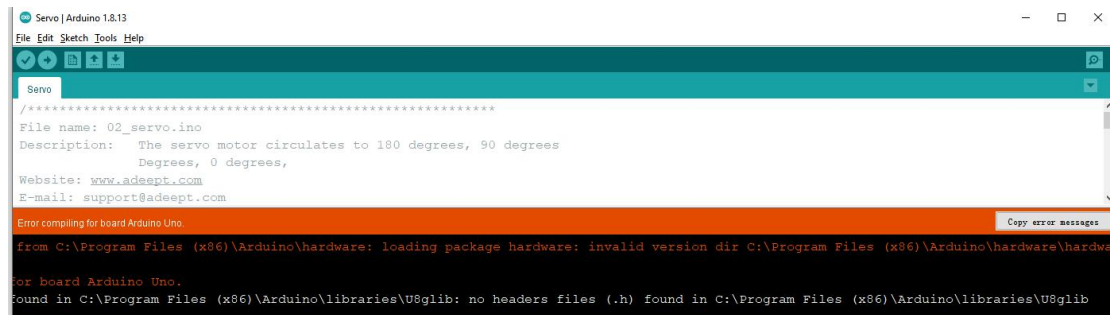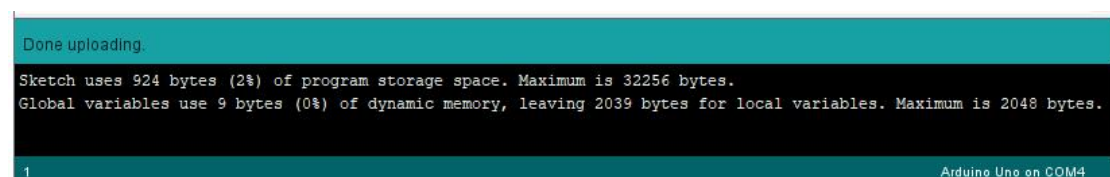
【Solution】

Find the directory where you installed the Arduino IDE, open the hardware folder, you need to delete the "hardware" inside.

Then you click again to upload the code program to the driver board. After the upload is successful, a text prompt appears in the lower left corner: Done uploading.

7. After successfully running the program, you will observe the movement of the servo.

4.4.2 The core code program

create servo object to control a servo

```
Servo myservo;//create servo object to control a servo
```

In the setup() function, attach the servo on pin 2 to servo object; back to 0 degrees; wait for a second.

```
void setup()
{
  myservo.attach(2);//attachs the servo on pin 2 to servo object
  myservo.write(0);//back to 0 degrees
  delay(1000);//wait for a second
}
```

In the loop() function, respectively control Servo to turn to different angles.

```
void loop()
{
  myservo.write(180);//goes to 180 degrees
  delay(2000);//wait for a second

  myservo.write(90);//goes to 90 degrees
  delay(2000);//wait for a second.

  myservo.write(0);//goes to 0 degrees
  delay(2000);//wait for a second.
}
```