

WonderKit

Green card

For micro:bit

These instructions are intended for experimental use of the board. Some prior experience with micro:bit and basic soldering skills are recommended.

If you need specific instructions, see www.makekit.no/docs and select your product.

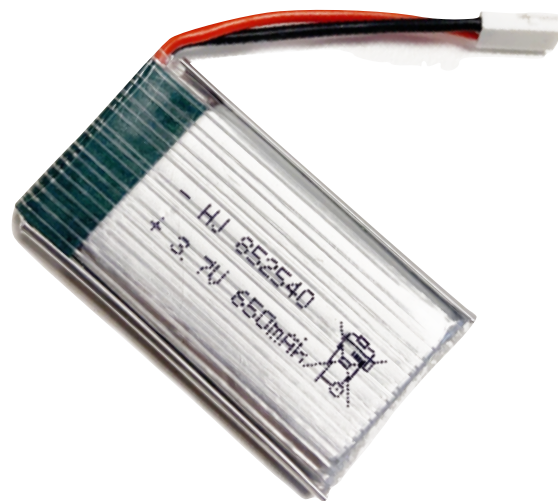
The code is written in makecode, makecode.microbit.org

Charging the battery

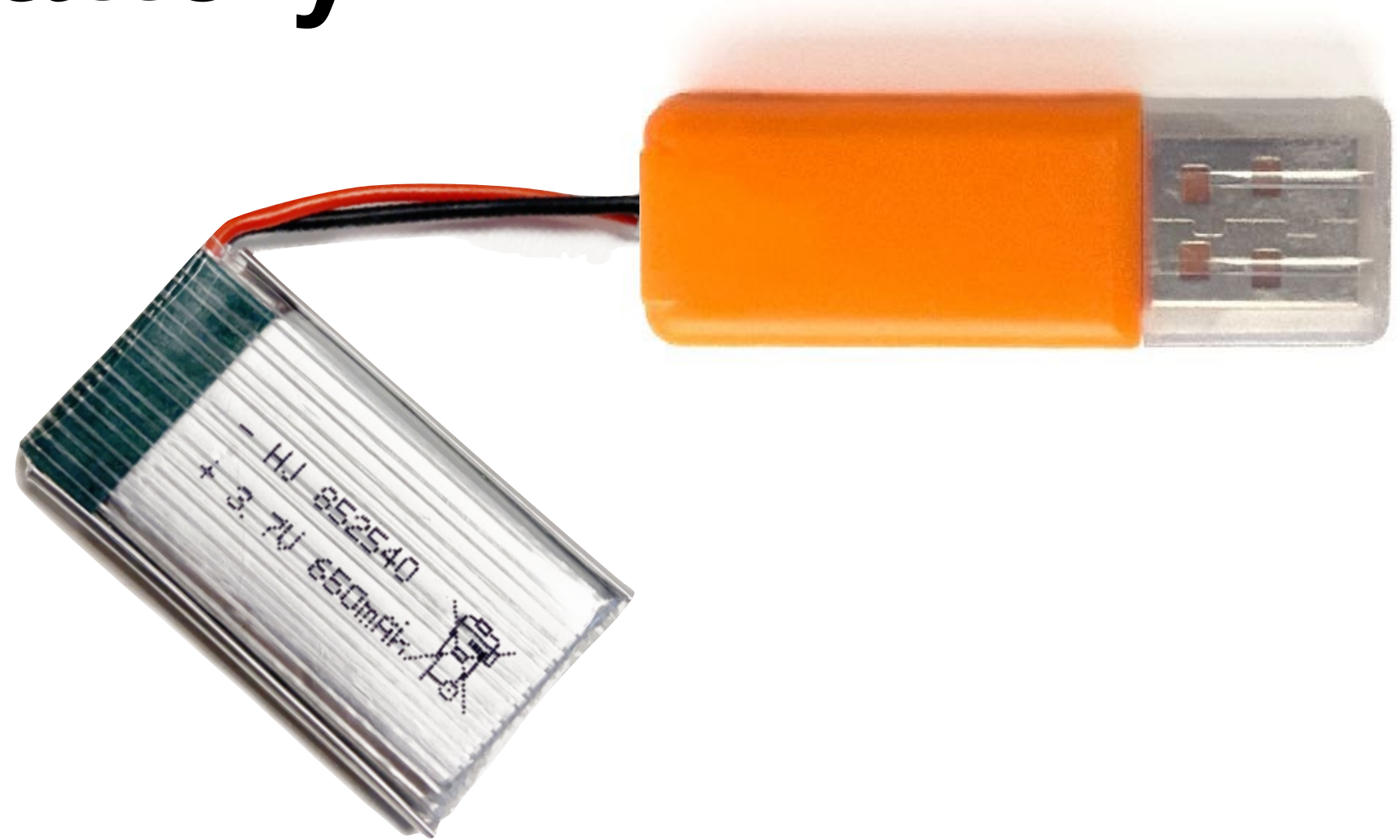
Deler:



Usb-charger



LiPo-Battery

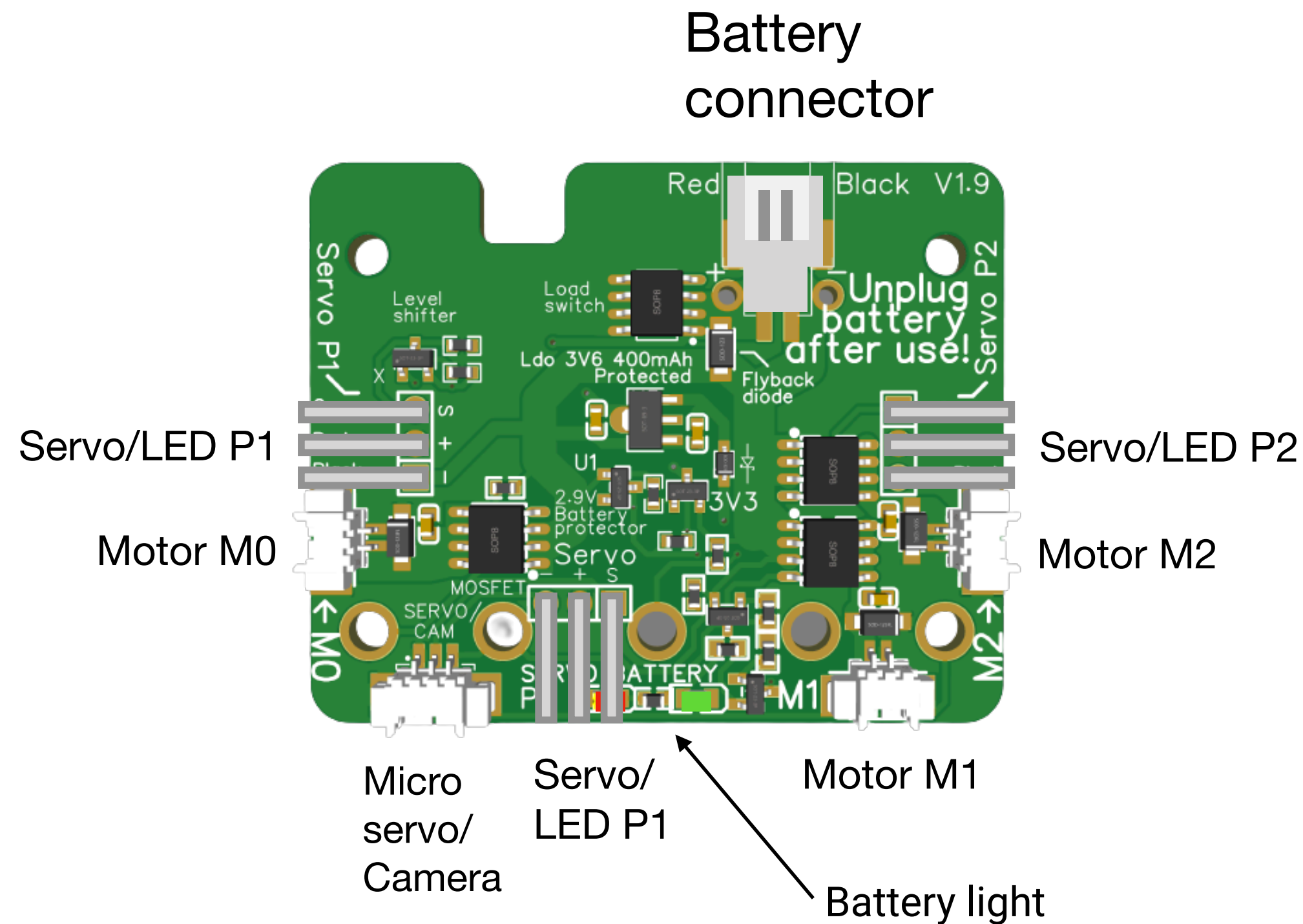


The green card comes with an orange charger.
First plug battery and charger together.
Then plug the charger into a USB socket. Orange light
lights up until the charger is finished after 1-2 hours.

**Note! For safety reasons, lithium batteries must always
be charged under supervision.**



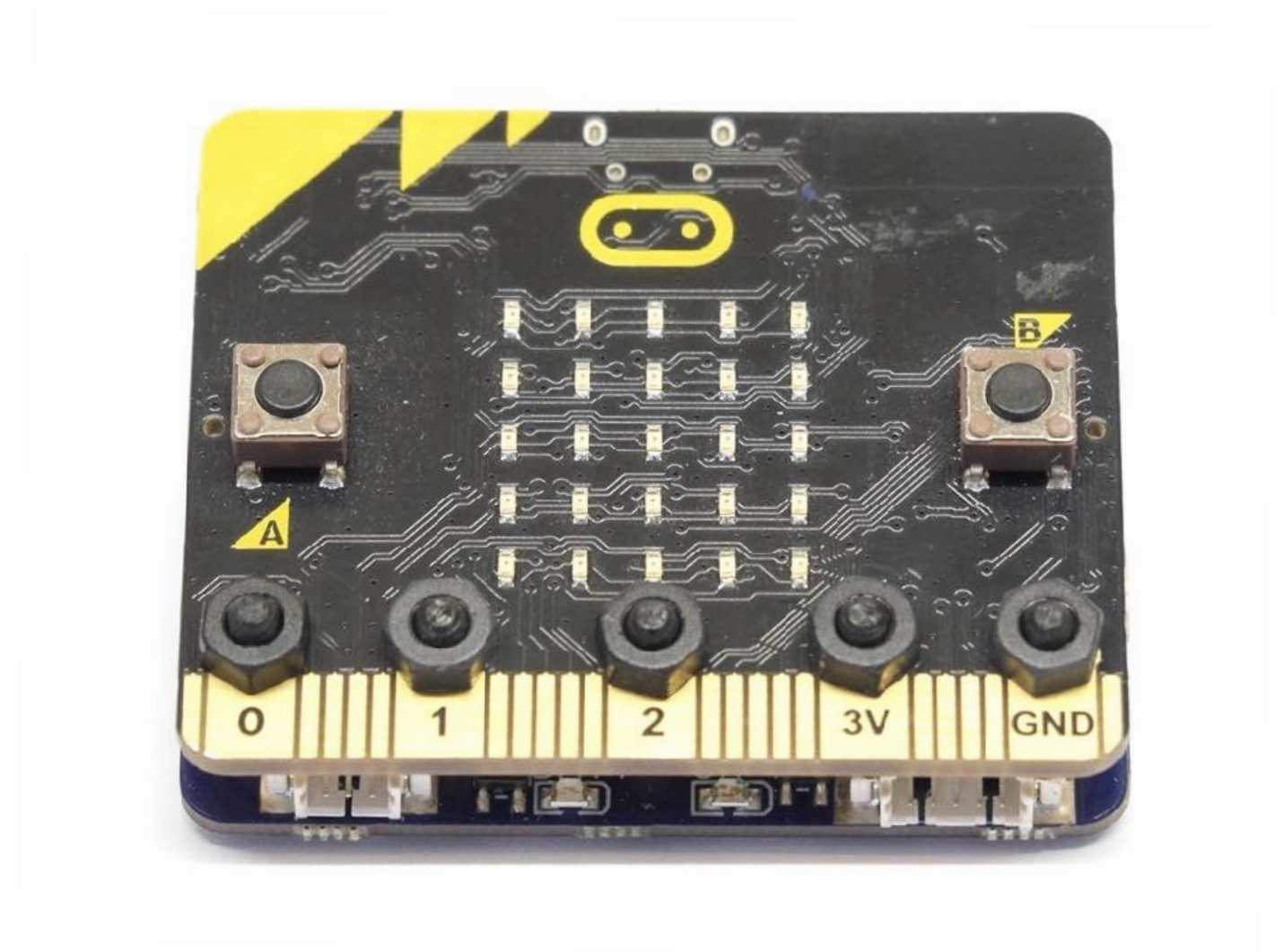
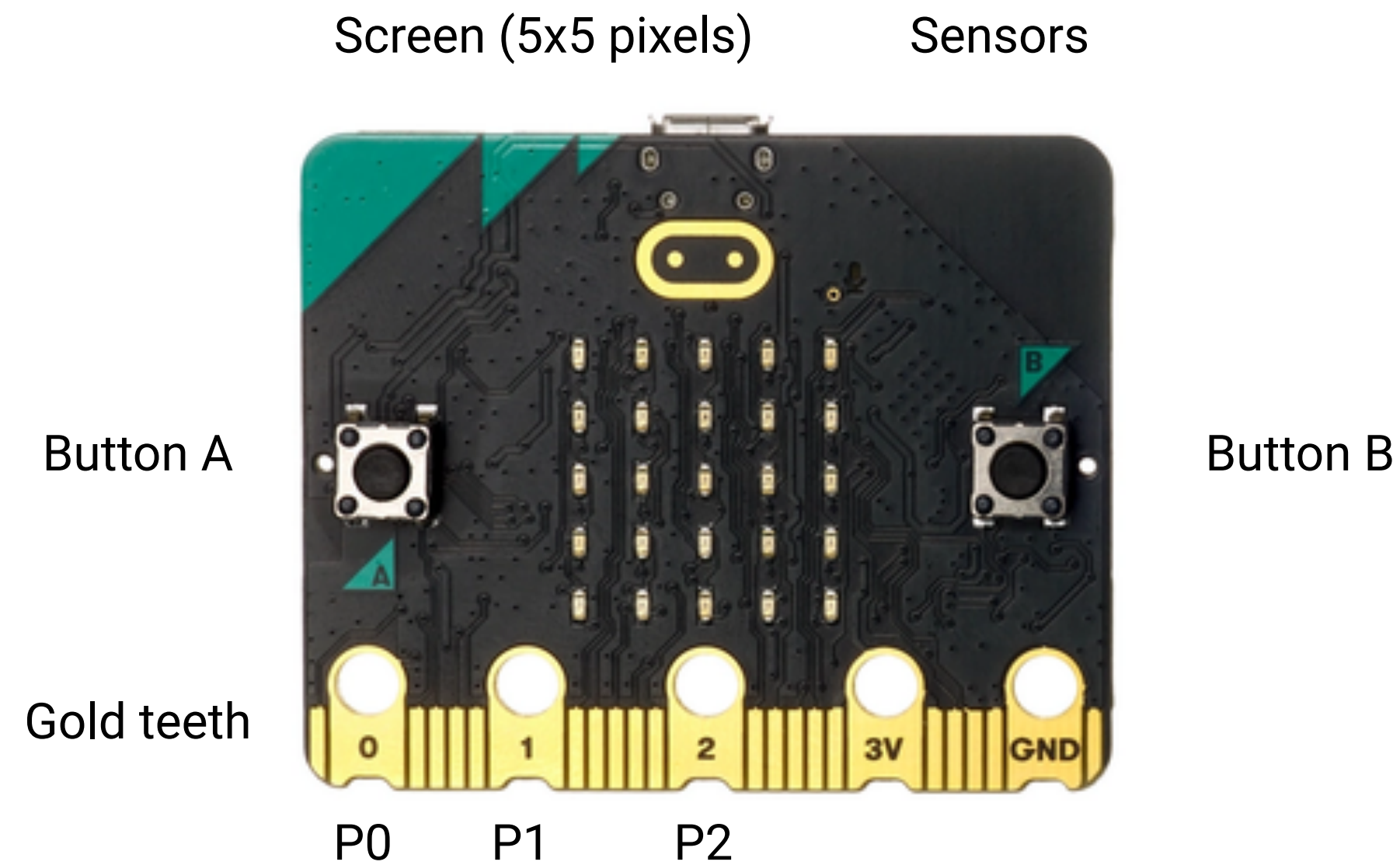
WonderKit Green card



The control board helps the micro:bit to connect to external things such as motors, and amplifies the electric current. Connect up to 3 servos, LEDs, motors, speakers or other actuators. You can use micro:bit V1 or V2.

Note that if the red light is flashing, the battery needs to be charged.

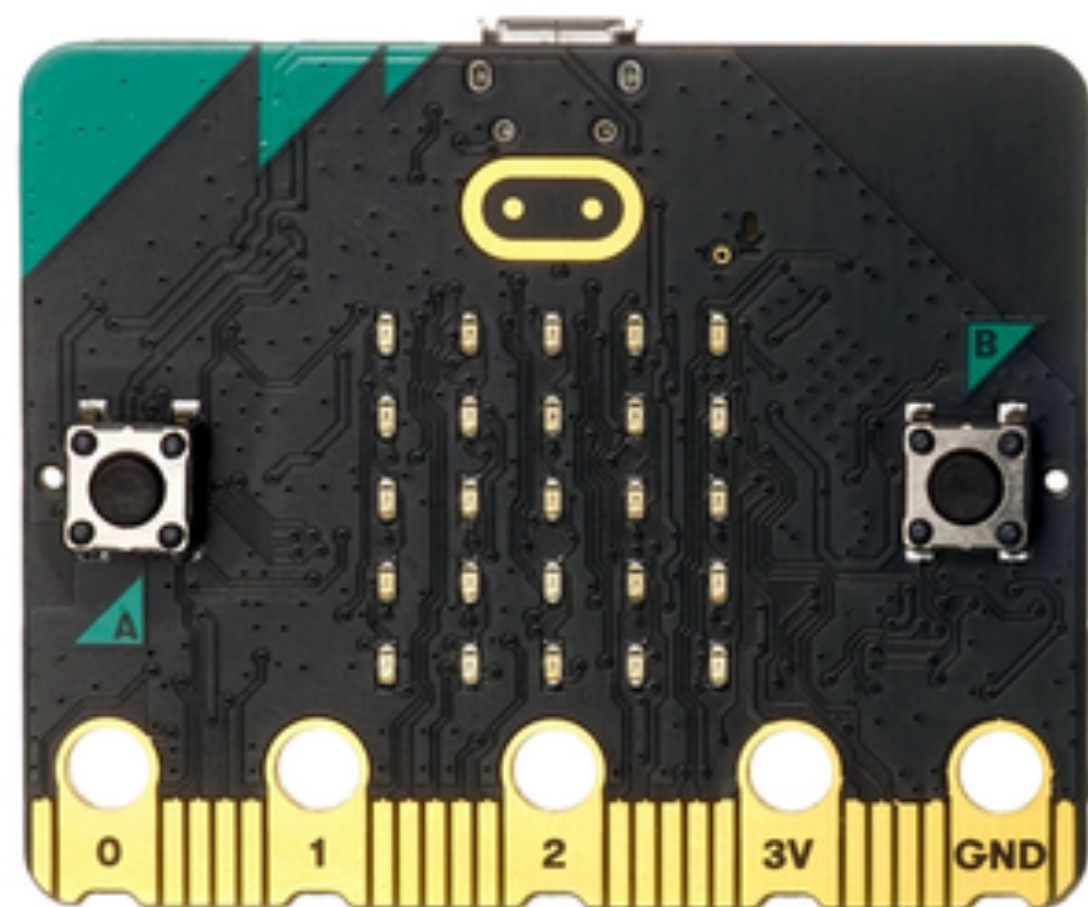
The micro:bit V2



The micro:bit / green card assembly

The micro:bit has 3 large output connectors: P0, P1 and P2. To control external devices, we must use one of these 3 connectors in our code.

Connection logic

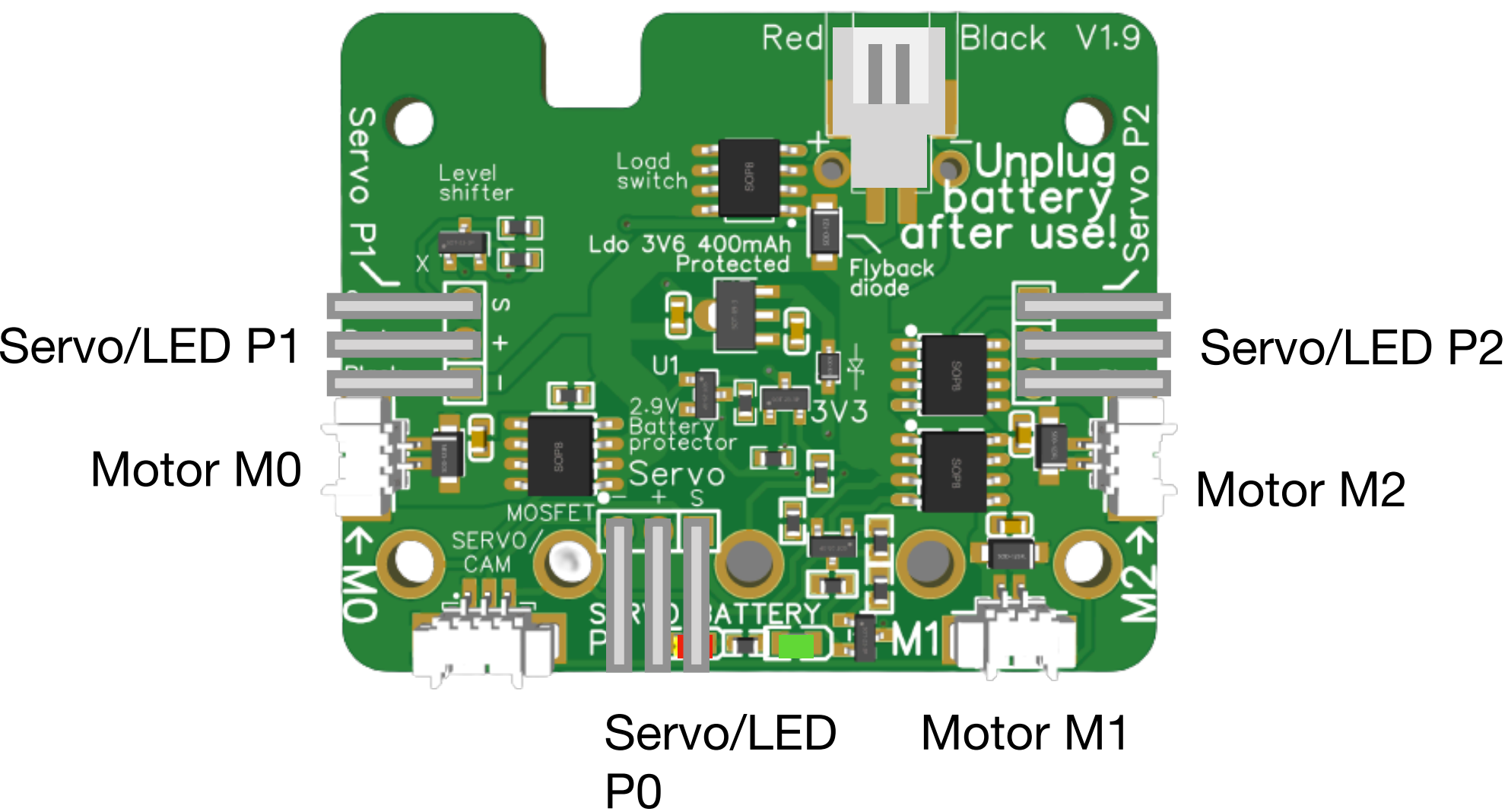


P0 P1 P2

You can control up to 3 servos, LEDs or motors at once. Start by choosing your output pin on micro:bit, eg. P0. Then decide if you want to use a motor or servo/LED.

Connect the chosen component according to the list. For example, if you want to control a servo on P0, connect the servo at the Servo/LED P0 position.

If you rather want to control a motor on P0, connect the Motor M0 instead. **Do not connect a servo and motor at the same number.**



For each pin: Choose either:

Micro:bit pin Motor port Servo port

P0	M0	P0
P1	M1	P1
P2	M2	P2

Assembly

Mounting screws (optional)

Used for mounting to hover:bit, bubble:bit, wheel:bit etc

Tools: Medium philips screwdriver, socket wrench

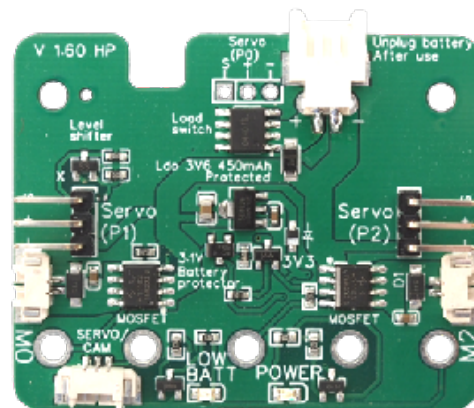
Parts:



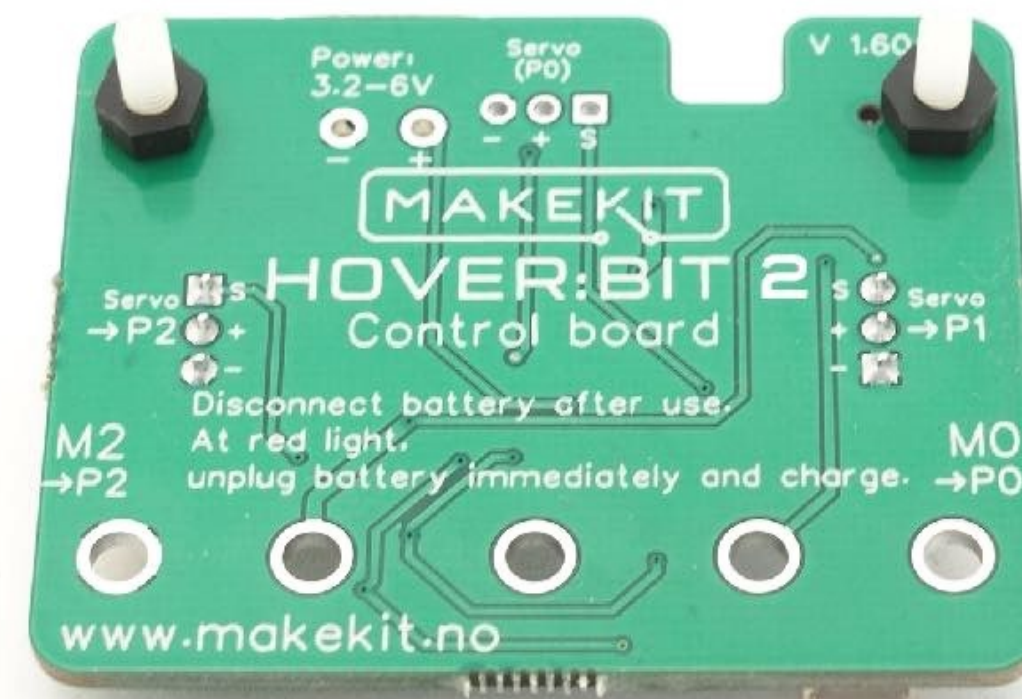
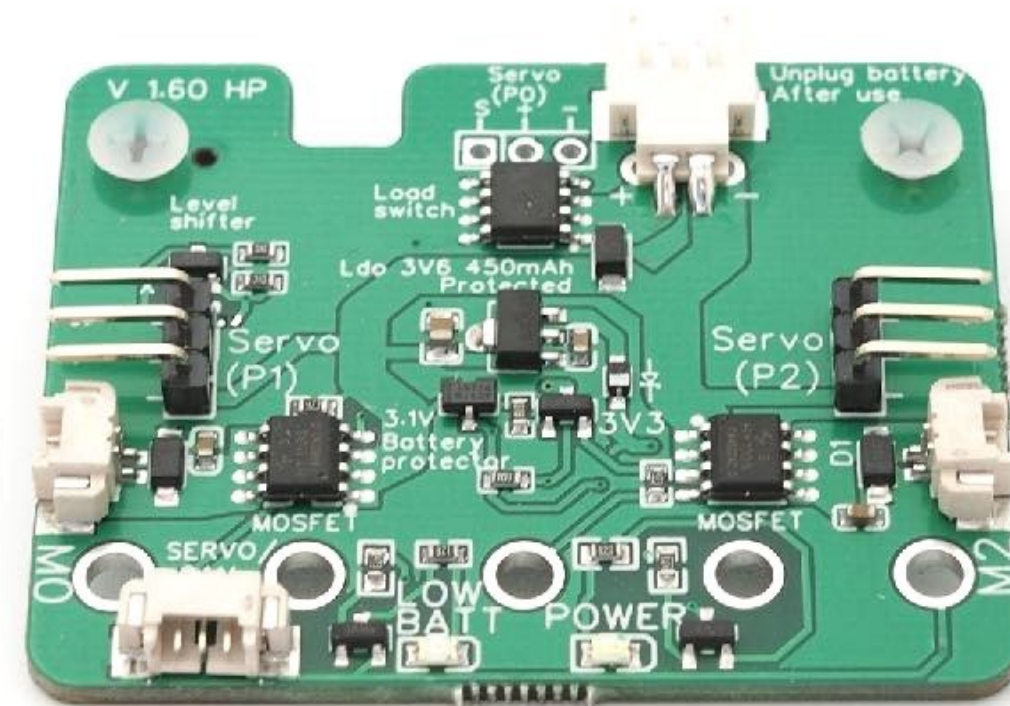
2x
Nylon screws
(Countersunk)



2x
Nylon nuts m3



Control board

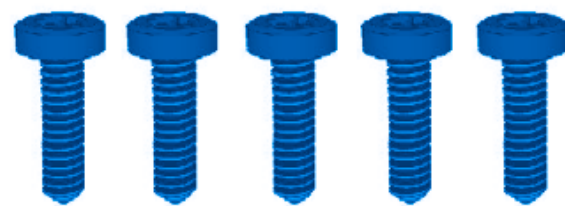


Insert the screws from top.
Attach the nuts on the backside of the board
(where the "MakeKit" logo is).

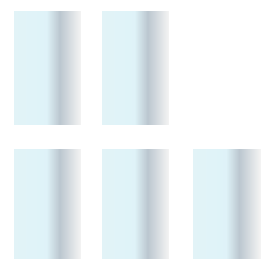
Spacers

Tools:

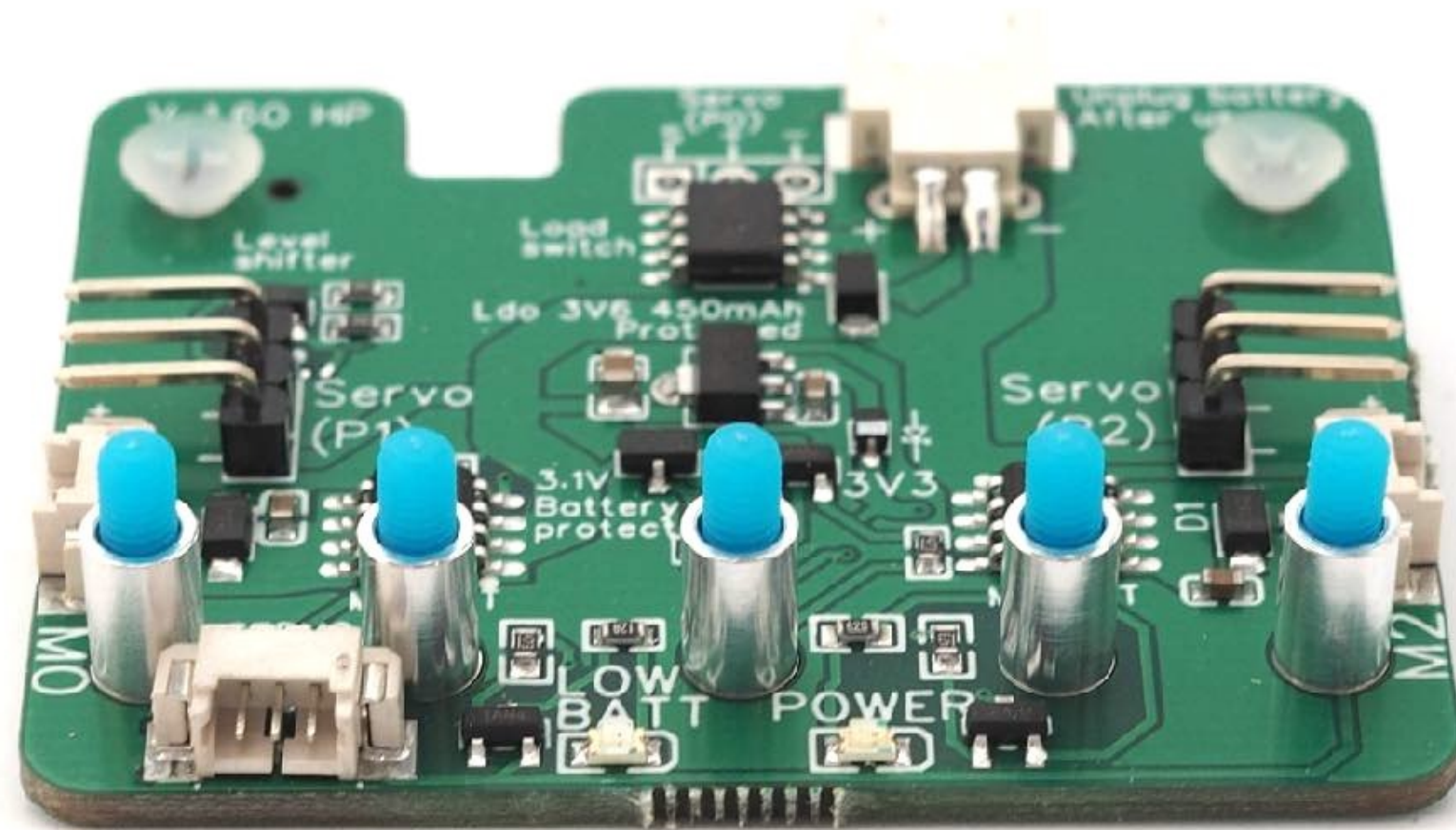
Parts:



5x m3x12
nylon screws, blue



5x
Electrical conducting aluminium
spacers

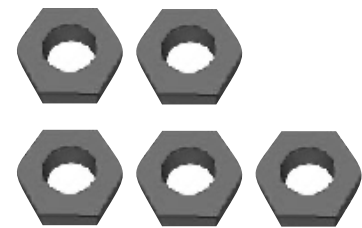


Insert five screws, pointing upwards.
Thread an aluminum ring onto each screw

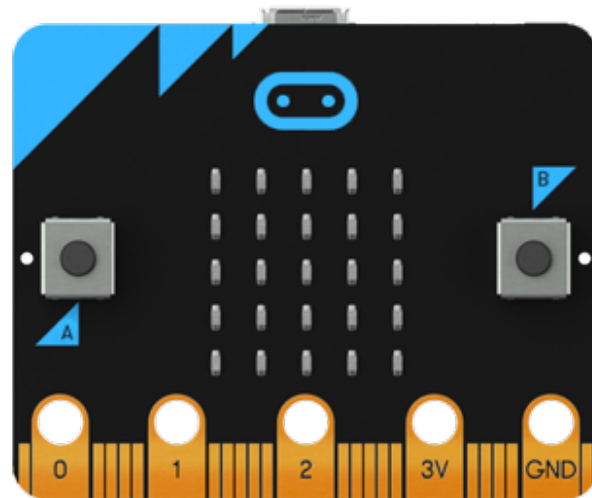
Mount the Micro:bit

Tools: Medium philips screwdriver, wrench

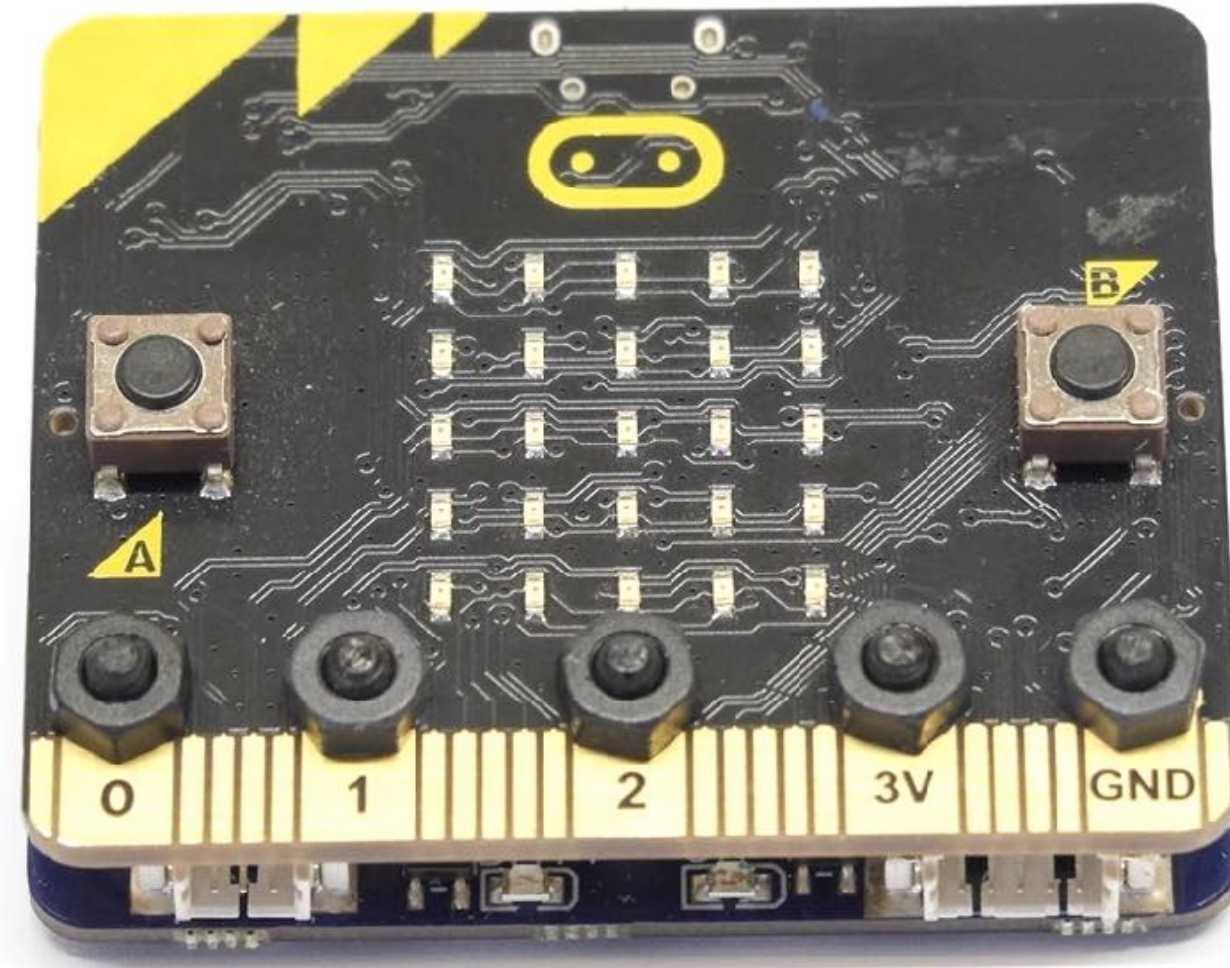
Parts:



5x nuts

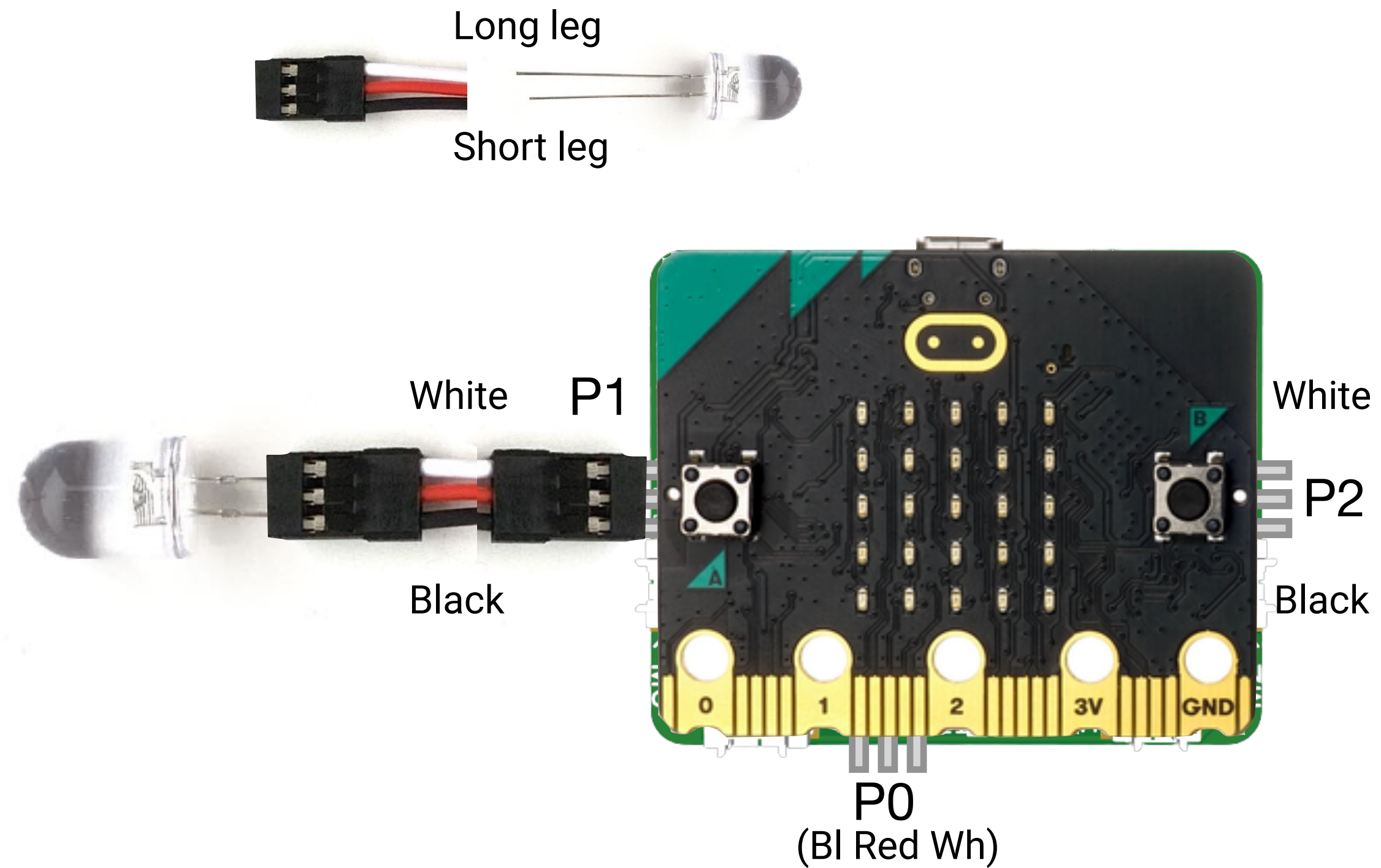


micro:bit



Place the micro:bit over and screw on the five nuts on top. **Tighten the screws** on the underside so that there is a **tight contact**.

Use a LED



Connect a LED into the servo cable. The long leg is the positive and must be connected to the white cable, while the short leg is the negative and goes to black.

Connect the LED to connector marked P1, P0 or P2. The selected pin must be entered in your code.

Coding

Locate the control commands in makecode

The code is written in makecode,
makecode.microbit.org

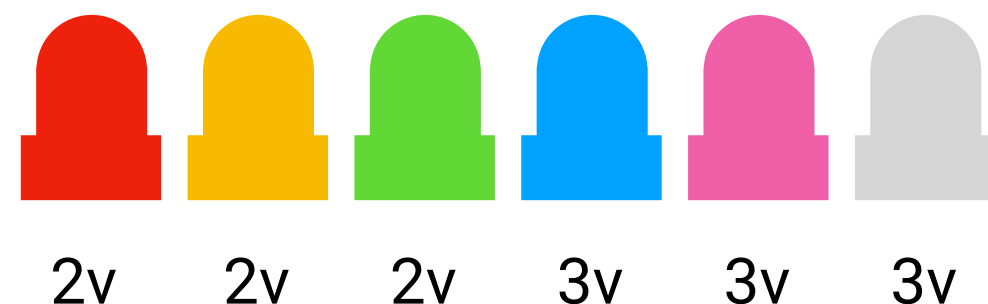


Code the LED

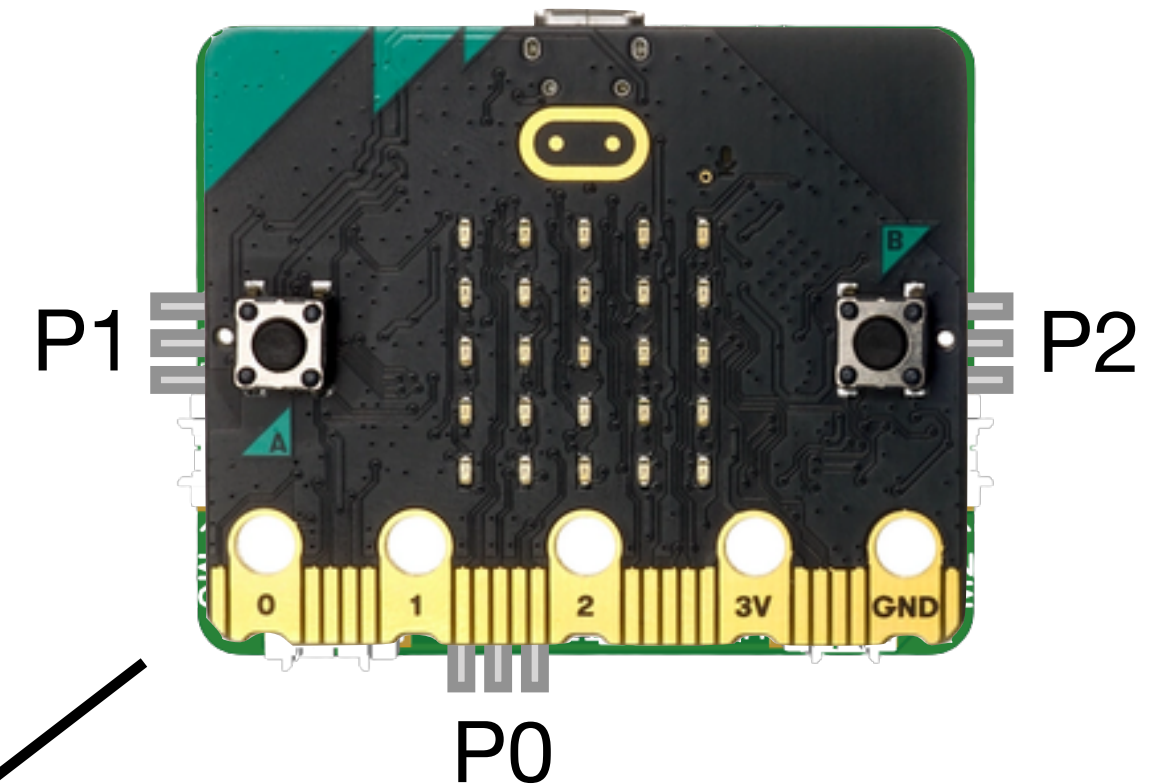
The code is written in makecode, makecode.microbit.org

```
forever
  digital write pin P0 to 0
  pause (ms) 1000
  digital write pin P0 to 1
  pause (ms) 1000
```

This code makes the LED blink every other second. The digital write makes the output go either high or low like a light switch. Remember to change P0 to the corresponding connection on where the LED was connected! It can be P0, P1 or P2. See the top right chart.



Select the right pin
(P0, P1 or P2)



```
forever
  analog write pin P0 to 650
  pause (ms) 1000
  analog write pin P0 to 0
  pause (ms) 1000
```

This code also makes the LED blink, but we can control the brightness. The analog write lets us decide how bright it should be.

The number 650 can be any number between 0 and 1023. We are using the number 650 because using 1023 can burn out our LED. Red, yellow and green LEDs should have only 2 volts, but analog write P0 to 1023 can give us more than 3v output, while 650 gives around 2 volts. ($3V \times 650 / 1023 = 1,9V$)

Therefore, analog write pin is better on some LEDs, compared to digital write who can over load the LED.

LED fading (Advanced)

The code is written in makecode, makecode.microbit.org



This code also makes the LED blink or fade in a different way.

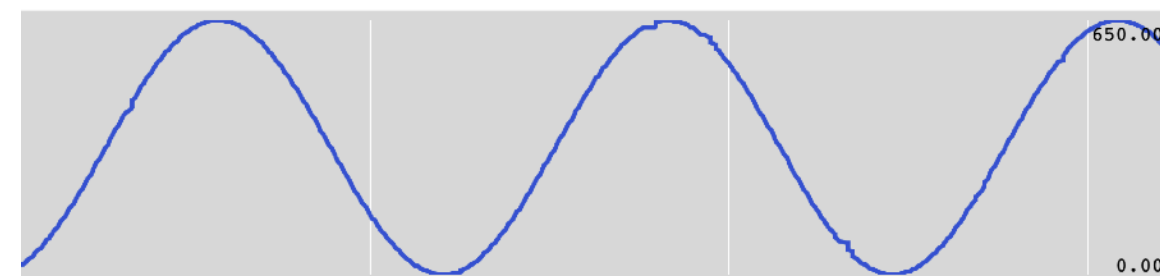
It starts to feed the LED with low power, then gradually increases the power up to 650 (around 2 volts).

The pause makes sure the code doesn't run too fast.

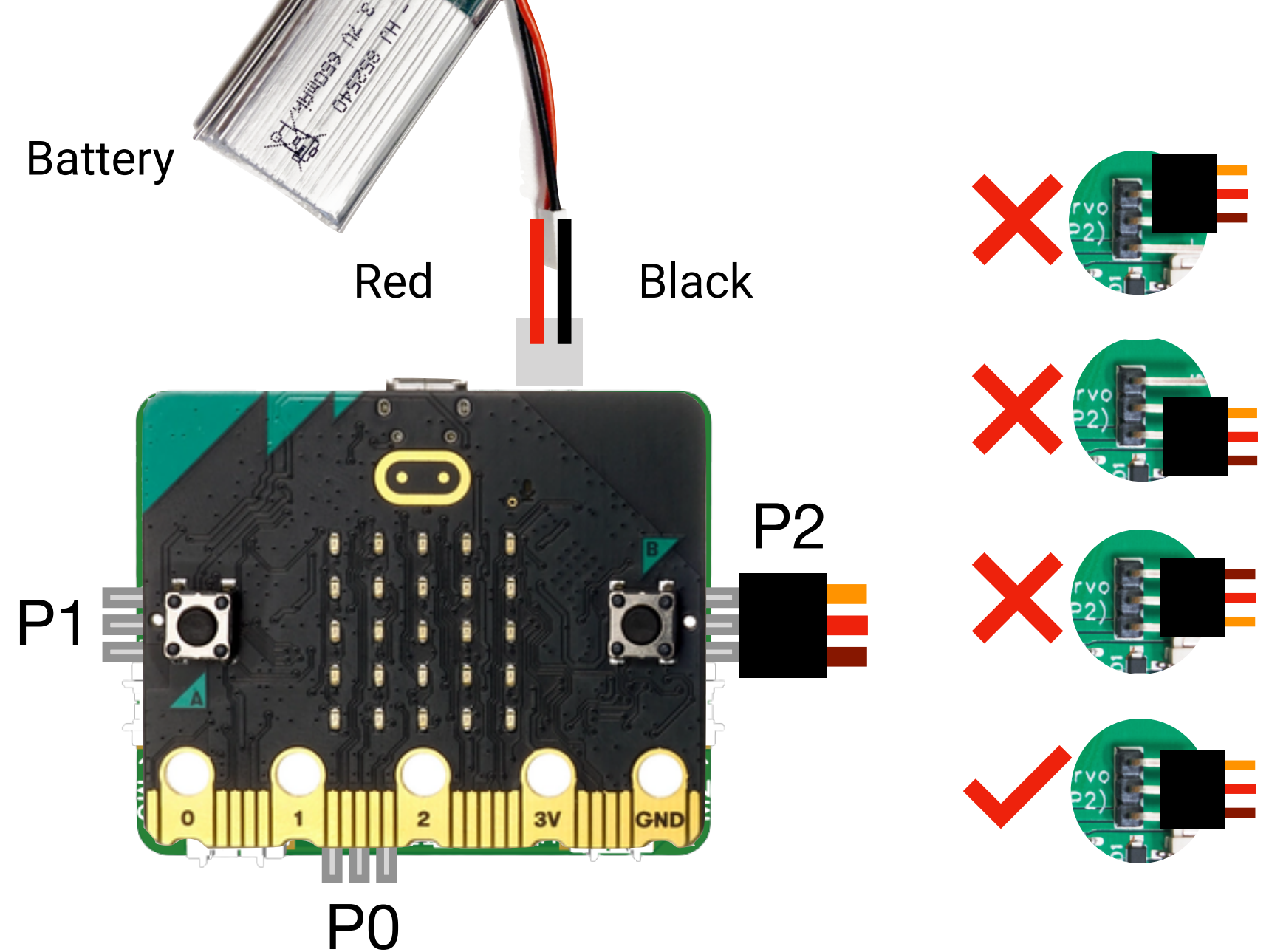
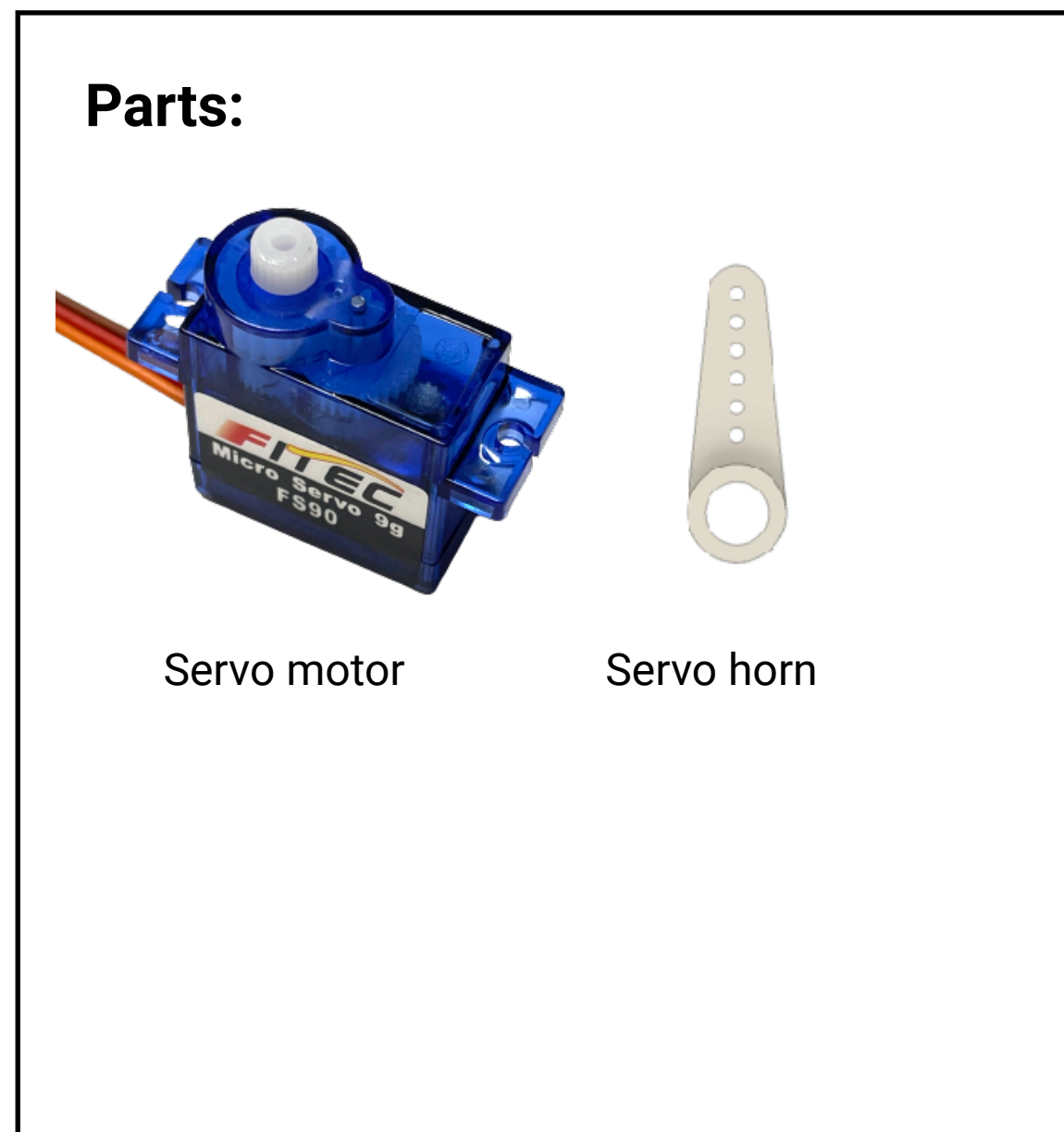
This following javascript code will make a super smooth fading effect using a sine wave. You can write javascript directly into makecode with the javascript button. To change the speed, change the number 1000 to eg. 500 or 2000.

```
basic.forever(function () {  
    maxpower = 650  
    pins.analogWritePin(AnalogPin.P0, Math.cos(input.runningTime() / 1000) * maxpower / 2 + maxpower / 2 )  
})
```

A sine wave is a curve that is often seen in light, sound, or water waves. Using a sine wave can make your blinking appear more natural, compared to triangle or square wave curves.

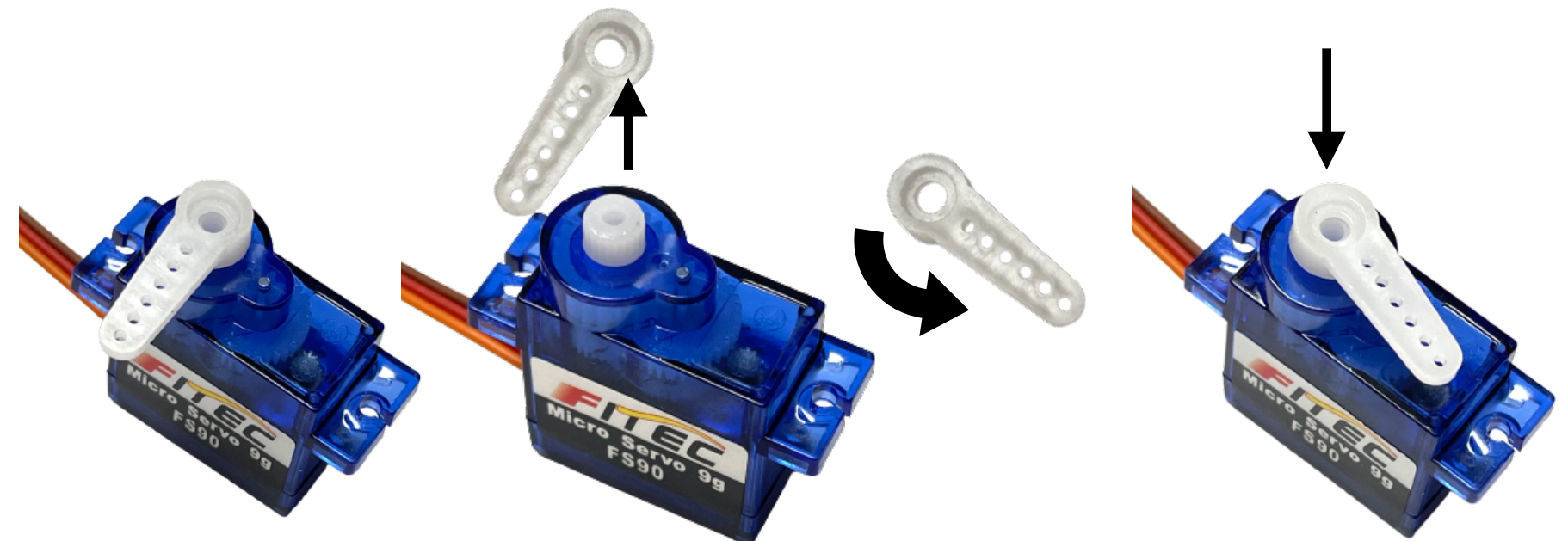


Use a servo



Connect a servo to one of the 3 connections. (Eg. P2).
Make sure orange color is facing upwards and that all 3 pins are connected.

Push a servo horn into the servo and connect the battery.



Sometimes we want to rotate the servo horn without changing code.
To reposition the servo horn: Lift it off, rotate and push on again.
Do not force the servo gears to rotate.

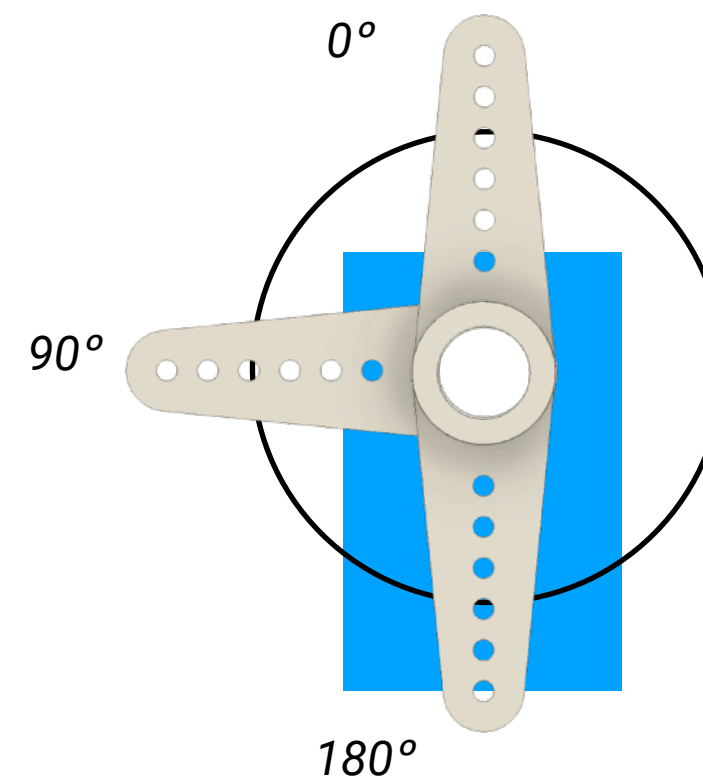
Coding the servo

The code is written in makecode, makecode.microbit.org



This test code will make the servo move between its maximum positions.

Again, make sure you have been using the correct pin (P0, P1 or P2), depending on where you connected the servo.

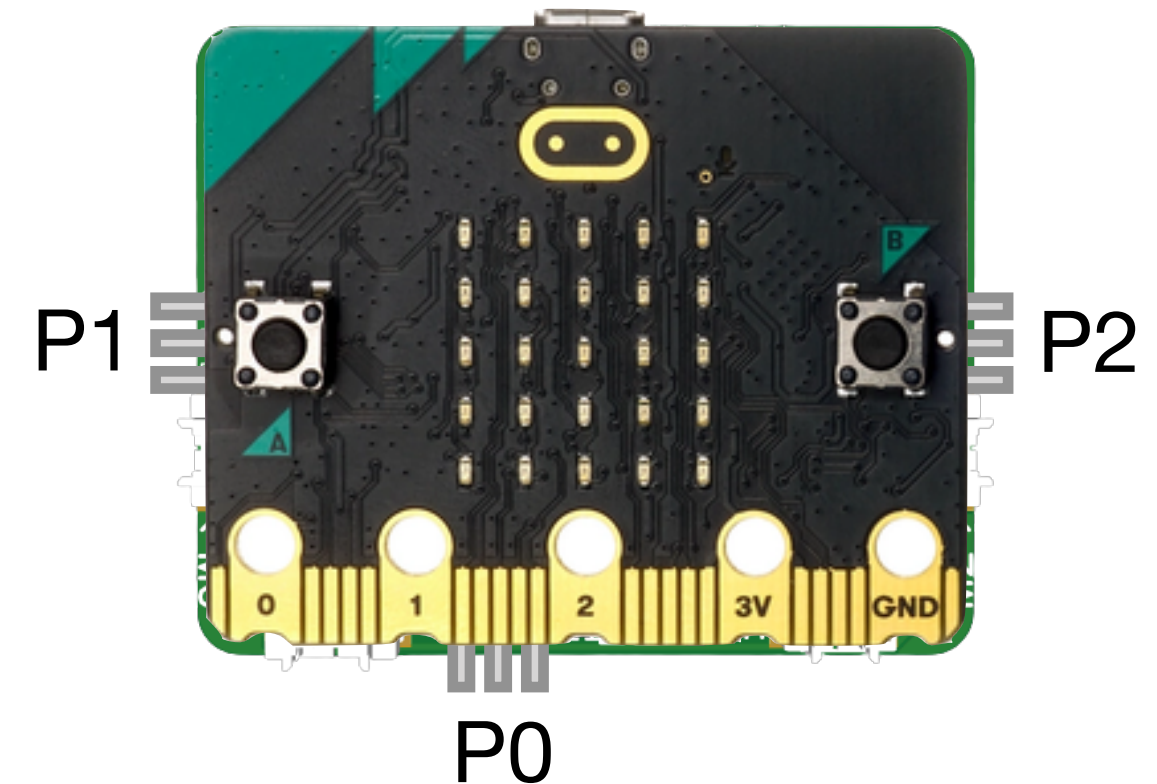


The servo should now rotate between the angles of a half circle. To reposition the servo horn, remove it, rotate in and insert it again (see last page)

Never use force to force rotate a servo motor. It should only rotate by itself.

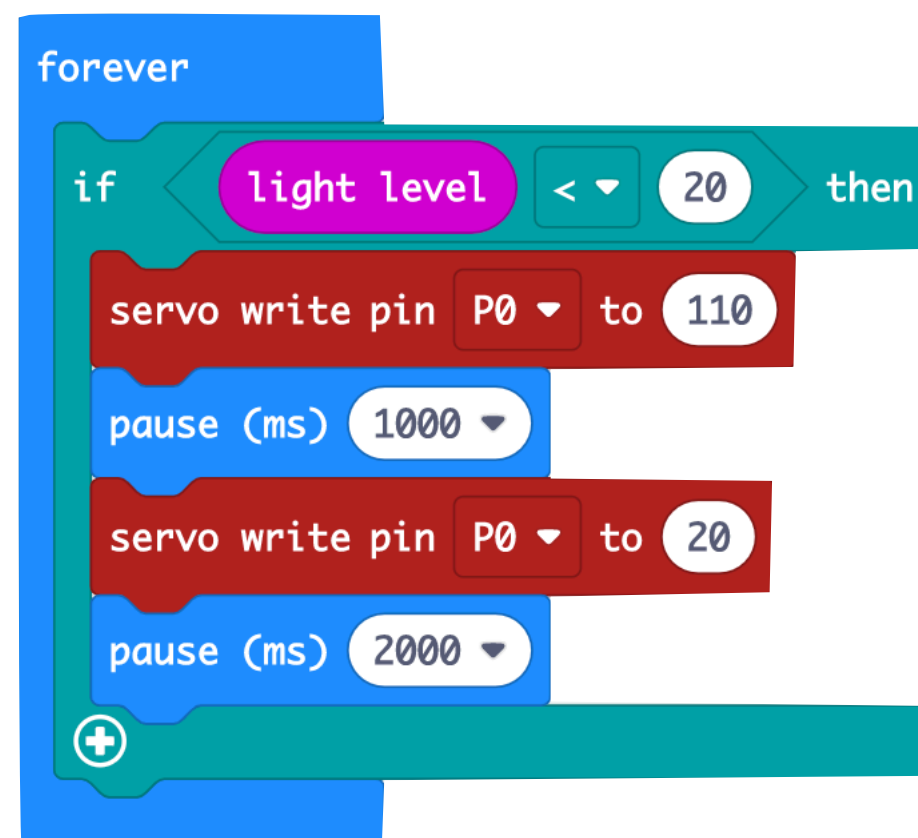
If it doesn't move, check the following:

- Did you transfer the new code to the micro:bit?
- Is the servo cable connected the correct way?
- Did you choose the correct pin in the code? (P0, P1 or P2)
- Is the battery connected and charged?
- Are the nuts on top of micro:bit properly tightened?



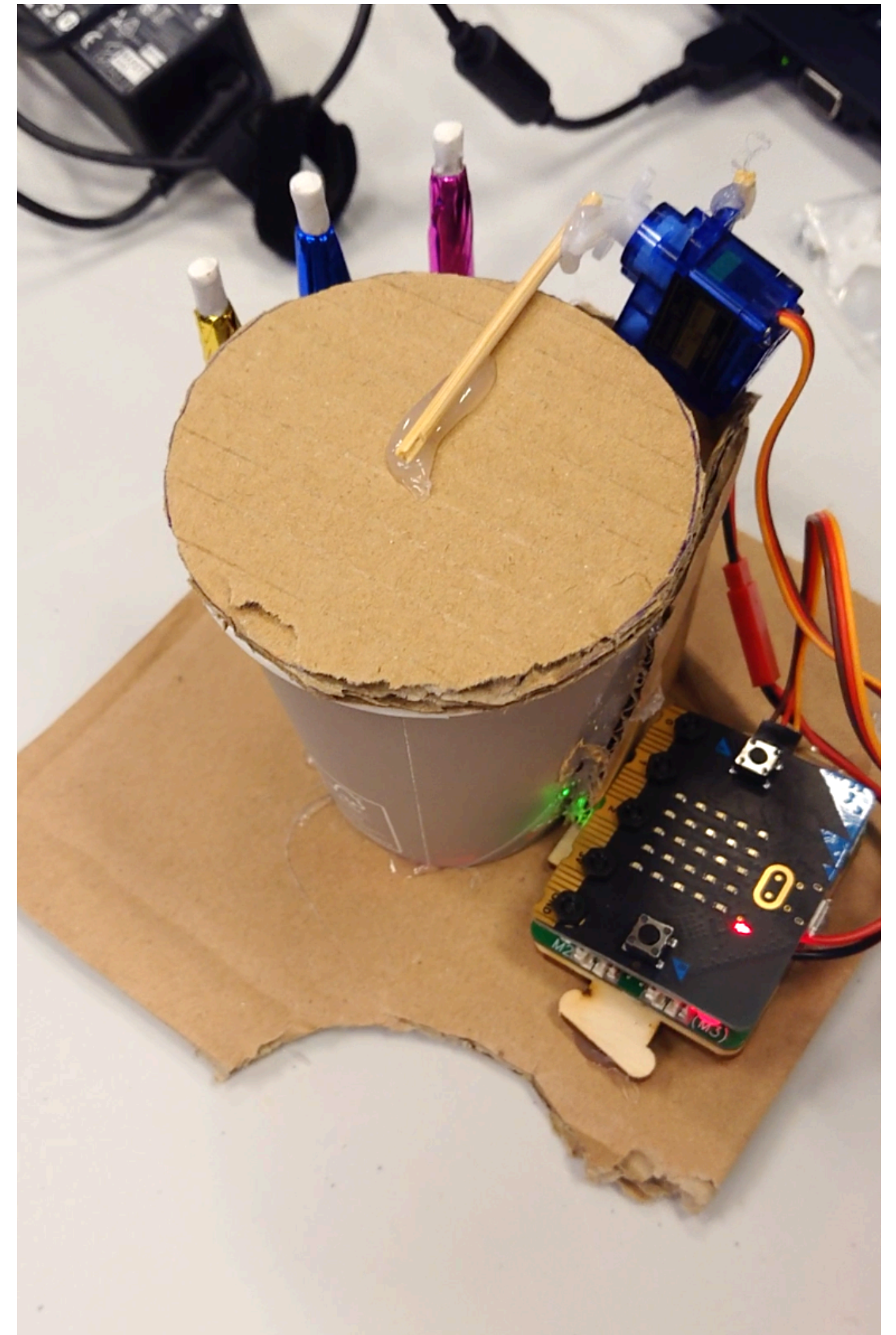
Coding the servo

The code is written in makecode, makecode.microbit.org



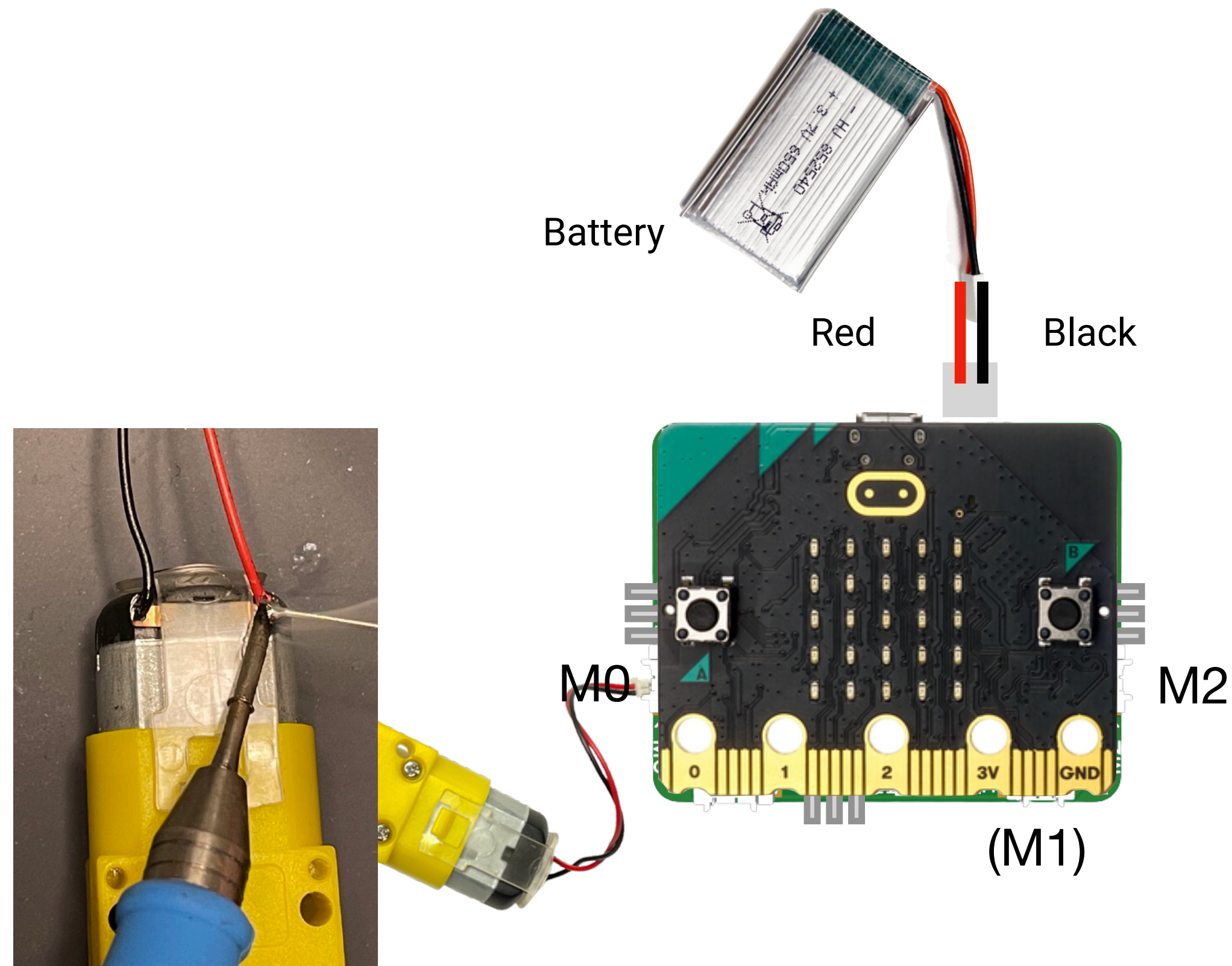
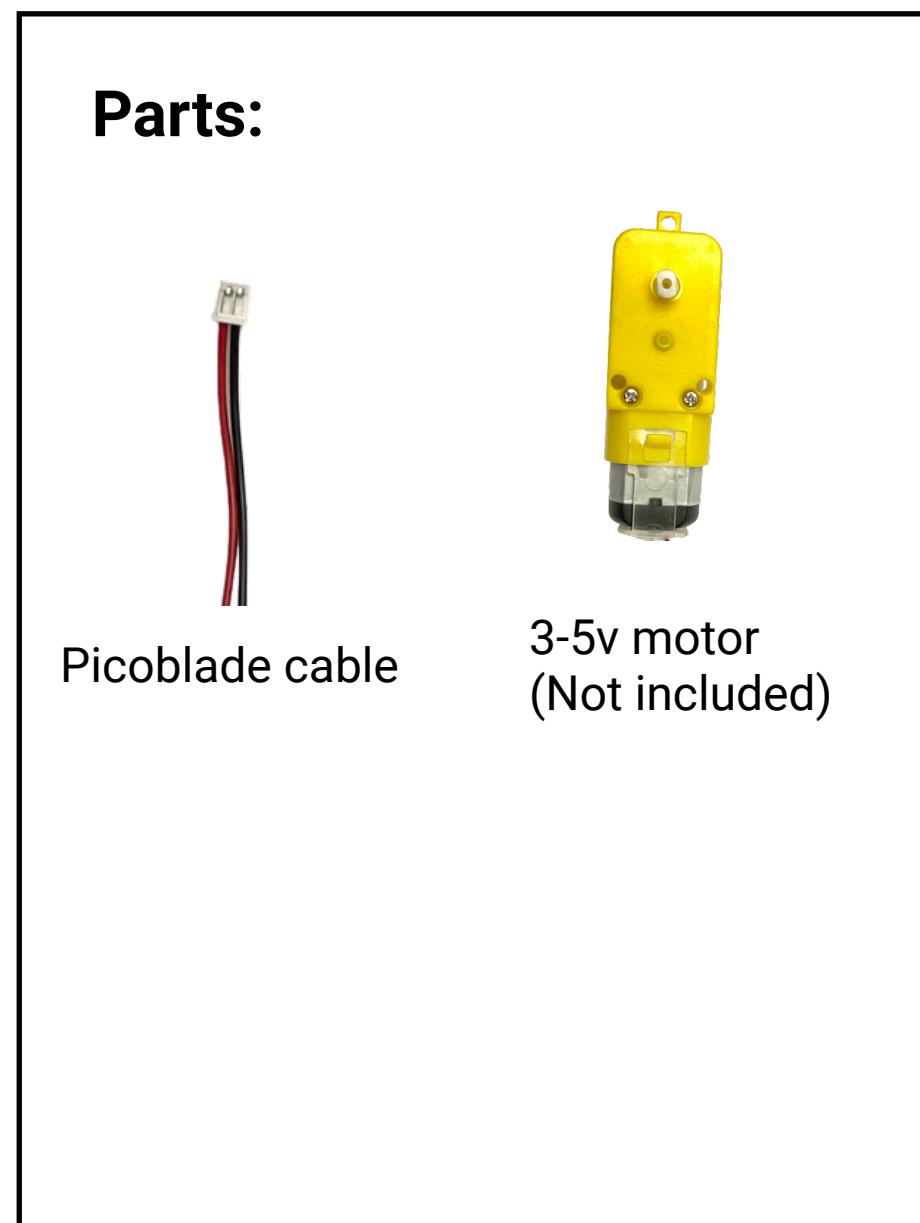
A servo can be used to make many smart inventions. To the right: an automatic trash can dispenser that will open automatically when a hand or object is above the screen (making a shade).

You can see the code above.



Use a motor

Tools: Soldering iron



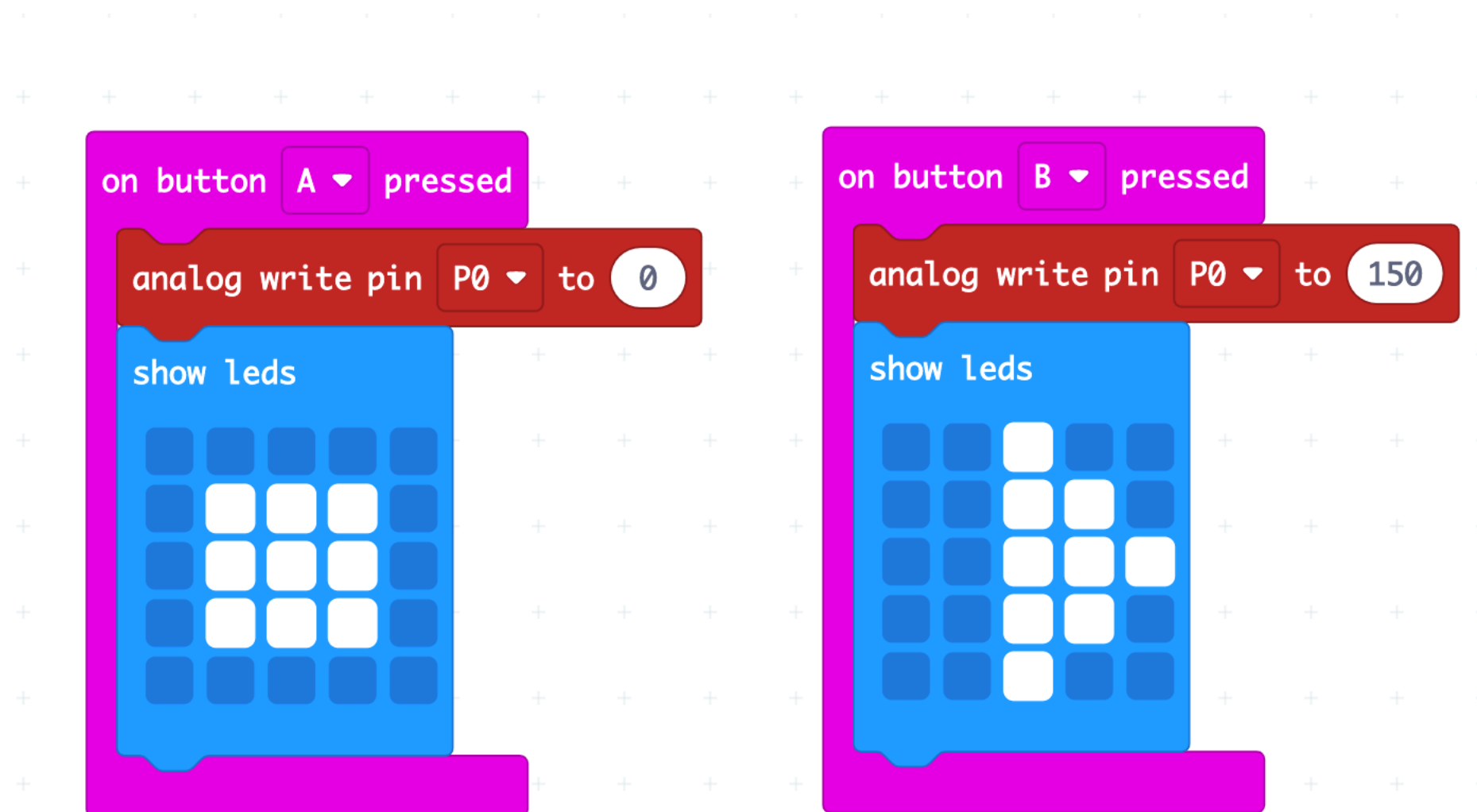
Solder the cable to the motor you want to use.
You can also connect solenoids, speakers and power LEDs or light bulbs.

Plug the motor in your chosen M0-M2 output.

A reminder: You can not use M0 and servo P0 at the same time, M1 and Servo P1 at the same time, or M2 and Servo P2 at the same time.

Motor controller

The code is written in makecode, makecode.microbit.org



This test code will turn on a motor on the output M0 at speed 150 out of 1023.

The screen will show an icon (stop or play)

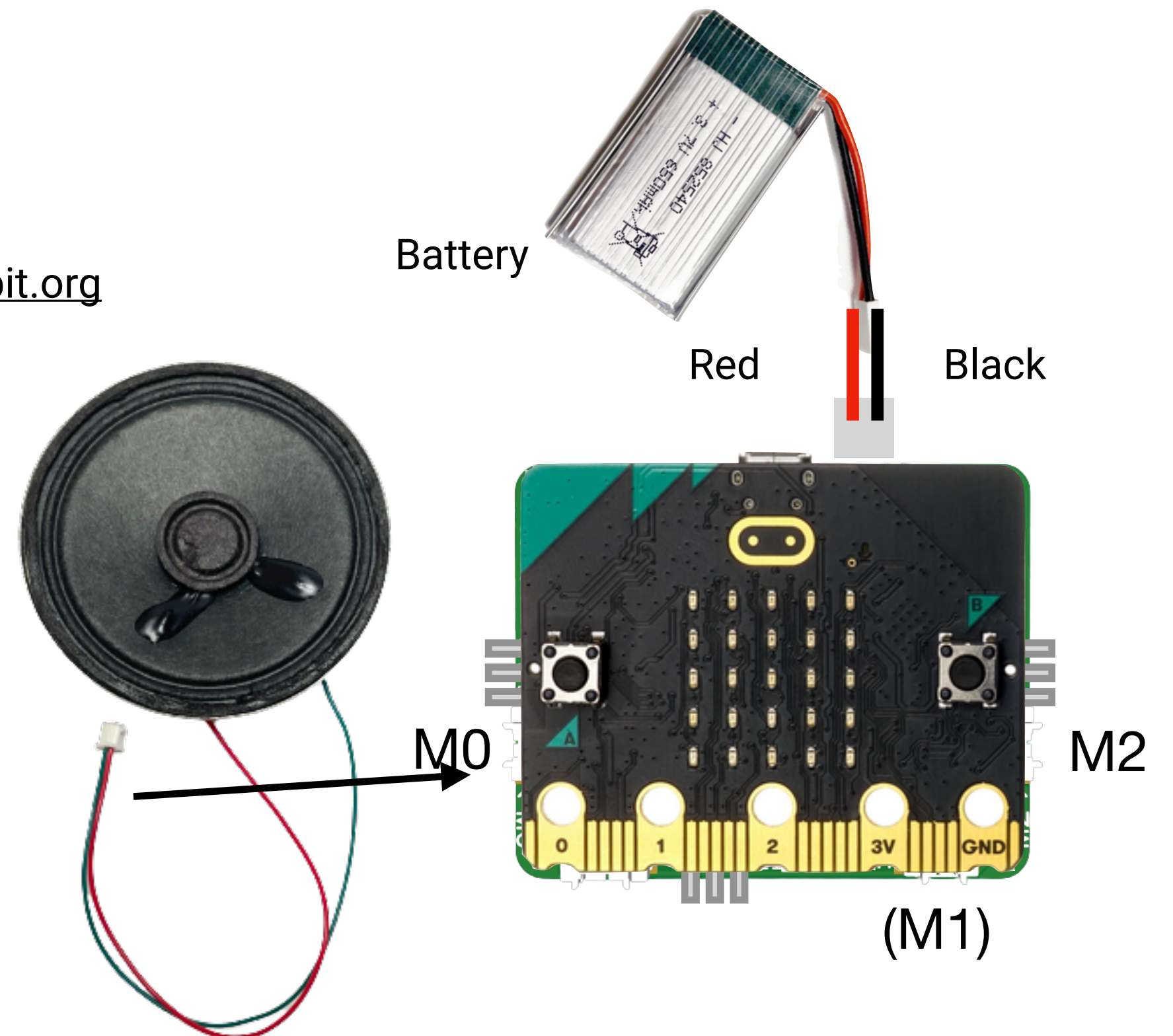
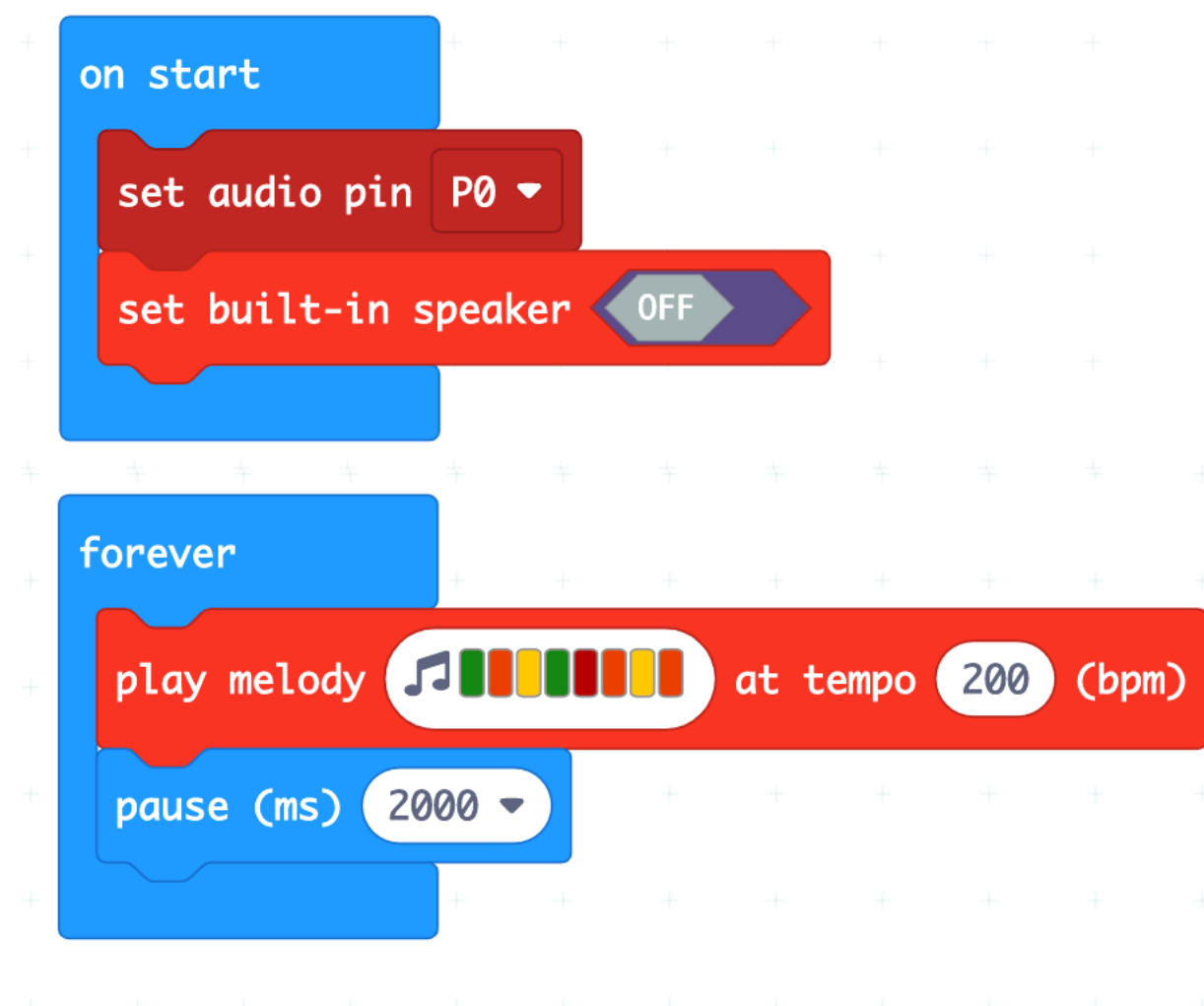
Never short circuit the motor connectors or cables

If it doesn't move, check the following:

- Did you transfer the new code to the micro:bit?
- Is the motor cable connected to the corresponding pin? (See page 5)
- Is the battery connected and charged?
- Are the nuts on top of micro:bit properly tightened?

Loudspeaker

The code is written in makecode, makecode.microbit.org



You can play loud sounds on a loud speaker element (not included). You can extract any loudspeaker from a discarded radio or similar. Solder a motor cable to the two terminals on the back of the speaker.

There are a few different sound blocks to play with, especially on micro:bit V2.

The “set built in speaker” only applies to V2.

Coding summary

Select P0, P1, or P2:

Control a servo (0-180 degrees)



Control a motor or LED (on/off)



1 = power on, 0 = power off

Control a motor or LED (variable power)



Choose speed between 0 (off) and 1023 (full speed)

Contact us:

We welcome questions and feedback.

Do not hesitate to contact us!
We normally respond within 1-2 working days.

Suggestions for improvements are also welcome at any time.



Henning Pedersen,
Chief product
developer



www.makekit.no



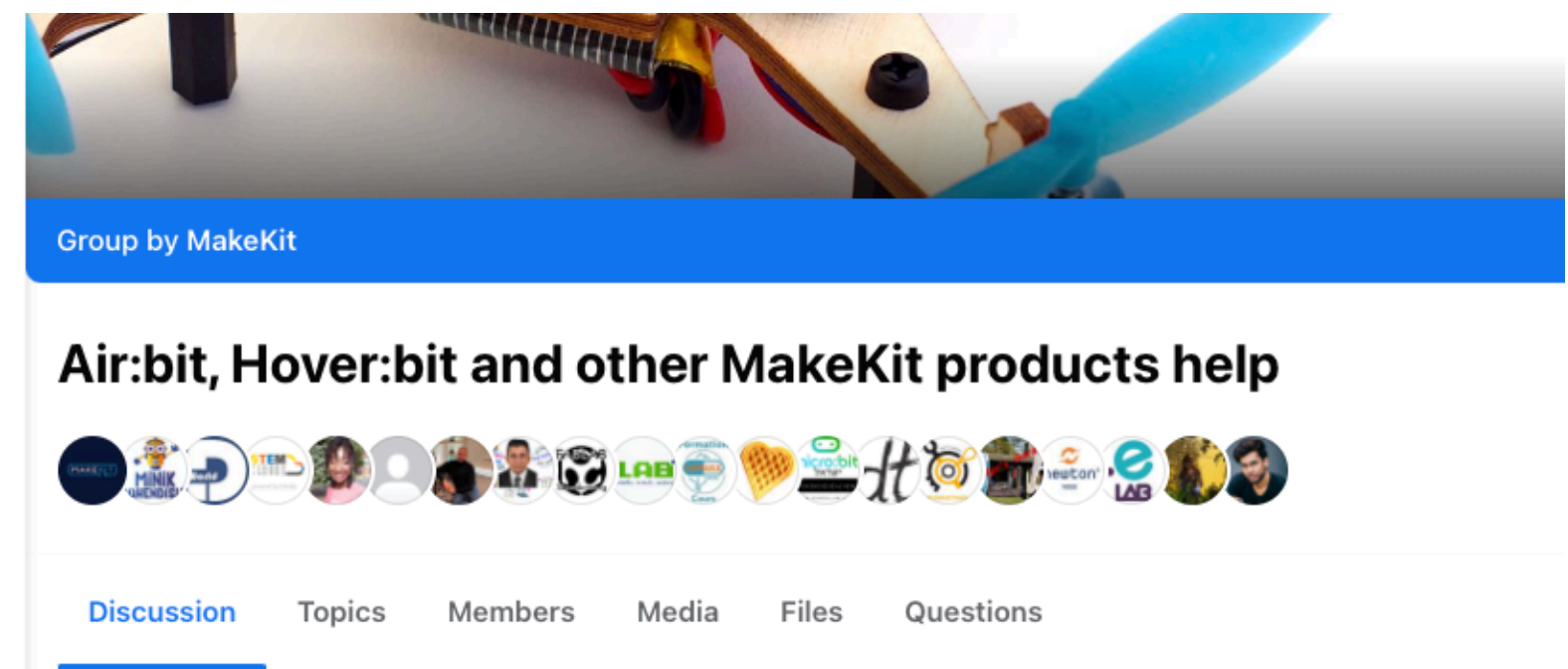
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