

Lesson4 Testing Mechanical Robot Claw

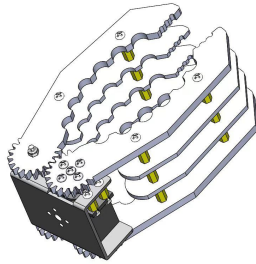
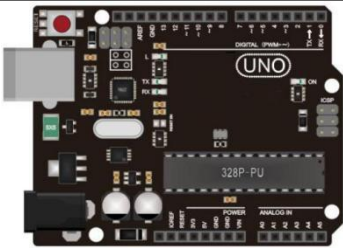

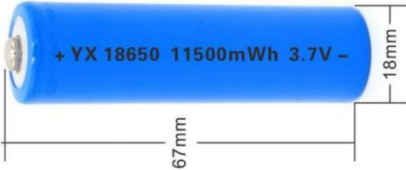
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Preface

We have learned about the relevant knowledge of MG996R Servo through the previous Lessons and have learned how to control the MG996R Servo based on Arduino/Raspberry pi/Raspberry pi Pico. Now, we have assembled MG996 Servo and acrylic kit into a Mechanical Robot Claw according to the assembly tutorial. Let's learn how to use code to drive the operation of this mechanical robot claw together.

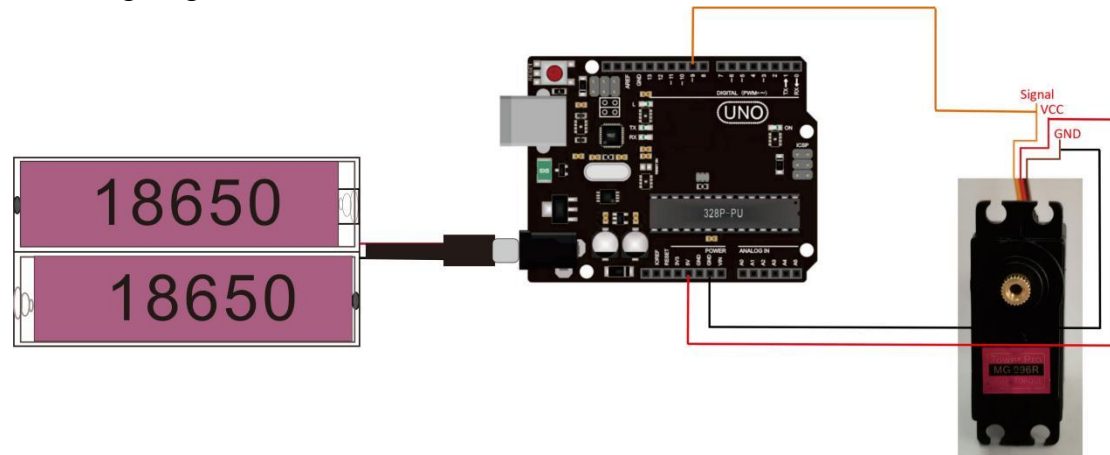
1. Drive the operation of this mechanical robot claw by Arduino Uno

1.1 What do you need to prepare

Components	Quantity	Picture	Remark
Mechanical Robot Claw	1		Assembled
Uno R3 Board	1		Not included in the Kit, you should prepare by yourself
18650 Battery Box	1	2 x 18650 	Not included in the Kit, you should prepare by yourself
18650 Battery	2		Not included in the Kit, you should prepare by yourself

1.2 Connection circuit

Prepare a UNO R3 board, an 18650 battery case, and two 18650 batteries, and then connect the servo on the assembled Mechanical Robot Claw as shown in the following diagram.



The corresponding connection relationship is shown in the table below:

UNO R3 PIN	MG996R PIN
9	Signal
5v	VCC
GND	GND

1.3 Upload the code and test

1.3.1 Open the code, code path:

[CKK0016-main \ Tutorial \ Arduino \ RobotClaw](#)

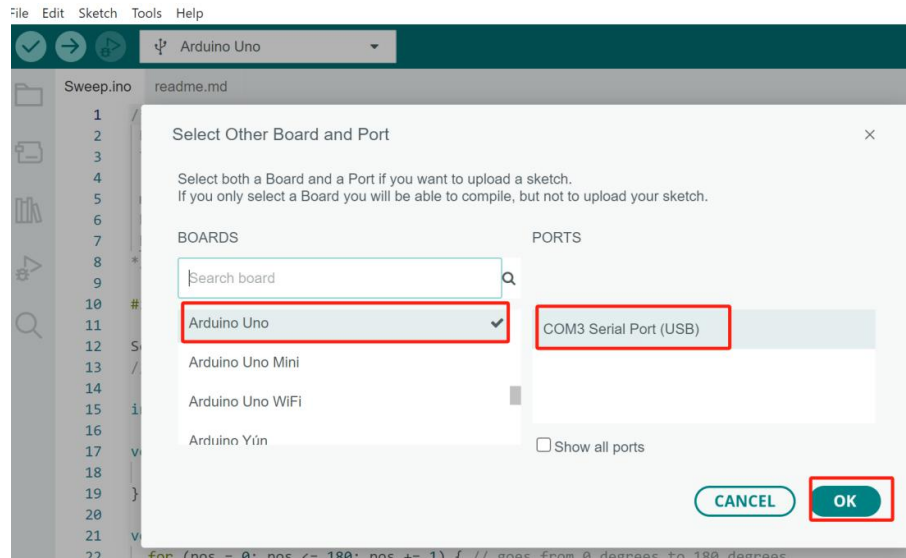
Double click on "RobotClaw. ino" to open the code as follows:

```

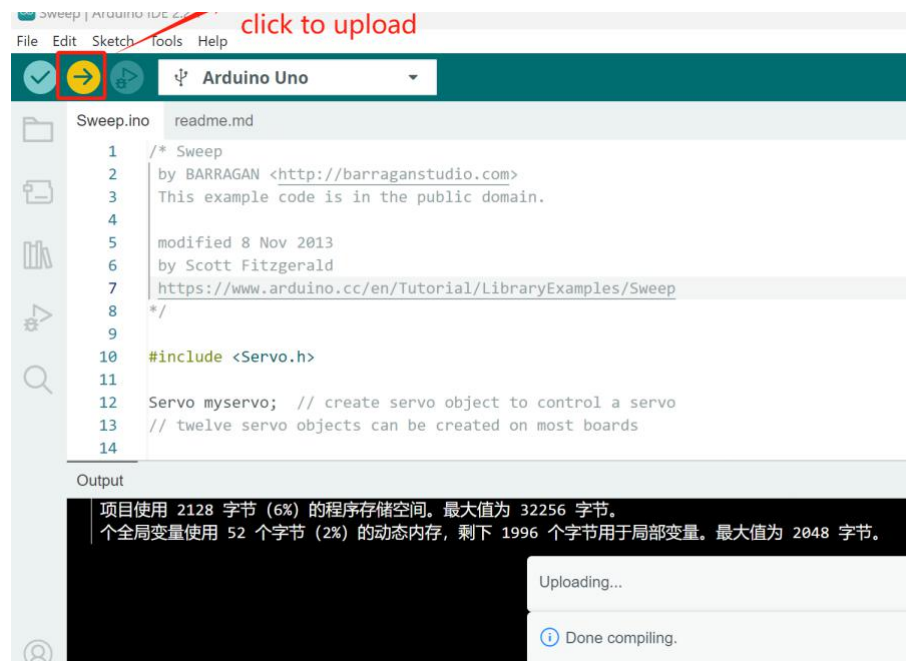
Robot_Claw | Arduino IDE 2.2.1
File Edit Sketch Tools Help
Arduino Uno
Robot_Claw.ino
1  /* Sweep
2  by BARRAGAN <http://barraganstudio.com>
3  This example code is in the public domain.
4
5  modified 8 Nov 2013
6  by Scott Fitzgerald
7  https://www.arduino.cc/en/Tutorial/LibraryExamples/Sweep
8  */
9
10 #include <Servo.h>
11
12 Servo myservo; // create servo object to control a servo
13 // twelve servo objects can be created on most boards
14
15 int pos = 0; // variable to store the servo position
16
17 void setup() {
18   myservo.attach(9); // attaches the servo on pin 9 to the servo object
19 }
20
21 void loop() {
22   for (pos = 110; pos <= 180; pos += 1) { // goes from 110 degrees to 180 degrees
23     // in steps of 1 degree
24     myservo.write(pos); // tell servo to go to position in variable 'pos'
25     delay(15); // waits 15 ms for the servo to reach the position
26   }
27   for (pos = 180; pos >= 110; pos -= 1) { // goes from 180 degrees to 110 degrees
28     myservo.write(pos); // tell servo to go to position in variable 'pos'
29     delay(15); // waits 15 ms for the servo to reach the position
30   }
31 }
32

```

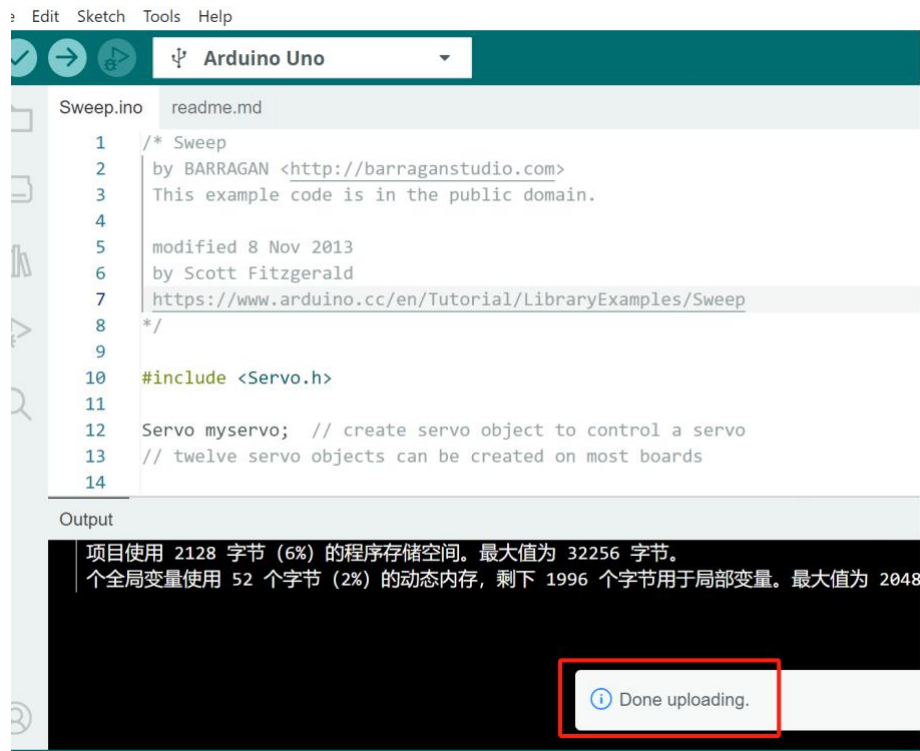
1.3.2 Connect the Arduino UNO board to the computer through a USB cable, click the "Select Other Board and Port" menu to select the Arduino Uno and Serial ports corresponding to the UNO board. This example here is com3.



1.3.3 Click the "upload" button on the IDE interface to start uploading the code to the UNO board.



1.3.4 "done uploading" will be displayed when the program upload is completed.



1.3.5 As UNO board is power on by the 18650 batterise, after the code is upload, you can see that the Robot Claw open and close in a loop.

1.4 Arduino Code

```

1.  /* Sweep
2.  by BARRAGAN <http://barraganstudio.com>
3.  This example code is in the public domain.
4.
5.  modified 8 Nov 2013
6.  by Scott Fitzgerald
7.  https://www.arduino.cc/en/Tutorial/LibraryExamples/Sweep
8.  */
9.
10. #include <Servo.h>
11.
12. Servo myservo; // create servo object to control a servo
13. // twelve servo objects can be created on most boards
14.
15. int pos = 0; // variable to store the servo position
16.
17. void setup() {
18.   myservo.attach(9); // attaches the servo on pin 9 to the servo object
19. }
20.

```

```

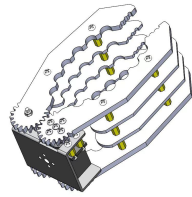
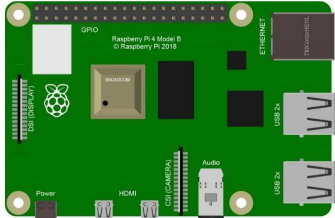

21. void loop() {
22.     for (pos = 110; pos <= 180; pos += 1) { // goes from 110 degrees to 180 degrees
23.         // in steps of 1 degree
24.         myservo.write(pos);           // tell servo to go to position in variable 'pos'
25.         delay(15);                    // waits 15 ms for the servo to reach the position
26.     }
27.     for (pos = 180; pos >= 110; pos -= 1) { // goes from 180 degrees to 110 degrees
28.         myservo.write(pos);           // tell servo to go to position in variable 'pos'
29.         delay(15);                    // waits 15 ms for the servo to reach the position
30.     }
31. }

```

2. Drive the operation of this mechanical robot claw by Raspberry Pi

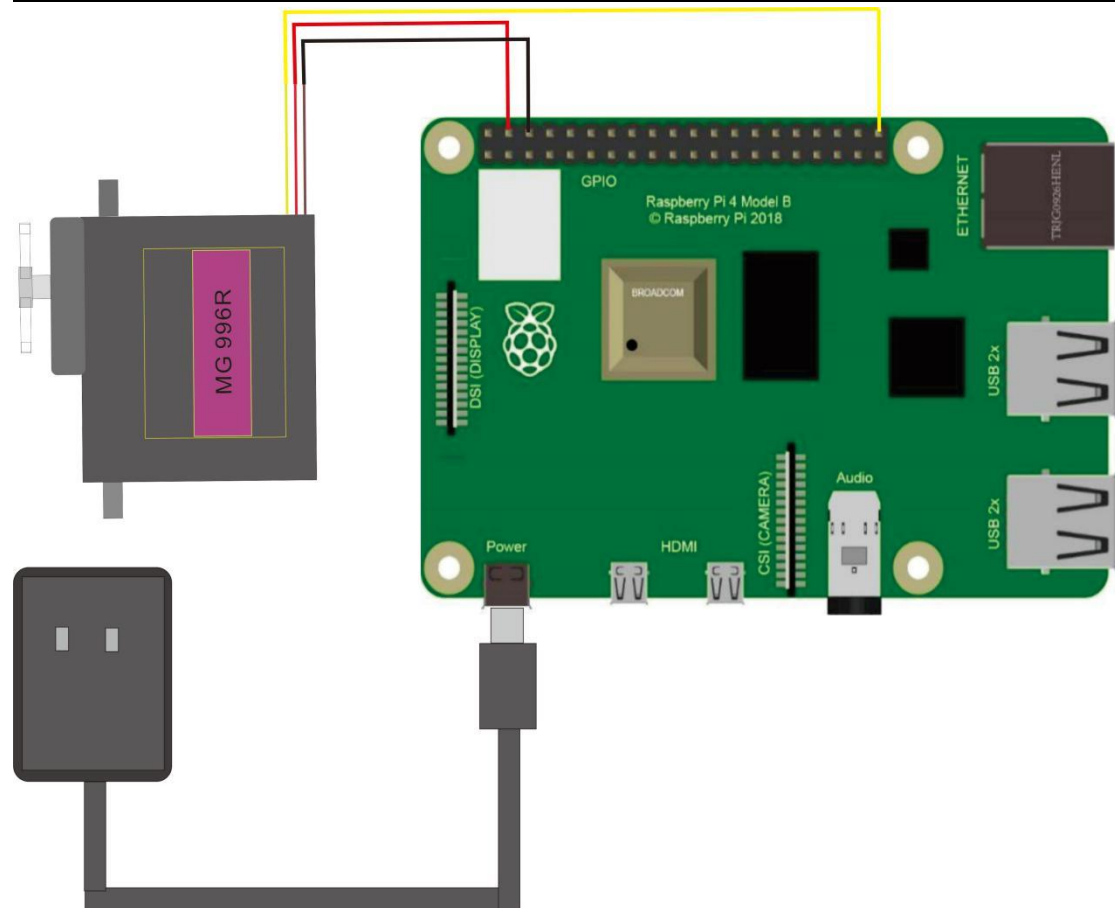
Taking Raspberry Pi 4B as an Example

2.1 What do you need to prepare

Components	Quantity	Picture	Remark
Mechanical Robot Claw	1		Assembled
Raspberry Pi 4B	1		Not included in the Kit, you should prepared by yourself
Raspberry Pi 4B Adaptor	1		Not included in the Kit, you should prepared by yourself

2.2 Connection Circuit

Prepare a Raspberry Pi 4B board and a power adapter, and then connect the servo on the assembled Mechanical Robot Claw as shown in the following diagram.



The corresponding connection relationship is shown in the table below:

Raspberry Pi 4B Board Pin	MG996R Servo Pin
21 (BCM)	signal
5V	VCC
GND	GND

2.3 Upload the code and test

you can visit our GitHub resources at (<https://github.com/cokoino>) to download the latest available project code.

Turn on and log in to your Raspberry Pi, In the pi directory of the RPi terminal, enter the following command.

```
cd
git clone --depth 1 https://github.com/cokoino/ckk0016
```

After the download is completed, a new folder "CKK0016" is generated, which contains all of the tutorials and required code.

Click File manager, you will find the folder "CKK0016"

Use cd command to enter the directory of Python code.

```
cd ~/CKK0016/Tutorial/Python/Python_Codes/Test_Robot_Claw
```

1. Use python command to execute python code Test_Robot_Claw.py.

```
python Test_Robot_Claw.py
```

Then you can see that the Robot Claw open and close in a loop.

2.4 Python Code

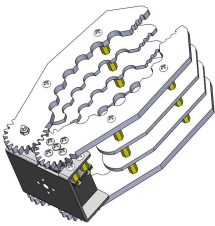
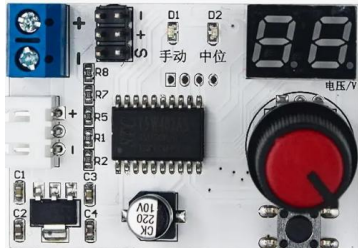

```
1.  # -*- coding: utf-8 -*-
2.  #!/usr/bin/env python
3.
4.  import RPi.GPIO as GPIO
5.  import time
6.  import signal
7.  import atexit
8.
9.  atexit.register(GPIO.cleanup)
10.
11. servopin = 21
12. GPIO.setmode(GPIO.BCM)
13. GPIO.setup(servopin, GPIO.OUT, initial=False)
14. p = GPIO.PWM(servopin,50) #50HZ
15. p.start(0)
16. time.sleep(2)
17.
18. while(True):
19.     for i in range(110,181,10):
20.         p.ChangeDutyCycle(2.5 + 10 * i / 180) #set rotation angle
21.         time.sleep(0.02) #wait 20ms for the cycle time
22.         p.ChangeDutyCycle(0) #Initialize
23.         time.sleep(0.2)
24.
25.     for i in range(181,110,-10):
26.         p.ChangeDutyCycle(2.5 + 10 * i / 180)
27.         time.sleep(0.02)
28.         p.ChangeDutyCycle(0)
29.         time.sleep(0.2)
```


3. Testing MG996R Servo by RC Digital Servo Tester

It is very convenient to use the RC digital servo tester to test the servo because it has a built-in control program. Simply rotate the potentiometer knob on top to change the pulse width of the pulse signal. Different pulse width signals make the servo rotate to different angles.

When testing the MG996R Servo function and for simple use, it is recommended to use this solution without the need for additional programming control, which is more convenient.

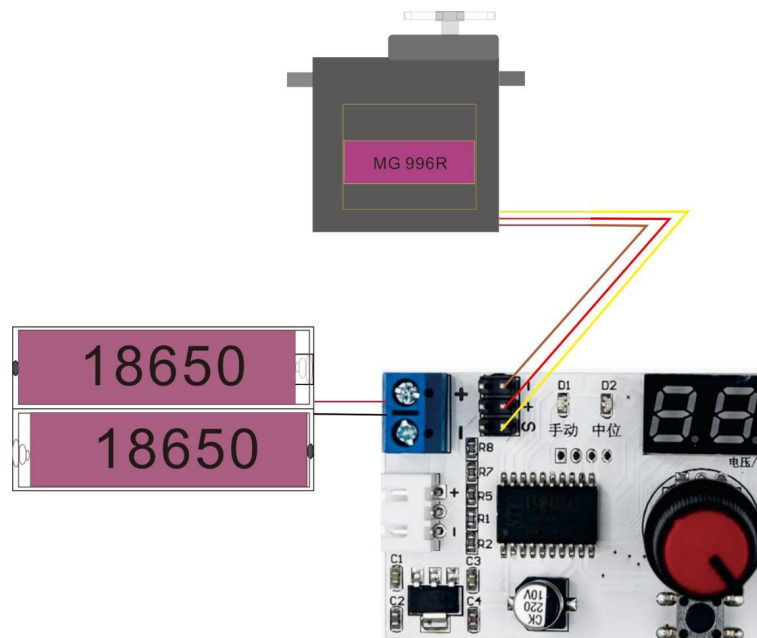
3.1 What do you need to prepare

Components	Quantity	Picture	Remark
Mechanical Robot Claw	1		Assembled
RC digital servo tester	1		Not included in the Kit, you should prepare by yourself. This is a sample for your reference. And there are many kinds of RC digital servo tester on Amazon, you can choose what you want.
Battery box with 2pcs 18650 batteries	1		Not included in the Kit, you should prepare by yourself

3.2 Connection Circuit

Before connecting the circuit, please rotate the potentiometer knob on the RC Digital Servo Tester to the middle position (the position indicated by the indicator line on the knob indicates the current potentiometer status position)

Connect the battery box containing two 18650 batteries to the RC digital servo tester, ensuring that the positive and negative poles are connected to the corresponding positions and not reversed. The RC digital servo tester in the example has two servo interfaces. Insert the MG996 servo into either interface, and note that the "signal vcc gnd" of the MG996 servo pin corresponds to the "s + -" on the RC digital servo tester.



3.3 Test

After the circuit is connected and checked for no issues, manually rotate the potentiometer knob on the RC digital servo tester. When rotating clockwise, the Mechanical Robot Claw is closing. When rotating counterclockwise, the Mechanical Robot Claw is opening.

4. Make your suggestion and get support

THANK YOU for participating in this learning experience!

We have reached the end of this Tutorial. If you find errors, omissions or you have suggestions and/or questions about this lesson, please feel free to contact us: cokoino@outlook.com

We will make every effort to make changes and correct errors as soon as feasibly possible and publish a revised version.

If you want to learn more about Arduino, Raspberry Pi, Smart Cars, Robotics and other interesting products in science and technology, please continue to visit our Amazon Store by search for "[LK COKOINO](#)" on Amazon. We will continue to launch fun, cost-effective, innovative and exciting products.

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