# Robot Arm for micro:bit User Manual

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OVERVIEW
Equip your micro:bit with this 4-DOF metal robot arm, and get started to explore the world of artificial intelligent robotic.

This starter robotic arm kit includes: servo driver board, metal mechanical arm structure, and 4x metal gear servos. When used with the micro:bit, it is easy to control the arm by smart phone through Bluetooth connection.

HARDWARE
Servo Driver for micro:bit and 5V 3A power adapter are included in this kit. You need to connect the power adapter to the POWER interface to feed Servo Driver board and servos. With regular onboard, it can also offer 3.3V power for micro:bit without external power input.

The pins on the top are servo interfaces. Black pins for GND (generally, ground pin of servo are brown), red pins for 5V, yellow pins are PWM pins. This board have channels 0~15, supports up to 16 servos work at the same time. DO NOT wrong connect servos.

【Note】
1. You cannot power the whole Robot Arm kit by micro:bit.
2. You need assemble the Robot Arm kit, before you assemble, please test if the servo work normally
3. Please set all servos to position that rotate 90 degree before you assemble it.
HOW TO USE

Visit micro:bit programming website in Browser: https://makecode.microbit.org/

Click Projects-> New Project to create a new project

Click Advanced->Add Package and input the address: https://github.com/waveshare/pxt-Servo

Add the package

After adding, you can see that Servo block class appears to block area. In the class, two blocks are included.
This block is used to control the angle of servo in range 0°~180°. Channel can be change from 0 to 15.

Use this block, you can set the PWM pulse in range: 500~2500.

The relationship between start pulse and degree is as below:

- 500  --------  0°
- 1000  --------  45°
- 1500  --------  90°
- 2000  --------  135°
- 2500  --------  180°

You can control servo just by setting channel, degree and pulse, it is simple.
DEMO CODES

We provide four demo codes (HEX file) for this module. You can copy them to micro:bit for testing. Drag HEX file to the web page directly could get details information of demo code: https://makecode.microbit.org/

MICROBIT-SERVO

This demo code is used to rotate 16 servos in range 0~180 all the time.

item: current angle
Flag: step length for every change. Positive value stands for co-rotating, and negative for reverse, interval is 20s.

After running the code, you can see that 16 servos turn from 0° to 180°, then turn 0° again all the time, you can adjust its speed by change the pause on code.

MICROBIT-SERVO

This demo uses A and B keys to control rotation of servo 0. It moves forward when A button is pressed and moves backward when B button is pressed.
pos: current angle

step: step length for every change. Positive value stands for co-rotating, and negative for reverse, interval is 20s. You can change the pause time to change the rotate speed of servo.

Download the demo code to micro:bit, connect servo to channel 0, then try to control it by buttons A and B.

**MICROBIT-SERVO-BLUETOOTH**

microbit-Servo-Bluetooth, the function of this code is to rotate four servos 0~4 via Bluetooth.

Assemble servo to robot arm, then you can use them to control robot ram via Bluetooth.
This is the Bluetooth remote control code. pos0~pos3 are current degrees of channel 0~3.
step0~step3 are step length.

When command are received by micro:bit from app, micro:bit will change the step as received to control servo. If step is not equal to 0, change the pos and let servo move. (Note that the value of pos should in: 0~180)

To use this demo code, you should first install APP for Bluetooth communication. (Only support Android)

- Bluetooth App (for Android)

Open APP, click Settings on the right top, uncheck Filter unpaired micro:bit from scan results?

Scanning BBCC micro:bit device and connect it. After connecting, you can enter the control page by click the Joystick icon.

There are 8 buttons, could be used to control servos from channel0 to channel3.

Note: If you want to create new Bluetooth project, don’t forget to set project that, choose No Pairing Required:Anyone can connect via Bluetooth.
MICROBIT-SERVO-RADIO

This code we use 2.4Ghz RF function of micro:bit. To test this code, you need two micro:bit, one is connected to Joystick for micro:bit as sender, and another connected to Servo Driver for micro:bit as receiver which will control robot.

Code if sender:
Code of Receiver:

Like Bluetooth code, pos0~pos3 are current degree of servos from channel 0 to channel 3, step0~step3 are step length.

You should flash sender code to micro:bit which connect Joystick module and flash receiver one to servo module. Then you can control servo by module Joystick for micro:bit.

For more details about Bluetooth and 2.4G, you can refer to the user guide of KitiBot for micro:bit:

https://www.waveshare.com/wiki/Chapter_8_of_KitiBot-Microbit