Bubble:bit

Micro:bit soap bubble machine
With rechargeable battery

From 11 years

Light emitting diode (LED)

Servo

Servo P2

Brown
Motor M2

Motor cable

At red light, charge the

Do not touch the rotating propeller!

bubbleiscious!

It's Just SOAP!

MAKEKIT

Bubble:bit
Code and control servo and motor
Your own soap bubble robot

makekit.no

Made in Norway

Veiledning
(makekit.no/docs)

MAKEKIT
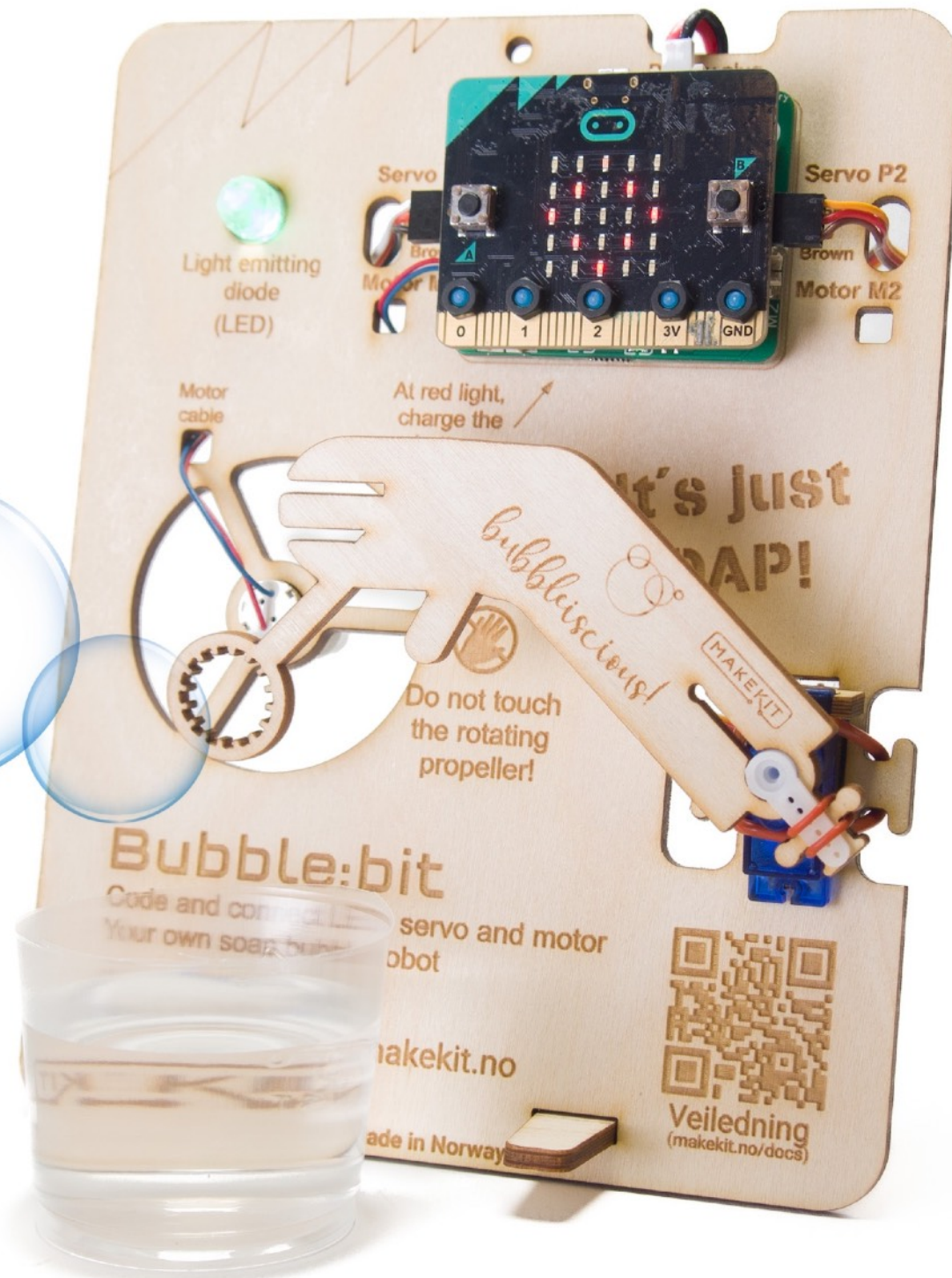
About the product

Hover:bit is designed and manufactured in the old premises of
Tanbergs Radiofabrikk at Skullerud in Oslo, Norway
We welcome questions and feedback.
Do not hesitate to contact us!
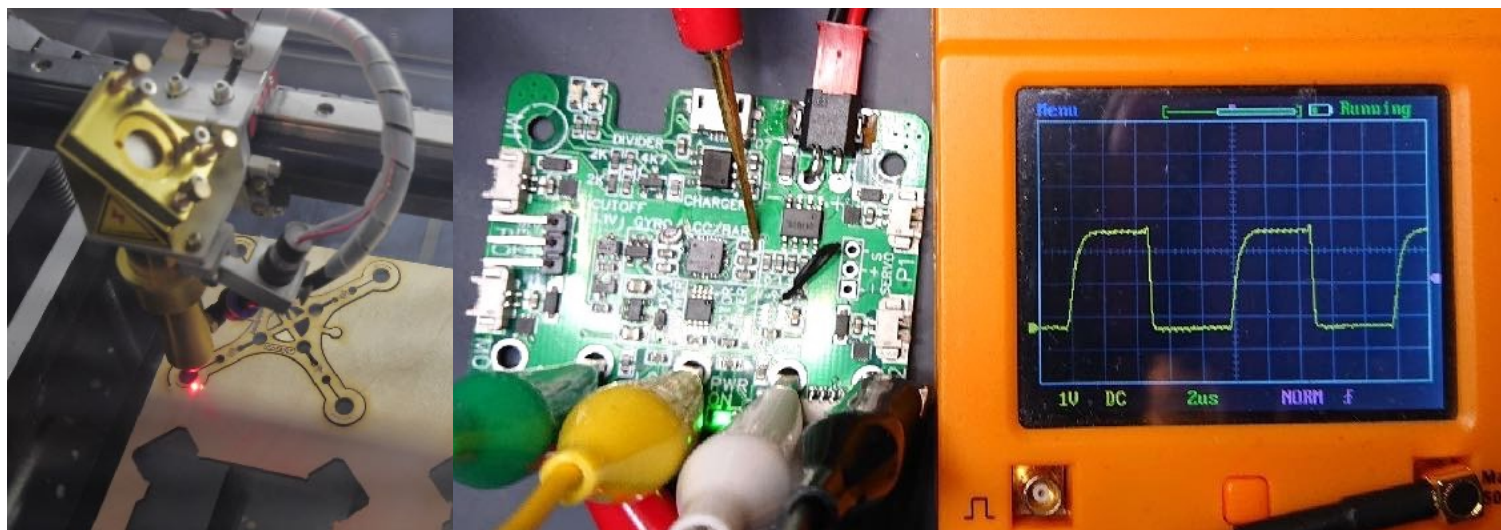Feel free to use our Facebook page as well

 www.makekit.no

 support@makekit.no

 makekit

 gomakekit (also twitter)

Henning and Steinar
At the Tandberg exhibition at
Skullerud

Meet the micro:bit V1

Reset button

Antenna 2,4 gHz

USB   Battery 3V

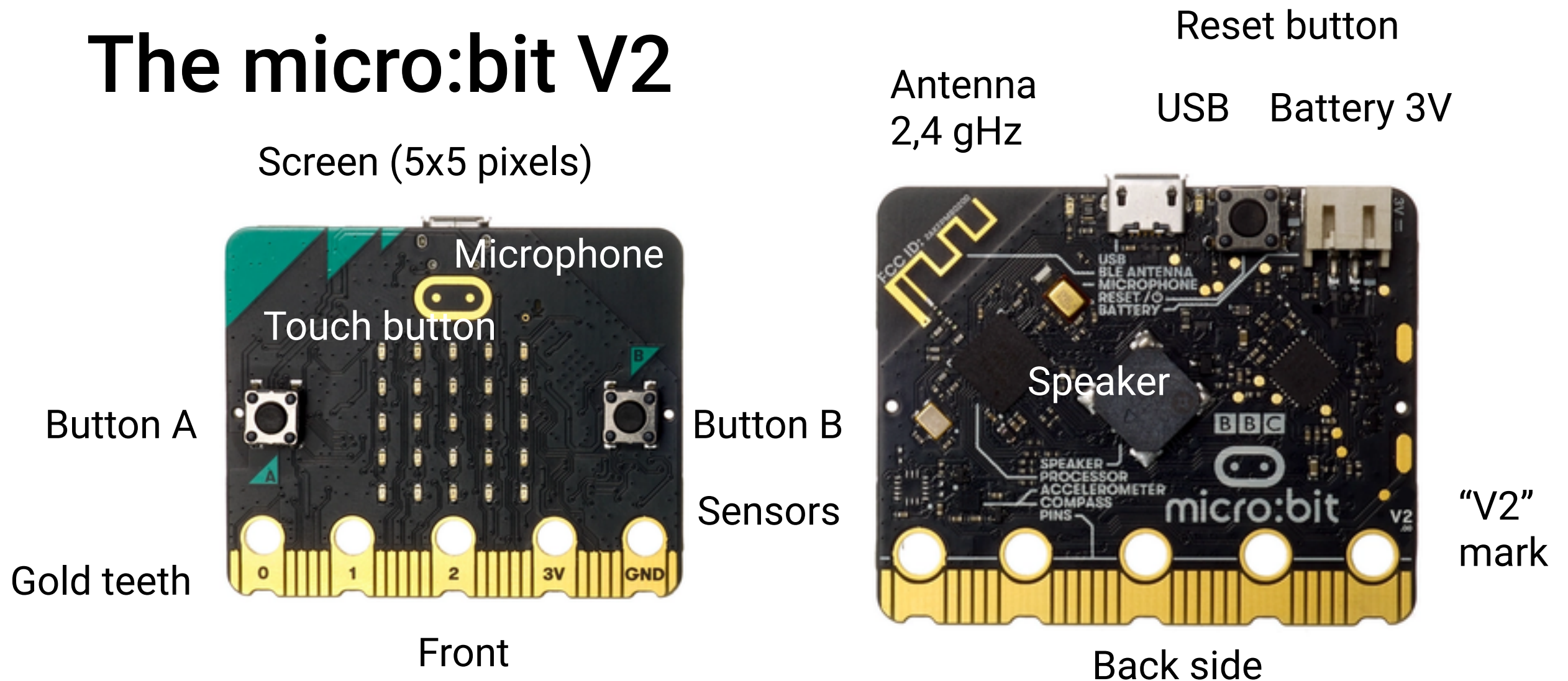Screen (5x5 pixels)

Haircut

Button A

Button B

Sensors

Gold teeth

Front

Backside
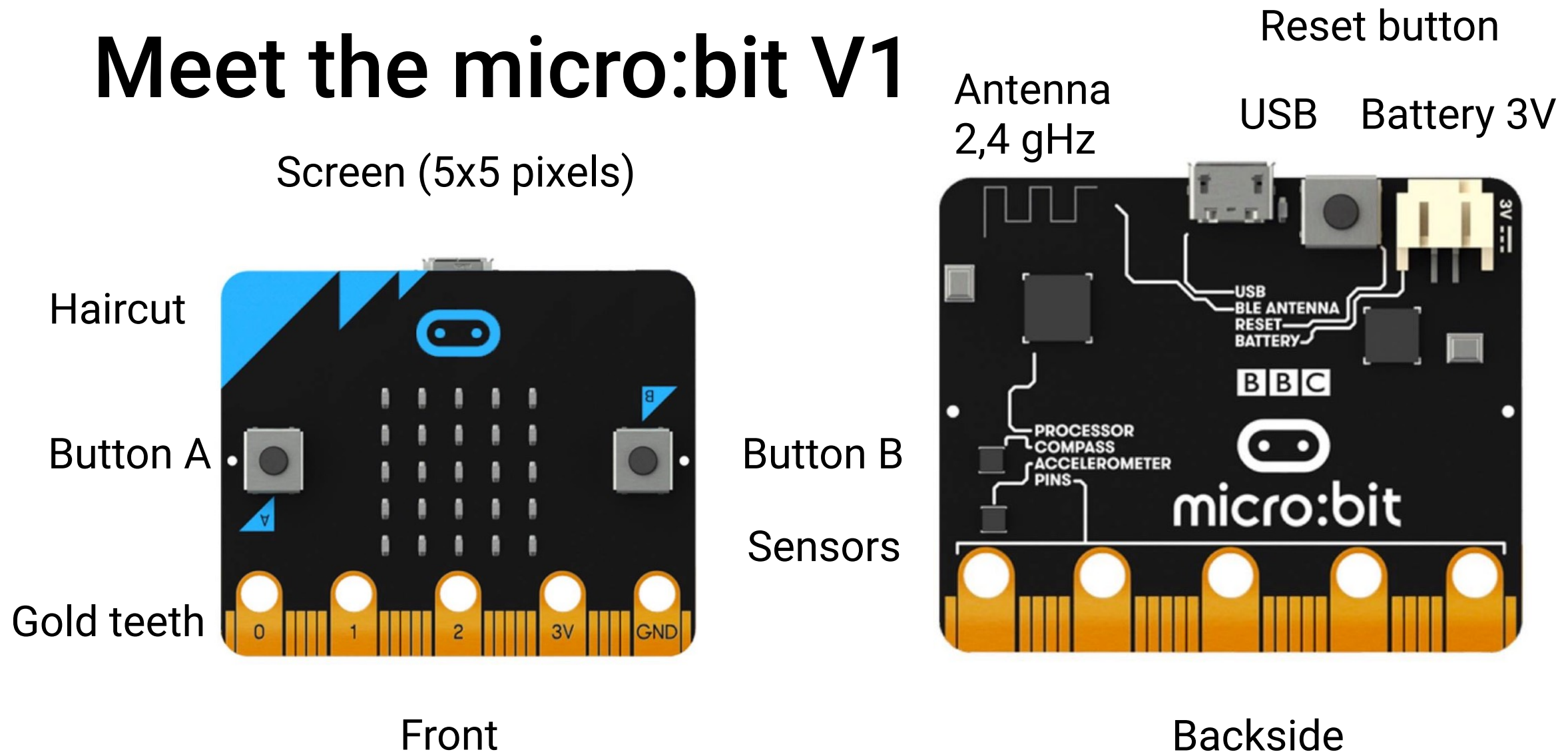
micro:bit is a small computer with prosessor, sensors, display and radio. It has connection pins for external components like LEDs, speakers or various sensors.
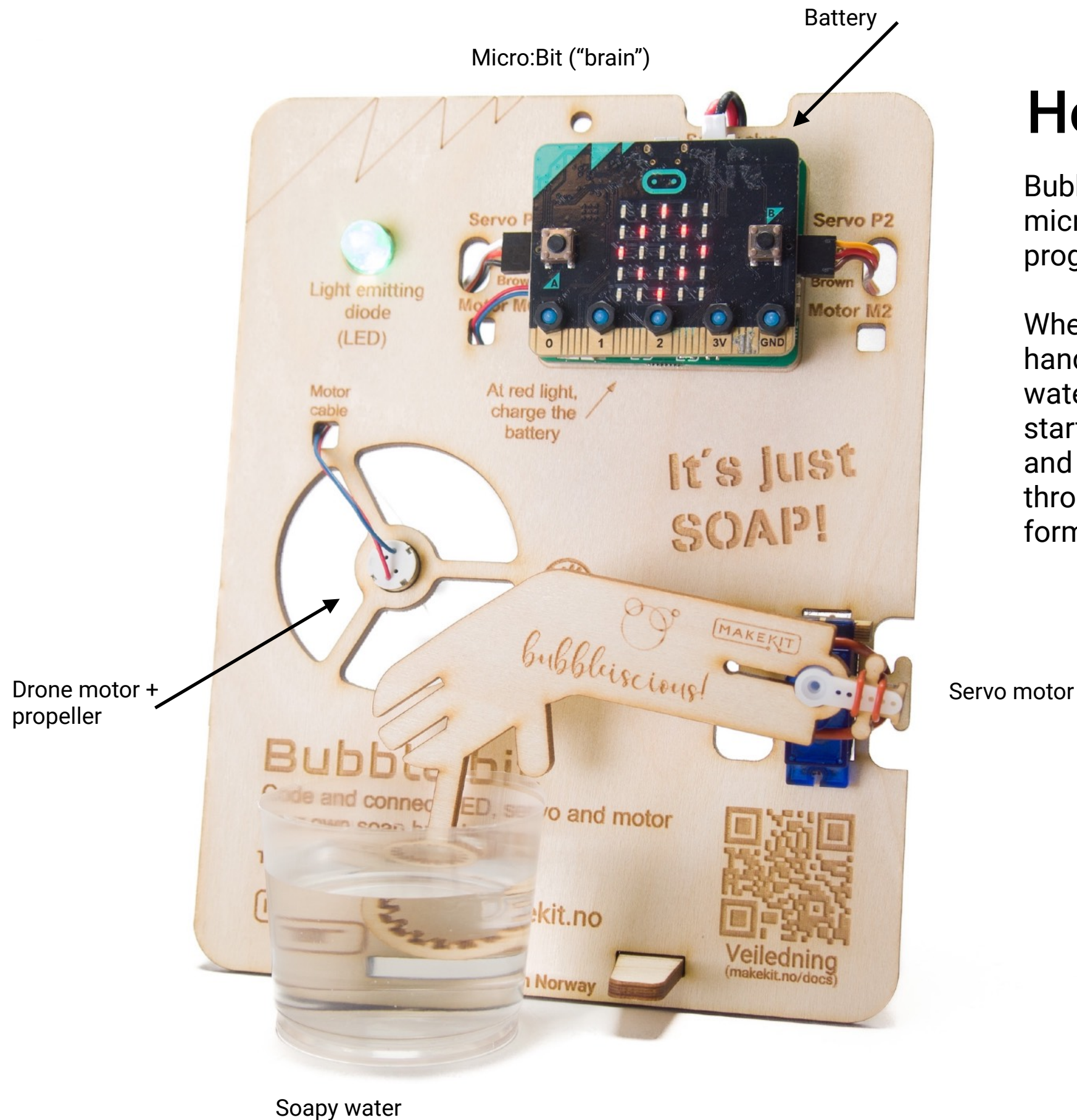You can learn more at: https://tech.microbit.org/hardware/

The micro:bit V2

Screen (5x5 pixels)

Antenna 2,4 gHz

Reset button

USB   Battery 3V

Microphone

Touch button

Button A

Button B

Speaker

Gold teeth

Sensors

"V2" mark

Front

Back side

The micro:bit V2 is very similar to V1 but with extra features, like: Microphone, speaker, touch button, faster processor and more memory. The "gold teeth" looks different compared to V1, for better grip with crocodile clips.

4

Battery

Micro:Bit ("brain")

Servo P2

Servo P

Brown
Motor M

Brown
Motor M2

Light emitting
diode
(LED)

Motor
cable

At red light,
charge the
battery

It's Just
SOAP!

bubbleiscious!

MAKEKIT

Drone motor +
propeller

Servo motor

Bubble:bi

Code and connec   ED, se   vo and motor

ekit.no

Norway

Veiledning
(makekit.no/docs)

Soapy water

How it works:

Bubble:bit is controlled by a micro:bit which runs a small program.

When you press button B, the hand will dip the ring in soapy water and the propeller will start. A film of soap will form and when the air is blown through, soap bubbles will form!
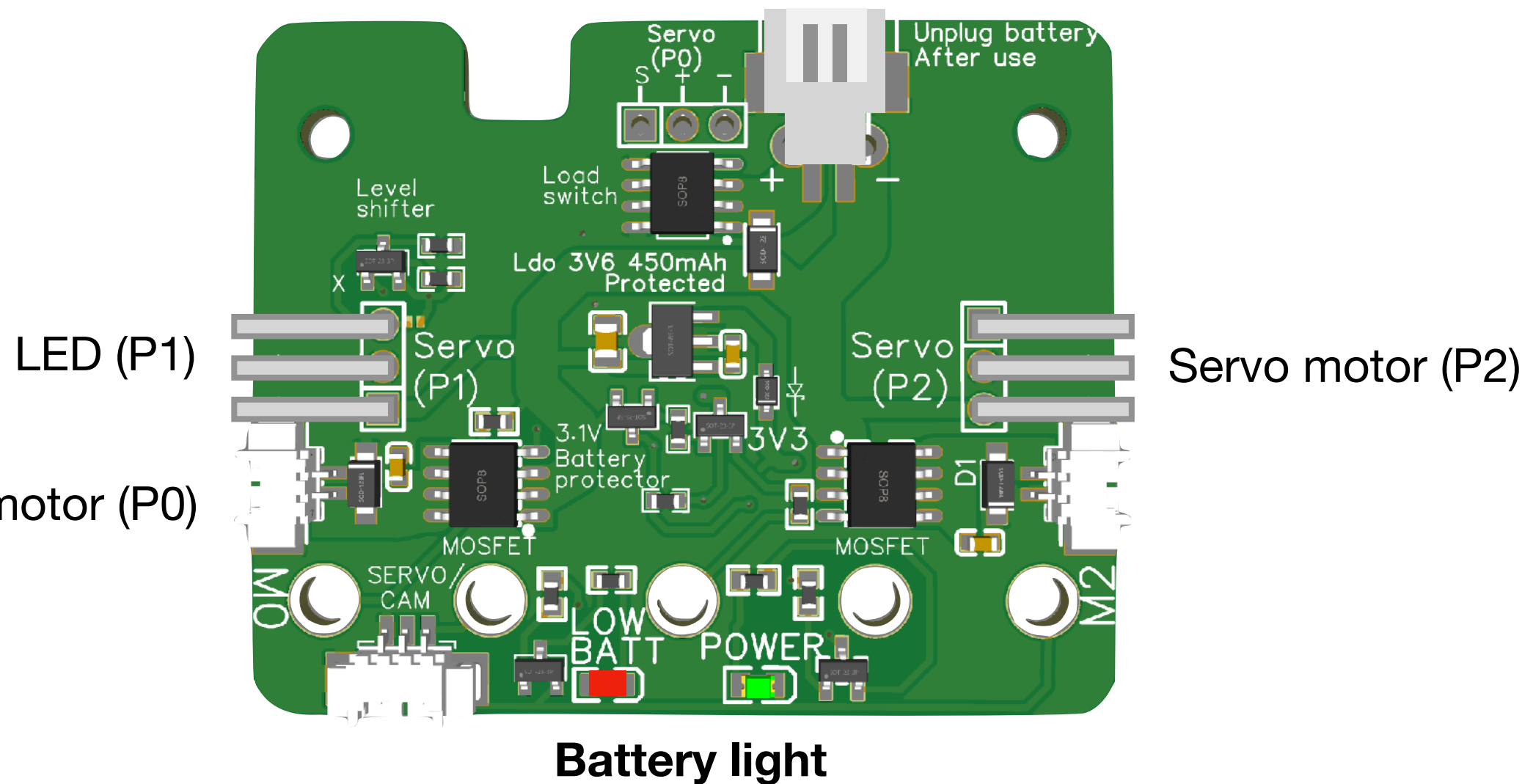
Same function on Bubble:bit
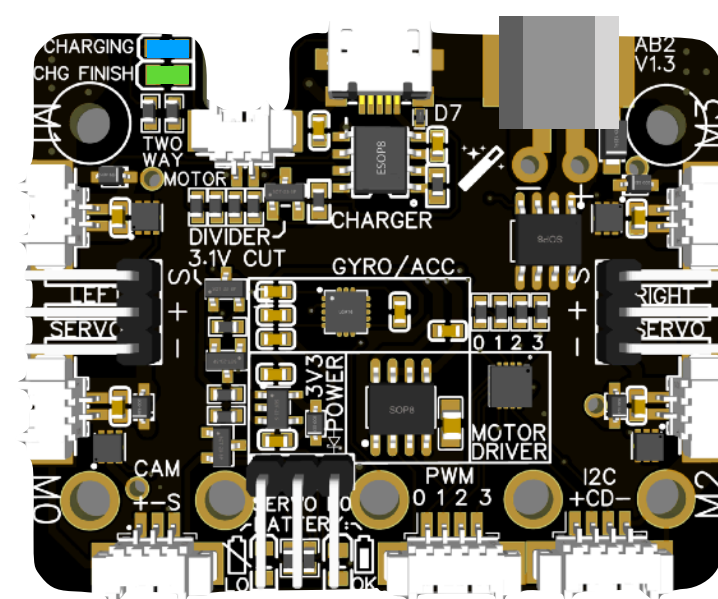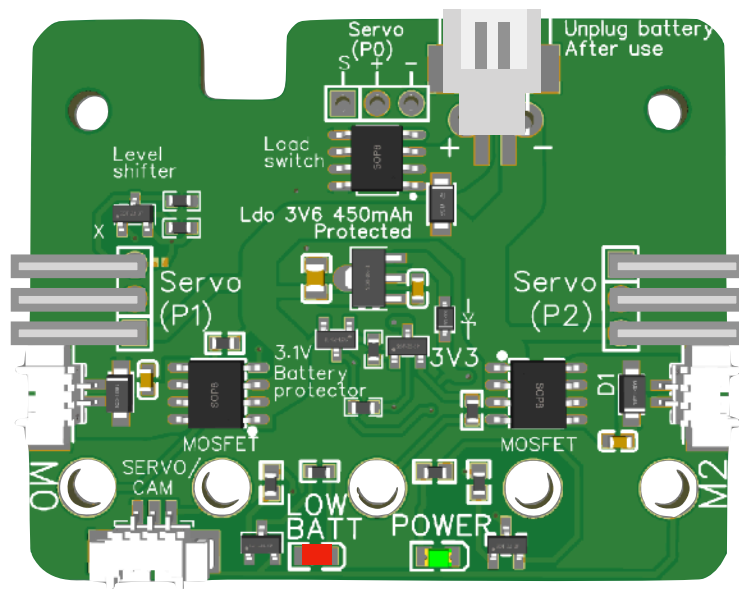
The black card has more connectors, but function for the Bubble Bit is the similar.
The motors, LED and servo should be connected at the same connections for both cards.

The green board needs no code exension, the black board needs the wonderkit code (download from makekit.no/docs)

Green card

Battery connector

Servo
(P0)
S + −

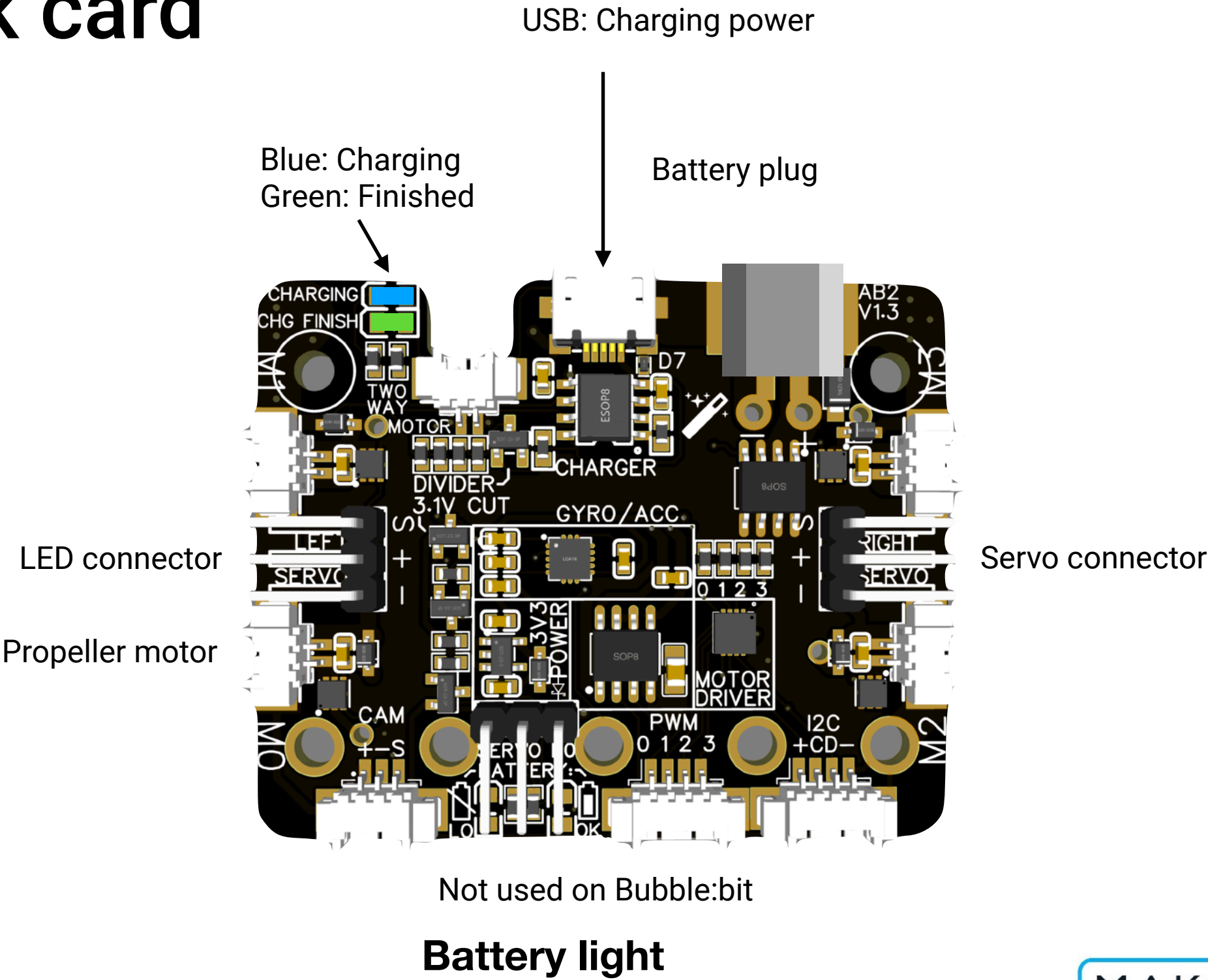Unplug battery
After use

+   −

Level
shifter

Load
switch

SOP8

X

Ldo 3V6 450mAh
Protected

LED (P1)

Servo
(P1)

Servo
(P2)

Servo motor (P2)

3.1V
Battery
protector

3V3

Propeller motor (P0)

SOP8

D1

MOSFET

SOP8

MOSFET

M0

M2

SERVO/
CAM

LOW
BATT

POWER

Battery light

The control board helps the micro:bit to connect to external things such as motors, and amplifies the current.

It also ensures that the micro:bit gets the right amount of power from the battery. If the battery is running low, the power is turned off to protect the battery.

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

Black card

USB: Charging power

Blue: Charging
Green: Finished

Battery plug

LED connector

Propeller motor

Servo connector

Not used on Bubble:bit

Battery light

MAKEKIT

Charging (green card users)
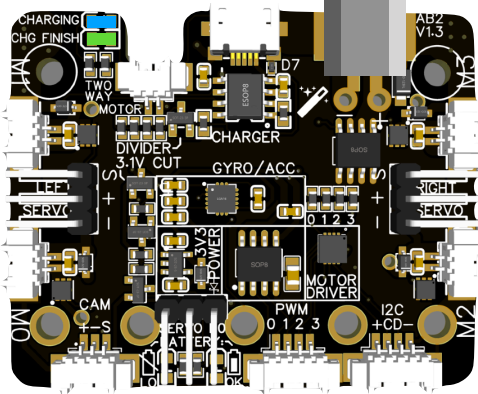
Deler:

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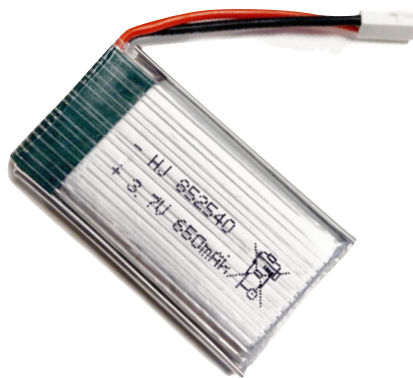
LiPo-Battery
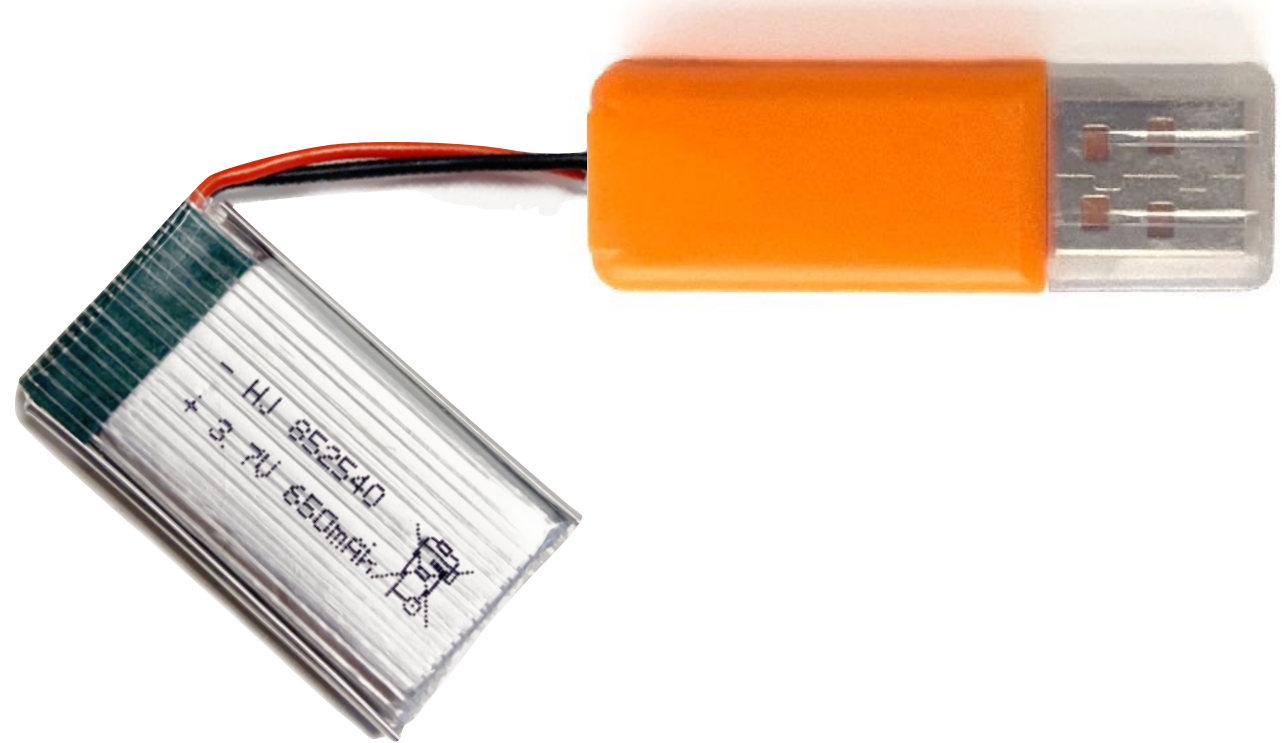
The green card comes with an orange charger.
First plug battery and charger together.
Then plug the charger into a USB socket. Orange light
lights up until the charger is finished after 1-2 hours.

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

Charging (black card)

Parts:

Black control board

Lithium (LiPo)-battery

Micro USB-Cable
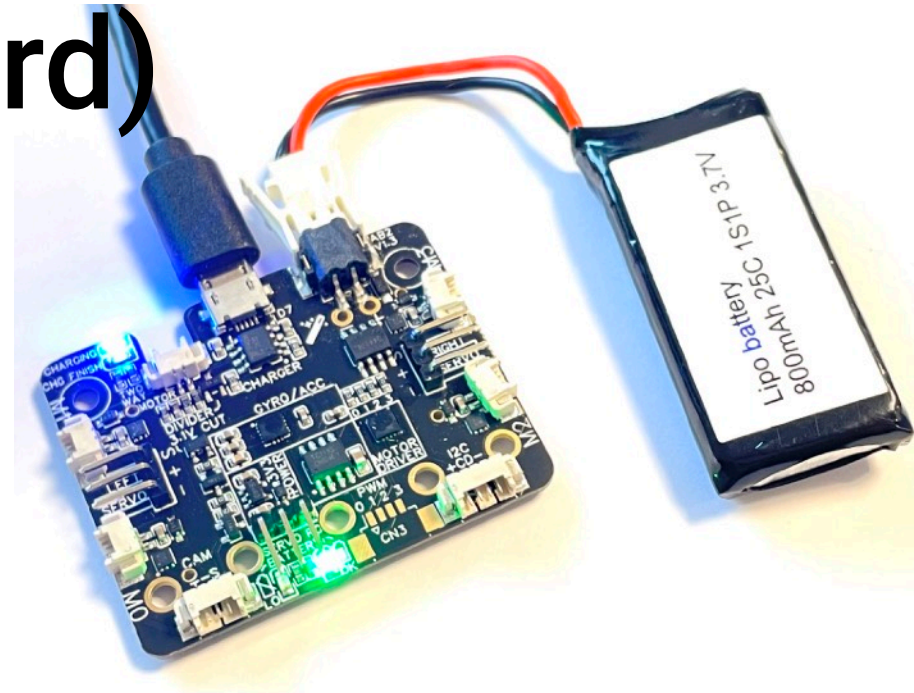
1. The battery can be charge with or without the micro:bit connected.
2. Plug the big white battery plug into the grey connector
3. Connect the micro USB into the control board (not the microbit)
4. Connect the other end into a USB charge outlet
5. Blue light indicates charging. Green light indicates charging finished. It takes about 1 hour to charge.
6. To prevent battery drain, always unplug battery when not in use!

Fire hazard:
Never charge a Lithium battery unattended!

Recommended tools

Pipe wrench

Small philips
screwdriver

Small plastic cup
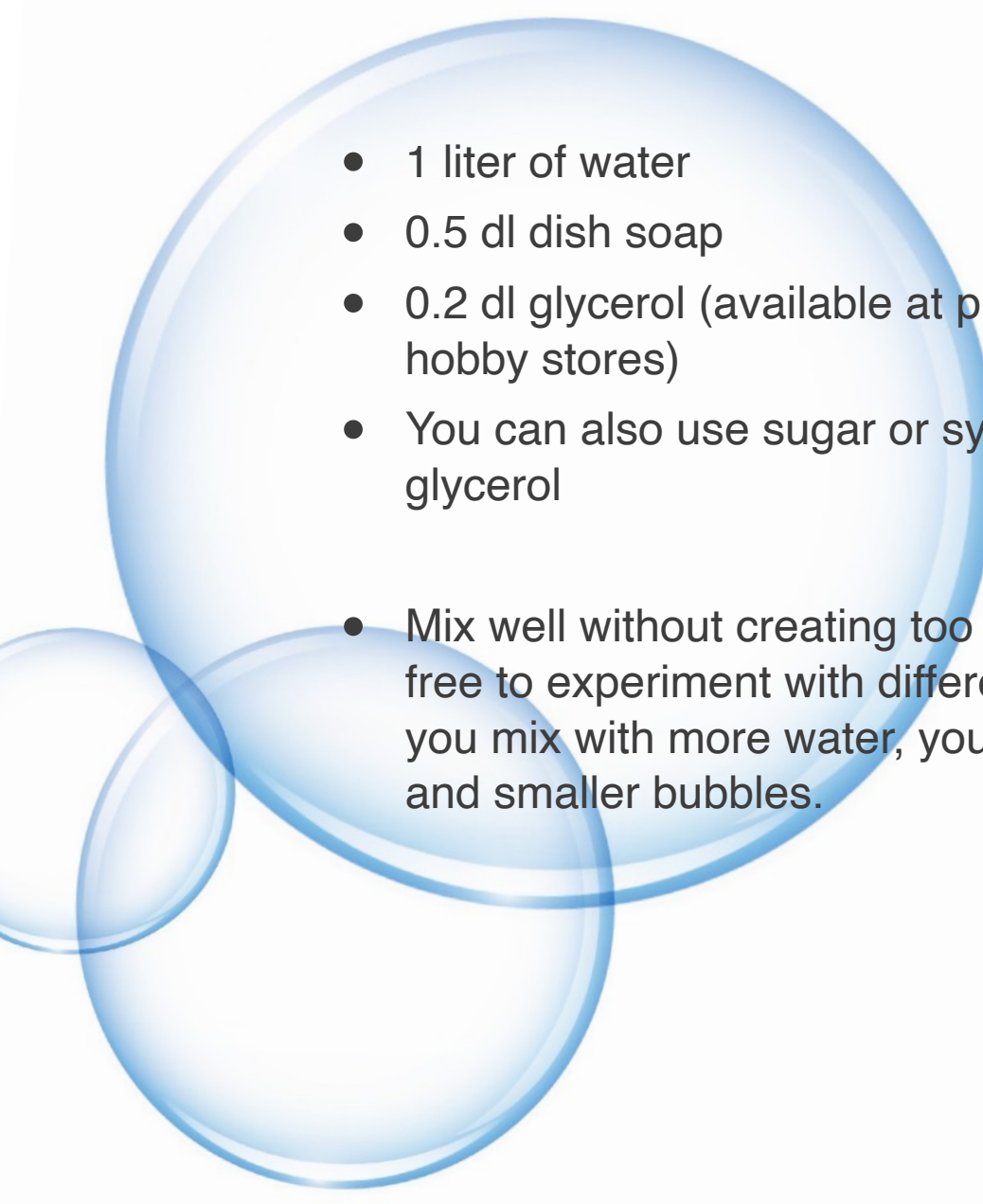
Optional scissors to
cut plastic cup
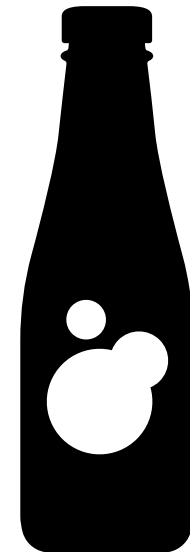
Bubble water or soap recipe

Soap bubble recipe

- 1 liter of water
- 0.5 dl dish soap
- 0.2 dl glycerol (available at pharmacies or hobby stores)
- You can also use sugar or syrup instead of glycerol

- Mix well without creating too much foam. Feel free to experiment with different quantities. If you mix with more water, you may get more and smaller bubbles.

Parts

Servo motor

Charger

Servo horn

Motor
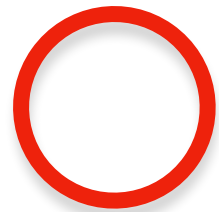
Propeller
(CW)

LED
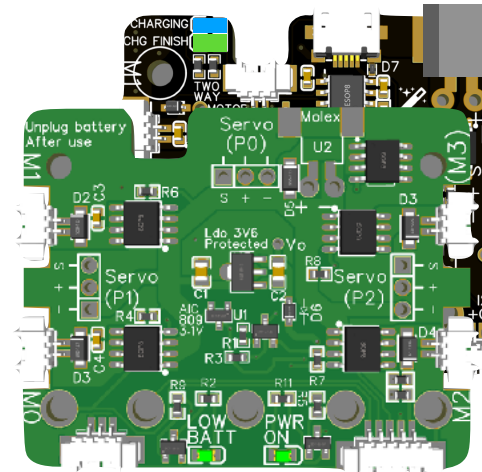
Control board,
Green or black

Rechargeable
battery
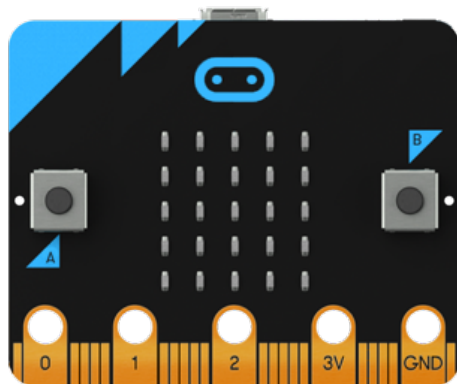
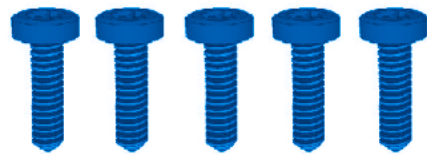Micro:bit with usb cable

Servo cable

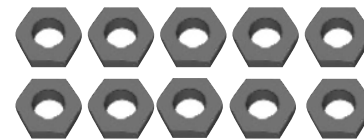1 large
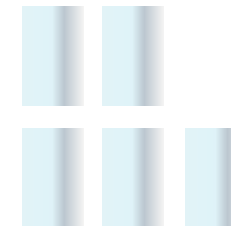Rubber ring

2 small rubber
rings

Rubber band

5x m3x12
nylon screws
Blue

2x m3x12
screw, white

10x nylon nuts

5x spacers,
aluminium

Spacer for servo

Main plate
(Birch ply)

Arm with bubble
blower
(Birch ply)

Support pin
(Birch ply)

Cup holder with wedge

Countersunk screws
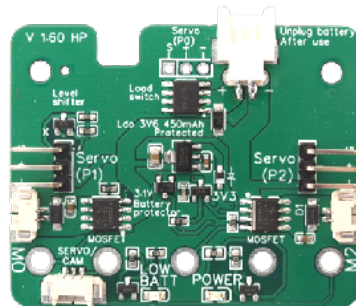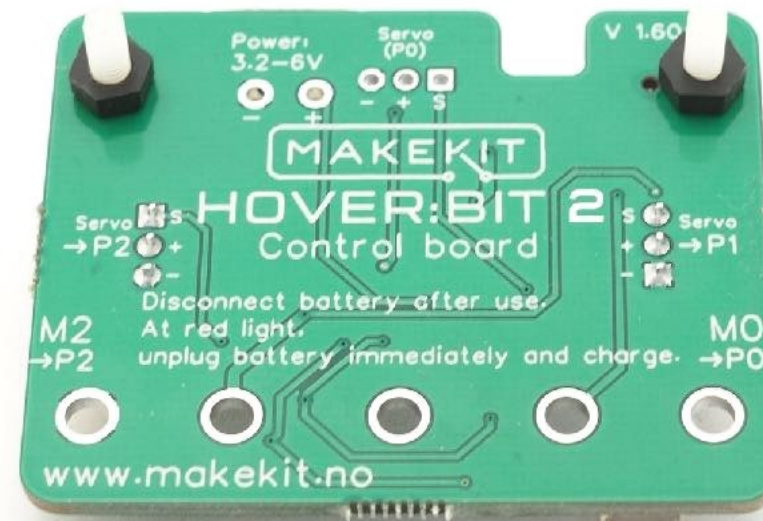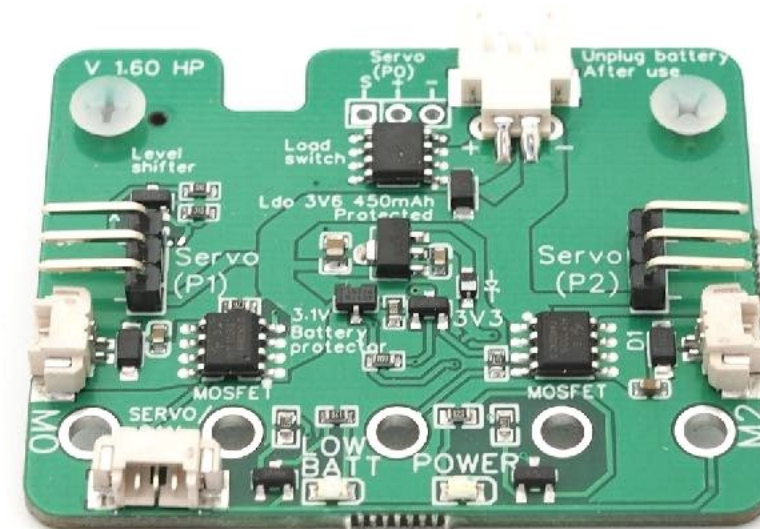
Tools: Medium philips screwdriver, wrench

Parts:

2x
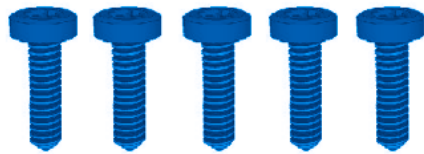Nylon screws
(Countersunk)

2x
Nylon nuts m3

Control board

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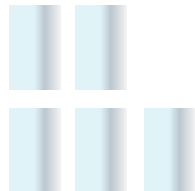Attatch the nuts on the backside of the board
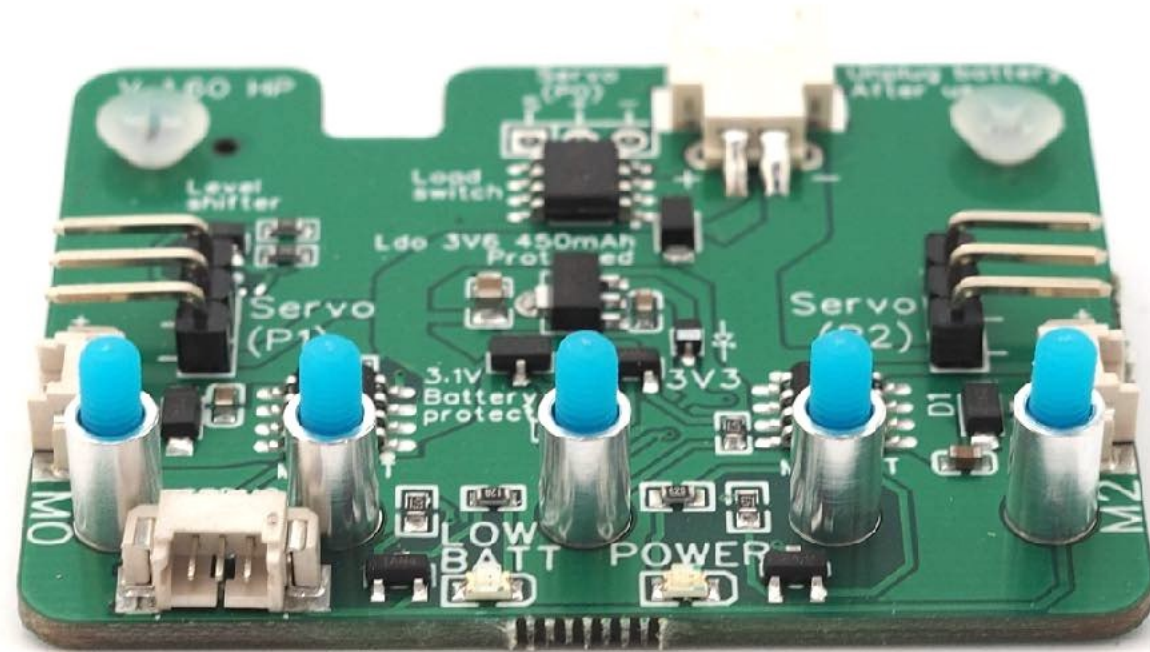(where the "MakeKit" logo is).

Spacers

Tools:

Parts:

5x m3x12
nylonskruer, blå

5x
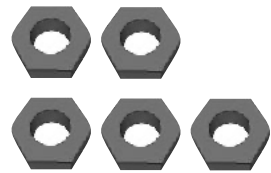Electrical conducting aluminium
spacers

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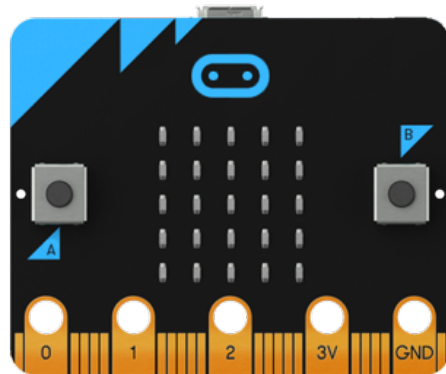Thread an aluminum ring onto each screw

Micro:bit

Tools: Medium philips screwdriver, wrench

Parts:

5x nuts

micro:bit
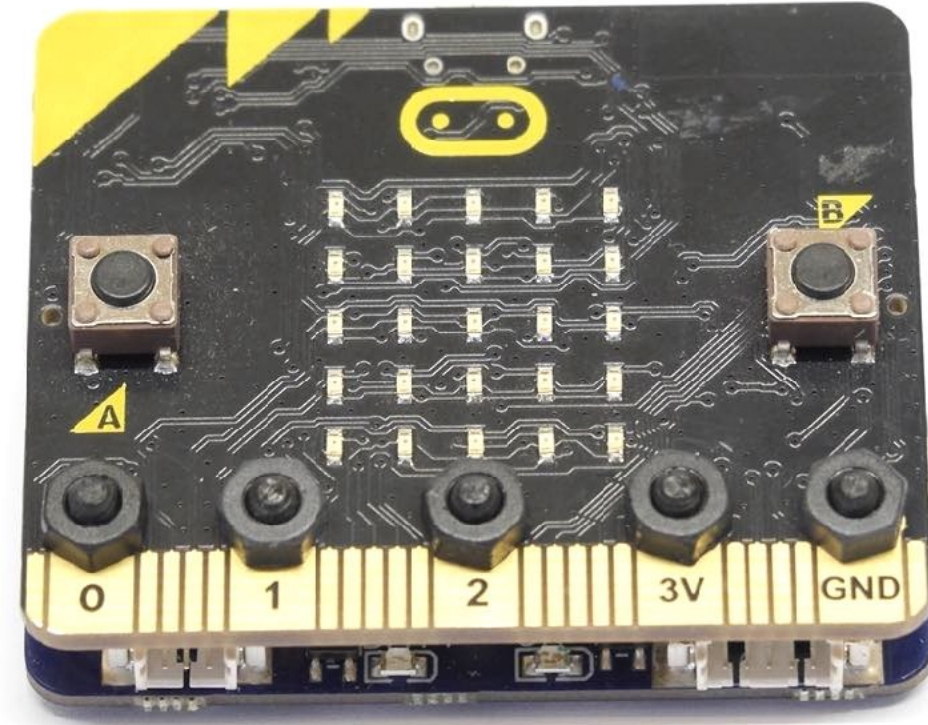
Place the micro:bit over and screw on the five nuts on top. Tighten the screws on the underside so that there is a tight and good contact. Do not use excessive force as this can damage the nuts.

Prepare board and arm

Mounting plate   Arm

Servo-horn   Small Rubber ring   Rubber Band
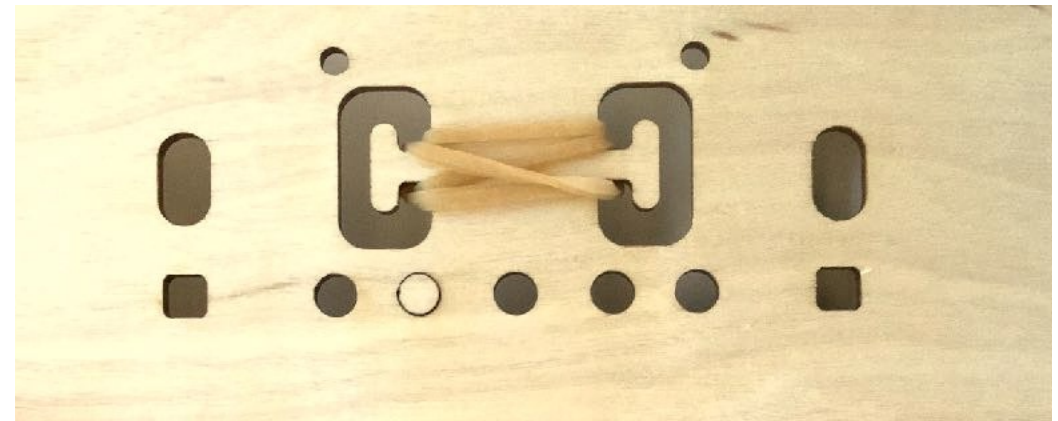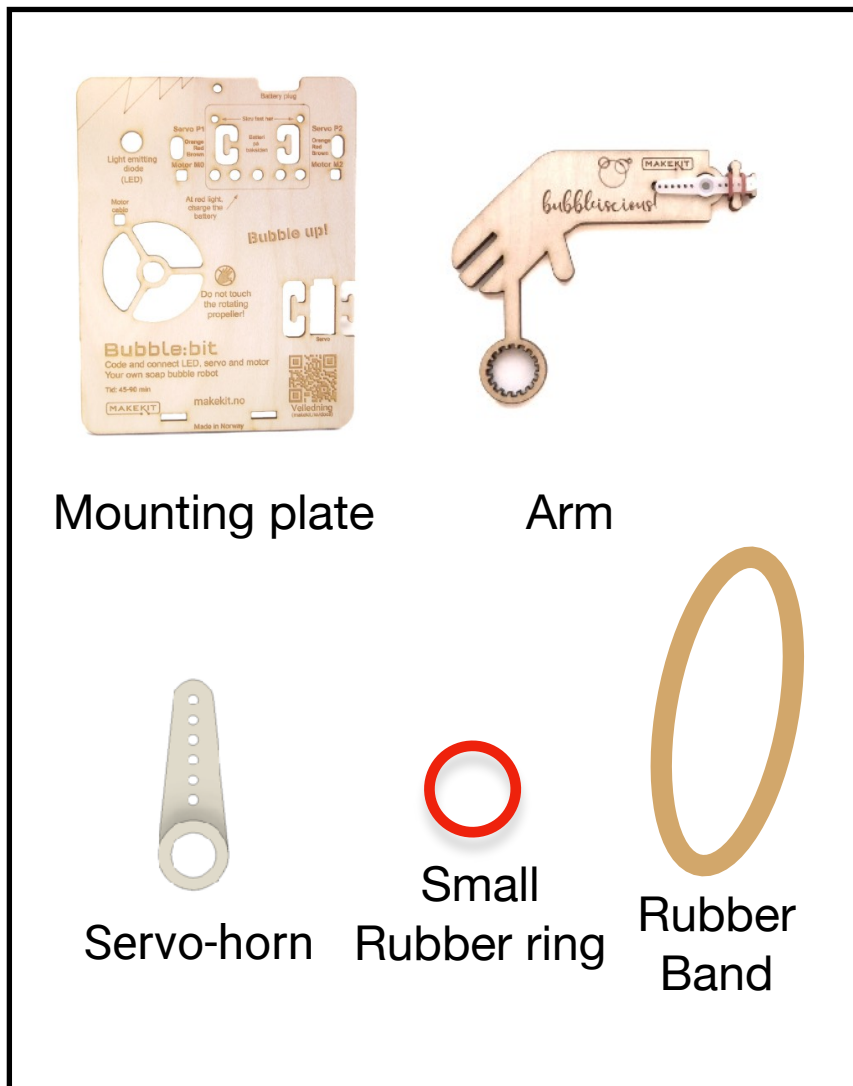
On the back of the plate, fasten the rubber band from one know, around the other and back again.

With a small rubber ring, mount the servo horn to the arm. First insert the servo horn, then connect the small rubber ring from one knob to the other.

The LED

(Light Emitting Diode)

LED   Servo cable

The LED has two legs, one long and one slightly shorter. The short leg should always go to ground, or black cable, while the long leg should go to plus, or red cable. Rule to remember: "It's positive to have long legs"
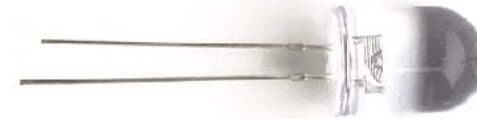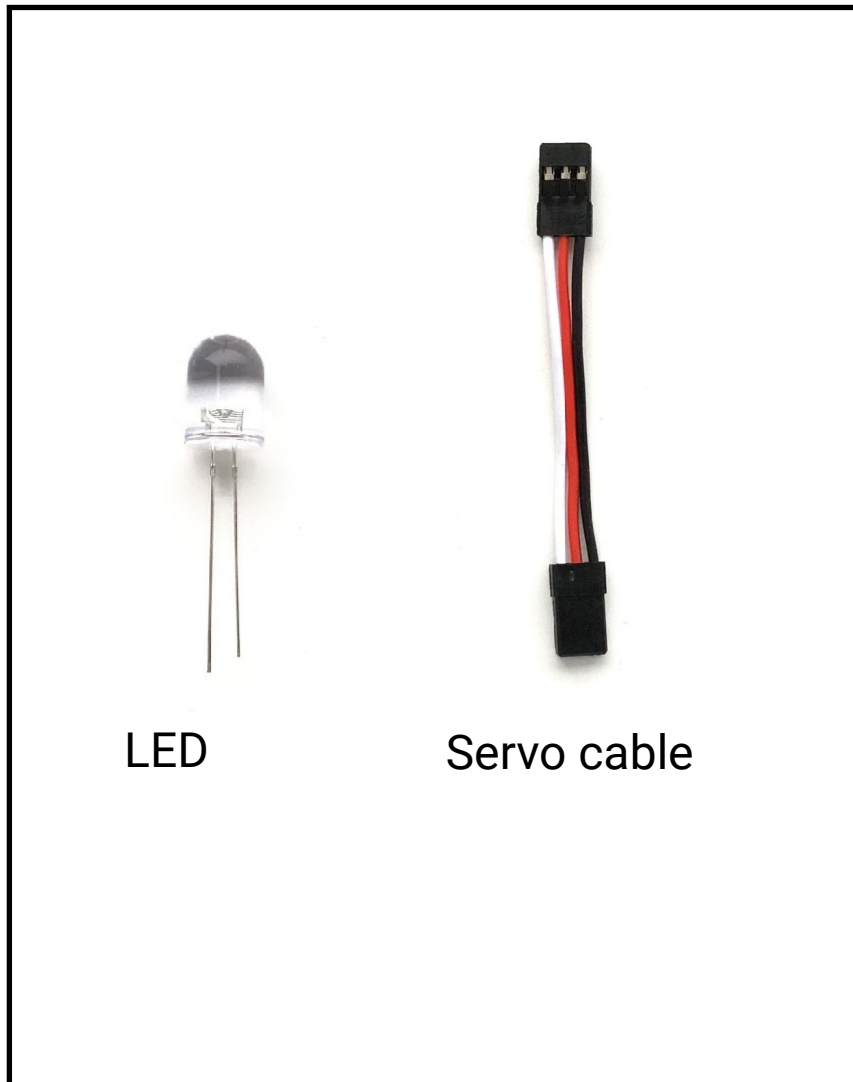
The servo cable has three colours, black, red and white. The red cable always outputs power, while the white one outputs power if you program it. In addition, the short leg must be connected to black (ground)

Always on
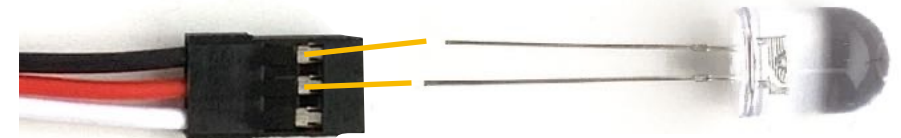
Programmeable
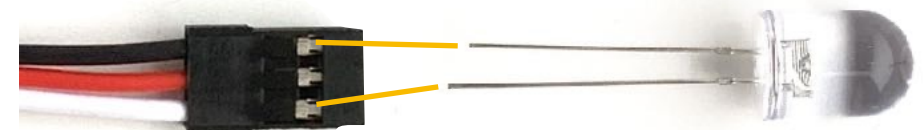
- If you want the LED to always light up when the battery is connected, connect it to black and red.
- If you want to program the light so that it flashes, you connect it to black and white.

Mounting the LED
(Light Emitting Diode)

LED
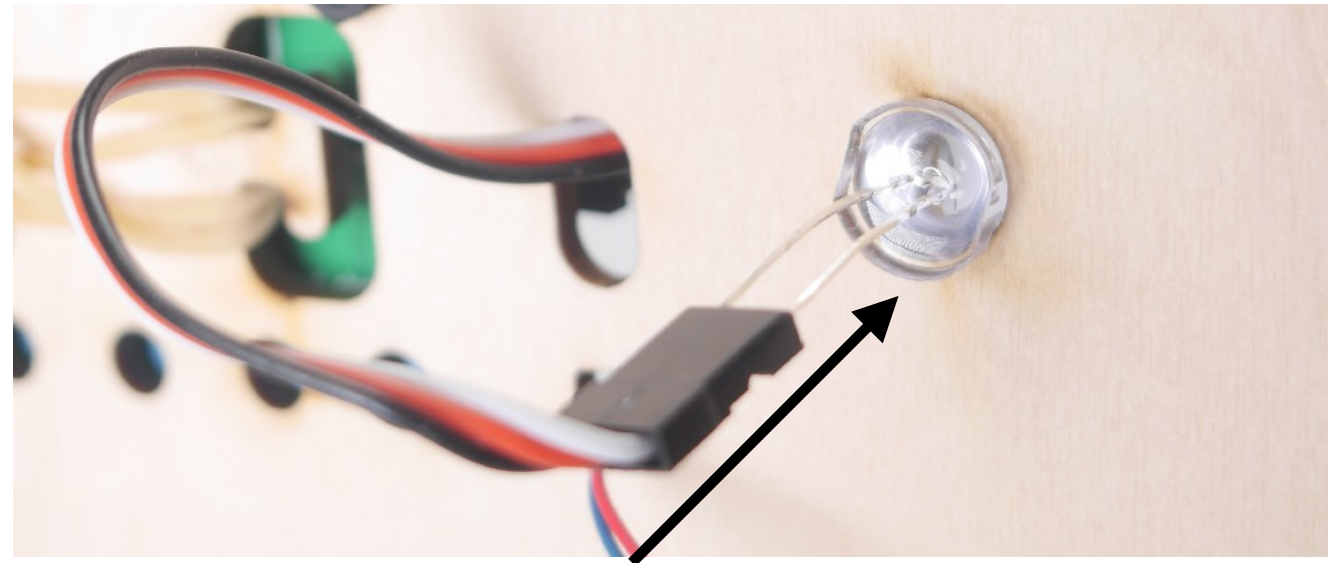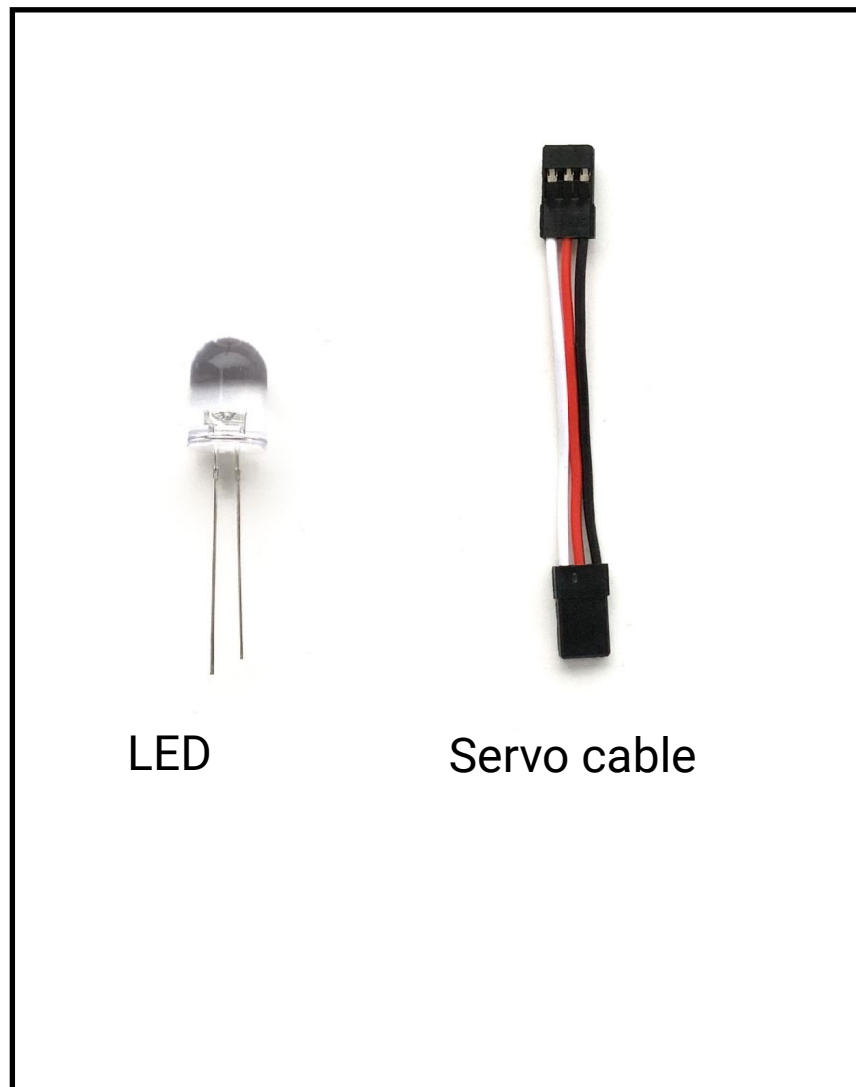
Servo cable

Insert the LED from the backside of the board.
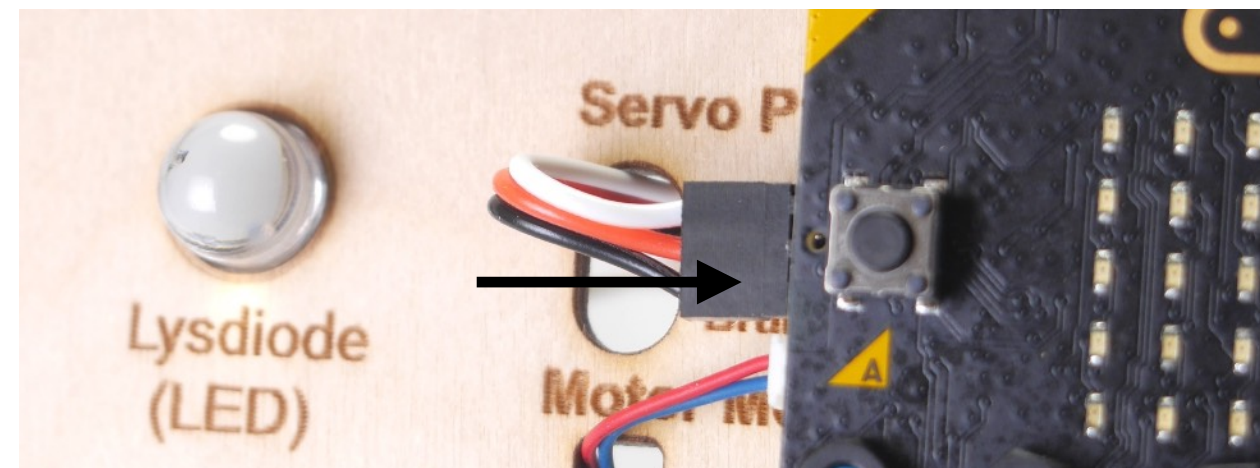
On the front side, the LED will appear like this.
Connect the servo cable like the picture shows.
Make sure you connect all three pins under the
micro:bit. White colour must be on top.

Mount the control unit
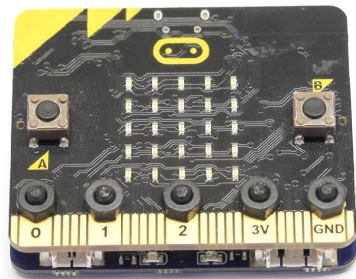
Control unit
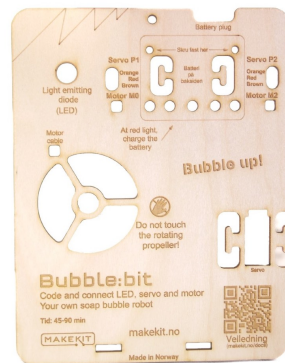
Mounting plate

2x nuts
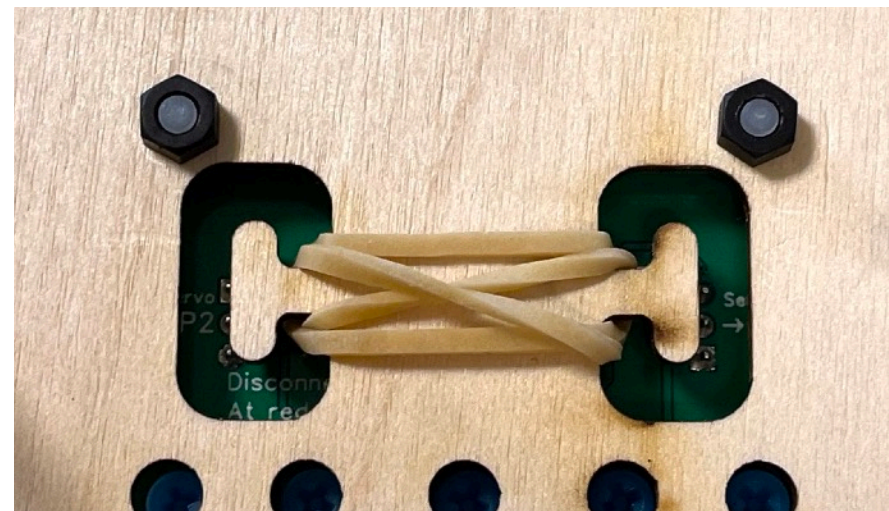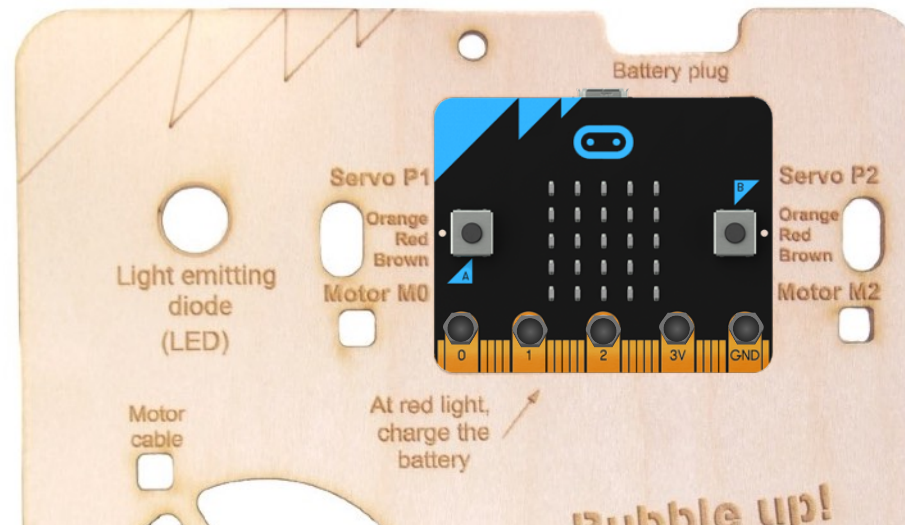
Place the control unit in place and secure it with two nuts on the back.

Start screwing with your fingers, tighten slightly with a socket wrench or nut tool

Mount the support

Support

Wedge

Insert the support from the back, like the picture shows.
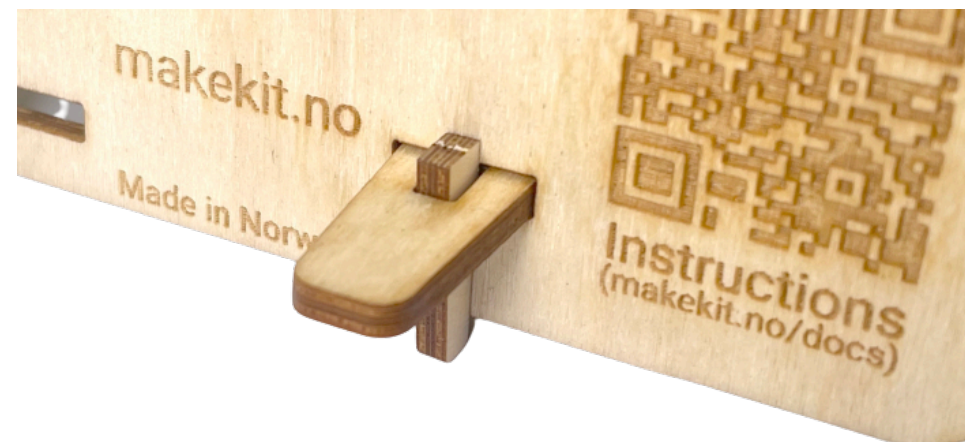
Lock the pin with a wedge on the front side.

Attatch the servo

Servo motor

1 large rubber ring
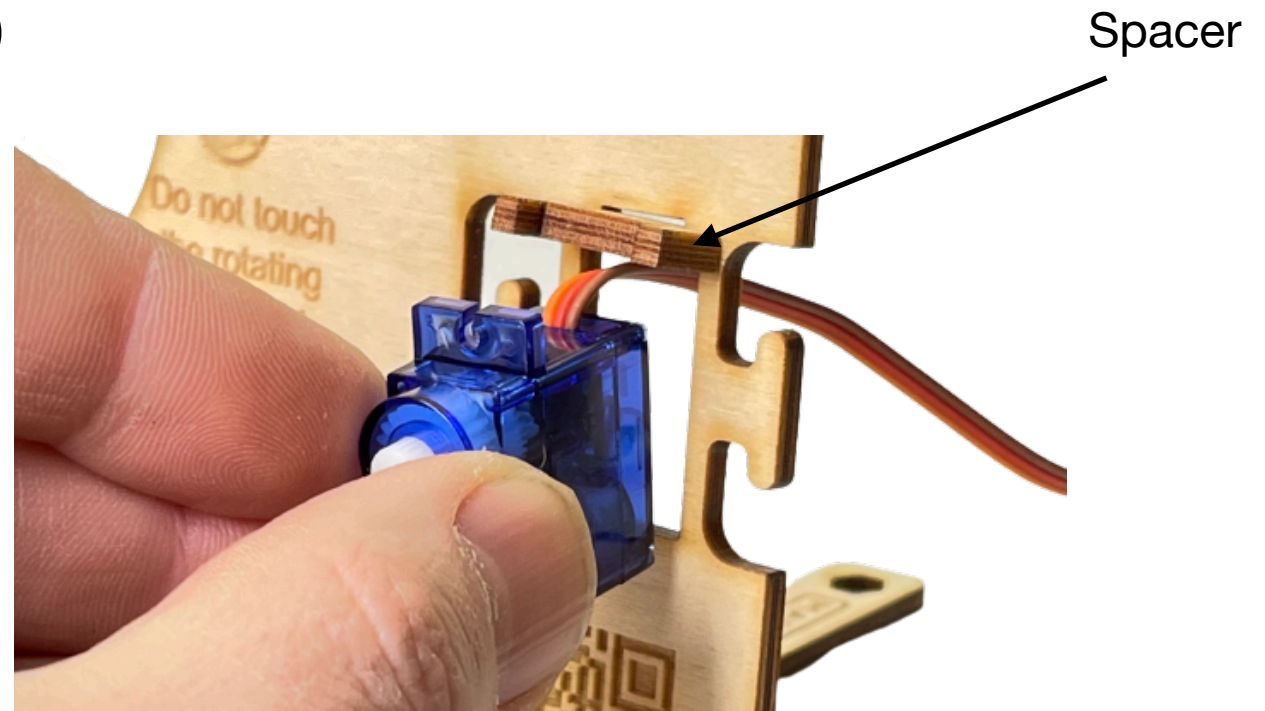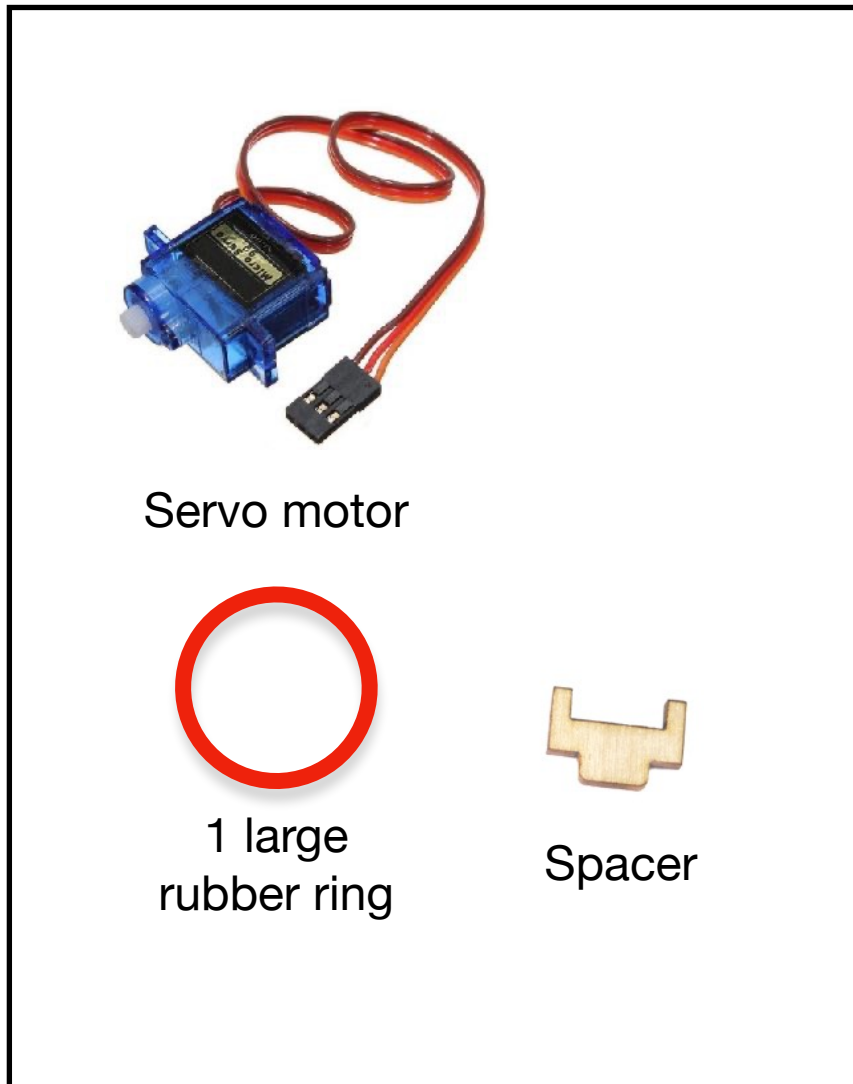
Spacer

Spacer

On the front of the plate, attach the spacer as shown in the picture. Feed the servo cable through the opening and press the servo into place.
Note that the servo is turned so that the wire comes up on the upper side.
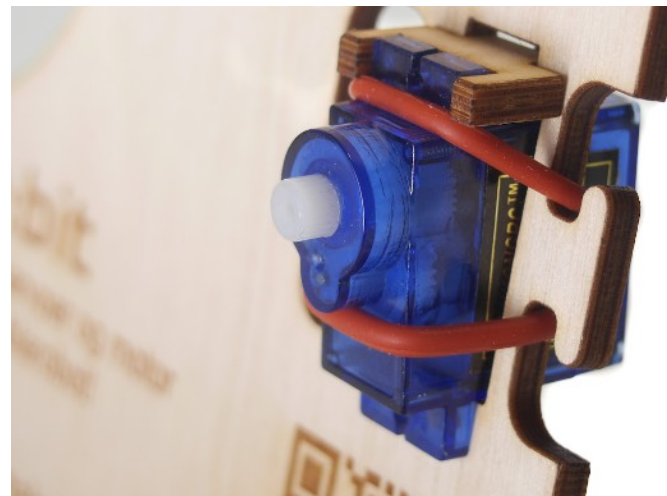
Press the servo into place and secure with a large rubber ring from one knob to the other.

Motor and propeller

Motor

Propeller

Small rubber ring
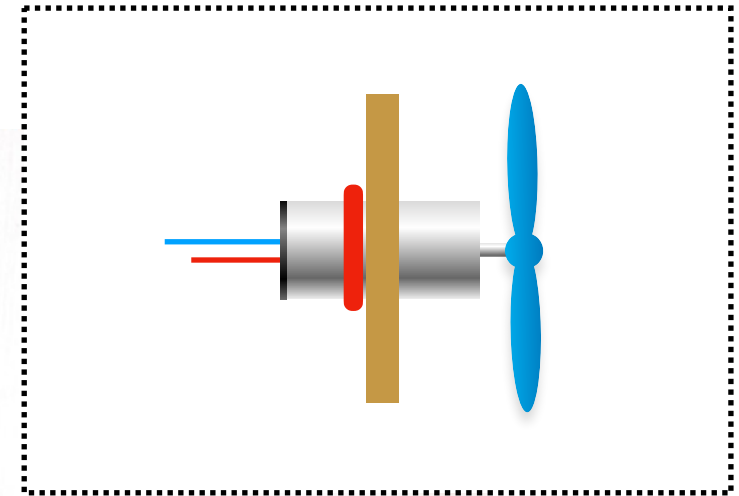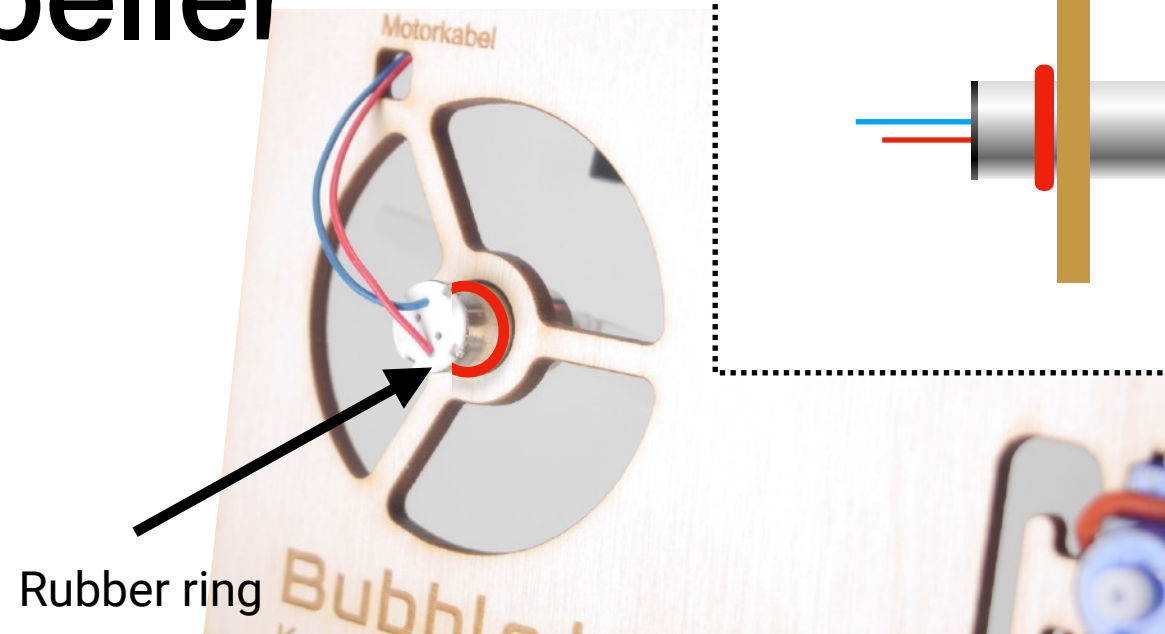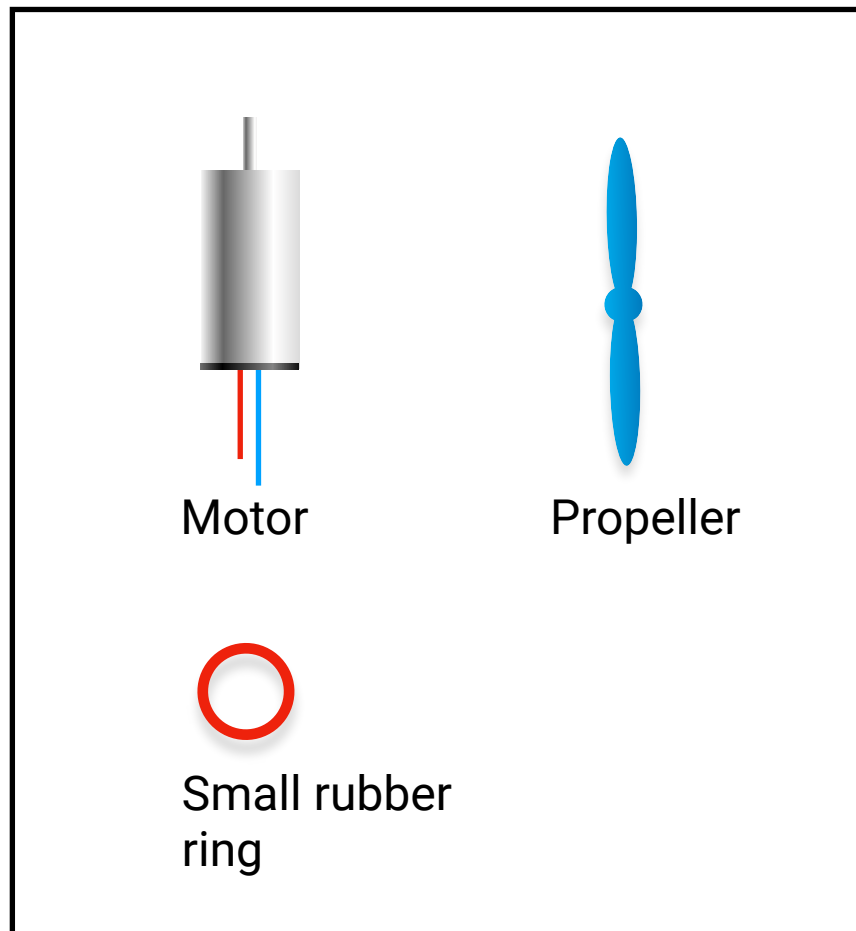
Rubber ring

Insert a rubber ring around the motor.
Press the motor into place and lay up the cable as shown in the picture. The motor should be a good distance in so as not to get in the way of the arm later.

Press the propeller into place on the back. Hold the back of the motor to prevent the base from loosening. The propeller does not need to be pushed in too hard, but should be slightly stuck.

Mount the arm
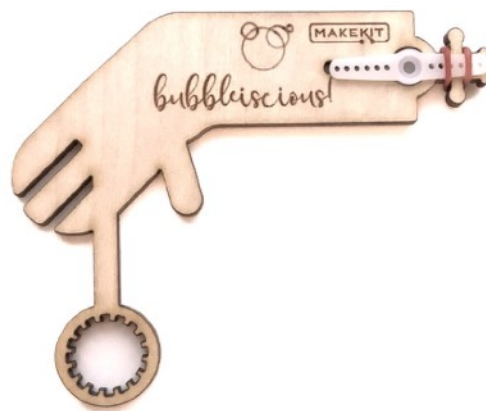
Arm with
servo-horn
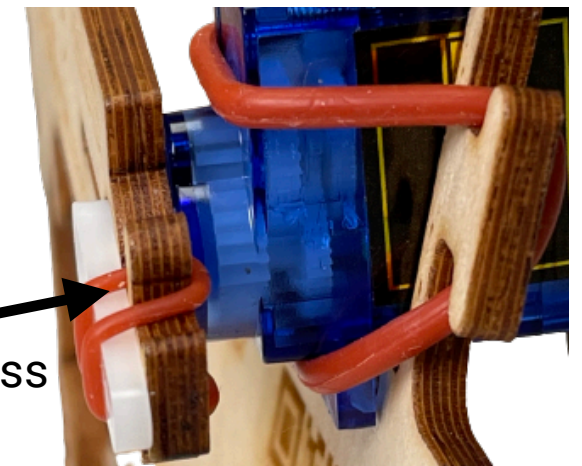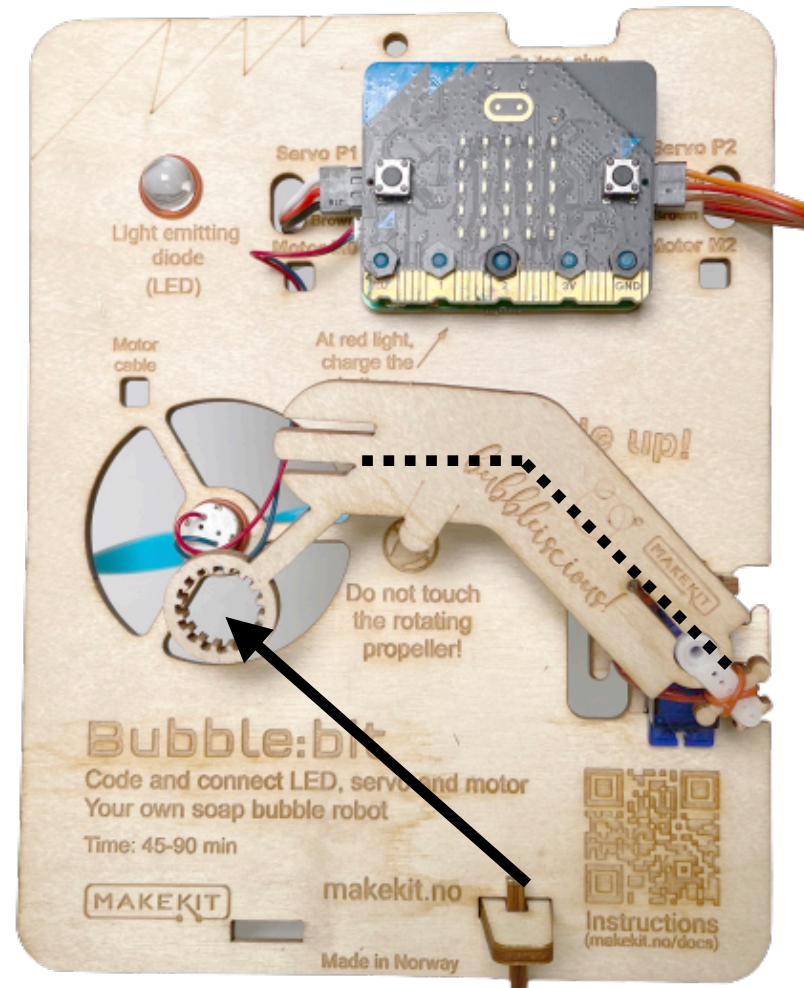
Press

Before attatching, position the arm in a rised position
so that the bubble nozzle is in front of the propeller
opening.
Press the arm onto the servo head.

**ATTENTION! Do not force the servo to rotate. This
can damage the gears inside the servo.**

Tip!
If you need to adjust the angle, lift off
the arm, rotate and press it on again.
Do not force the servo arm to rotate.

Download the code

You can find finished code at www.makekit.no/docs
Go to bubble bit. Select the code that matches the
color of the wonderkit circuit board (black or green
color)

It is easily downloaded by connecting the micro:bit
to a PC with the micro-USB cable. A drive called
micro:bit should appear. Copy over the .hex file onto
this.

You can also edit the code by going to
makecode.microbit.org and open the code there
(drag and drop from the file explorer or read more at
microbit.org

Chrome is the best browser for makecode.

Read more about getting started with micro:bit:

https://microbit.org/get-started/first-steps/set-up/
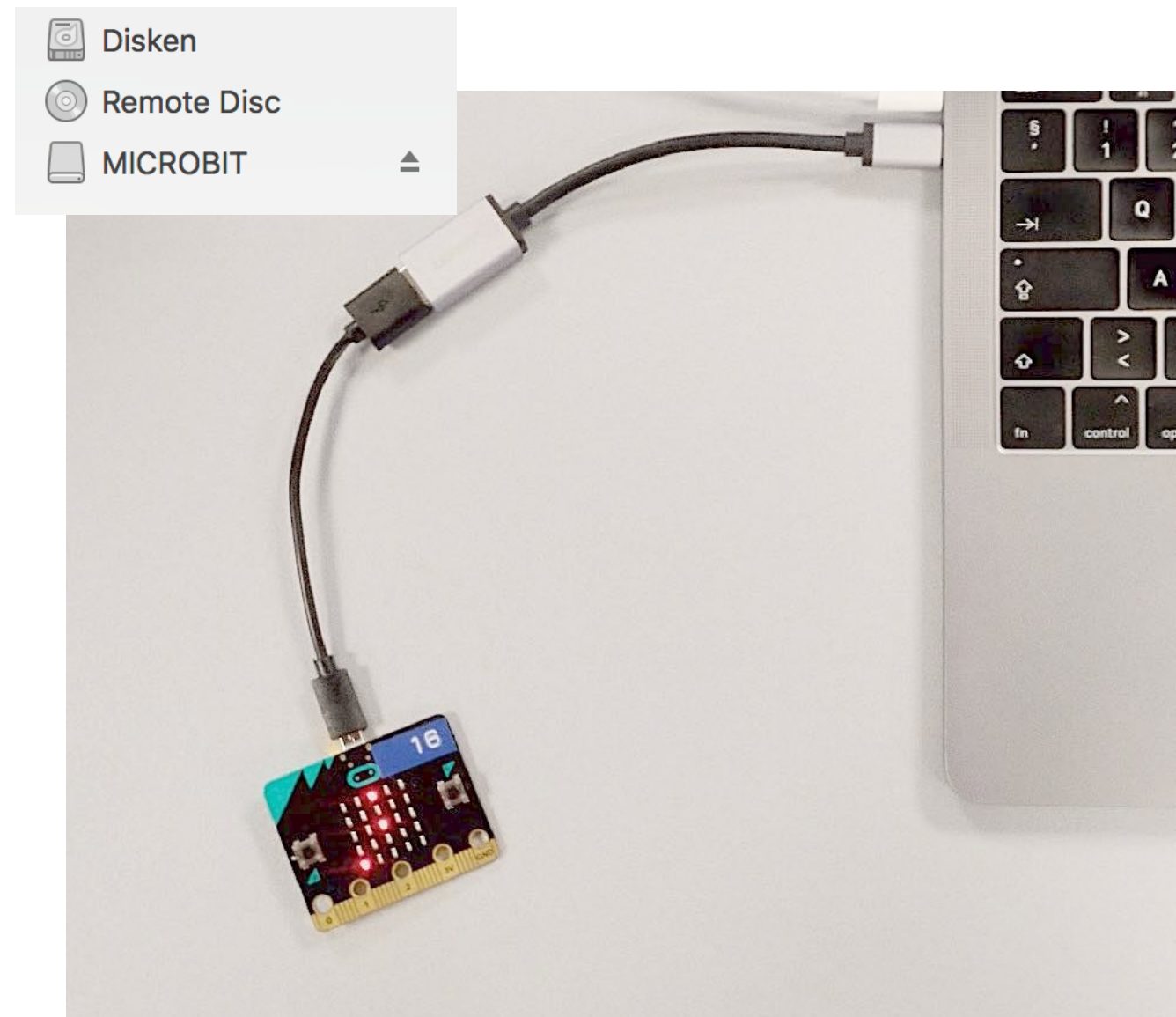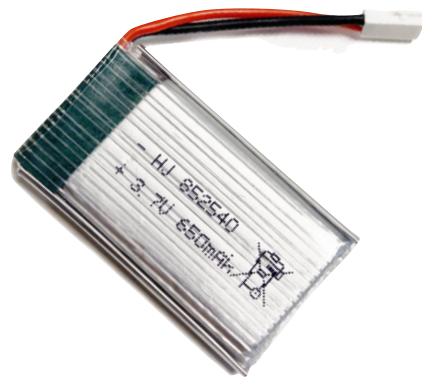
Battery

LiPo-Battery
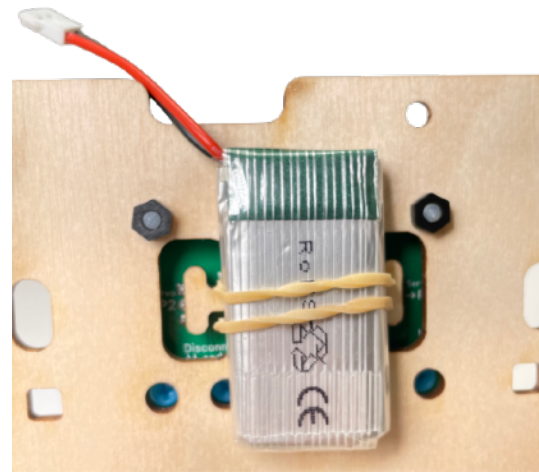
At the back, mount the battery into the rubber band at the back, behind the micro:bit.
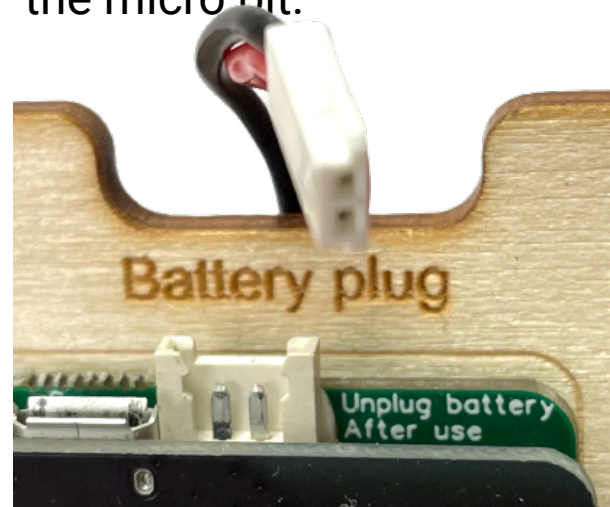
When you arent using the machine, always unplug the battery.
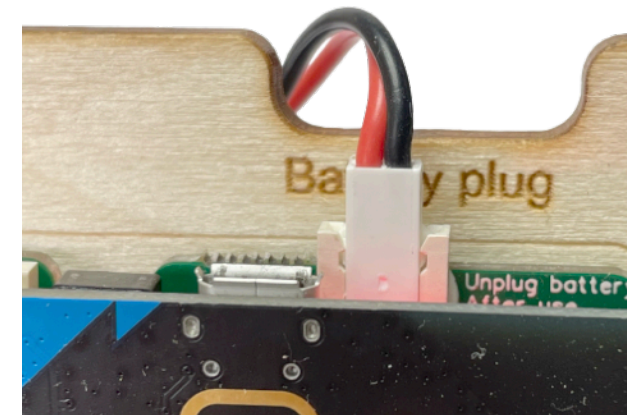
To power the device, go to the front side top over micro:bit and carefully connect the plug like this

Note:

You must connect the battery even if you are connected to USB. The motor and servo only get power from the battery. (The LED can light up with USB on a green card)

Connections

Battery

Led-cable
White must be on top

Servo P1

Motor M0

Light emitting
diode
(LED)

Motor
cable

Motor-cable

At red light,
charge the
battery

Bubble up!

Servo P2

Motor M2
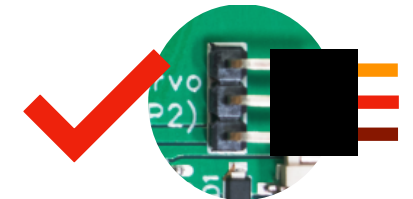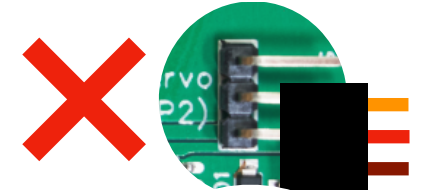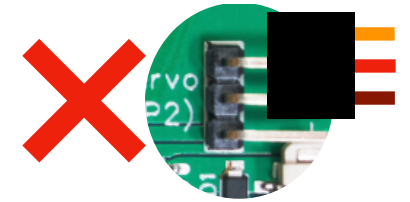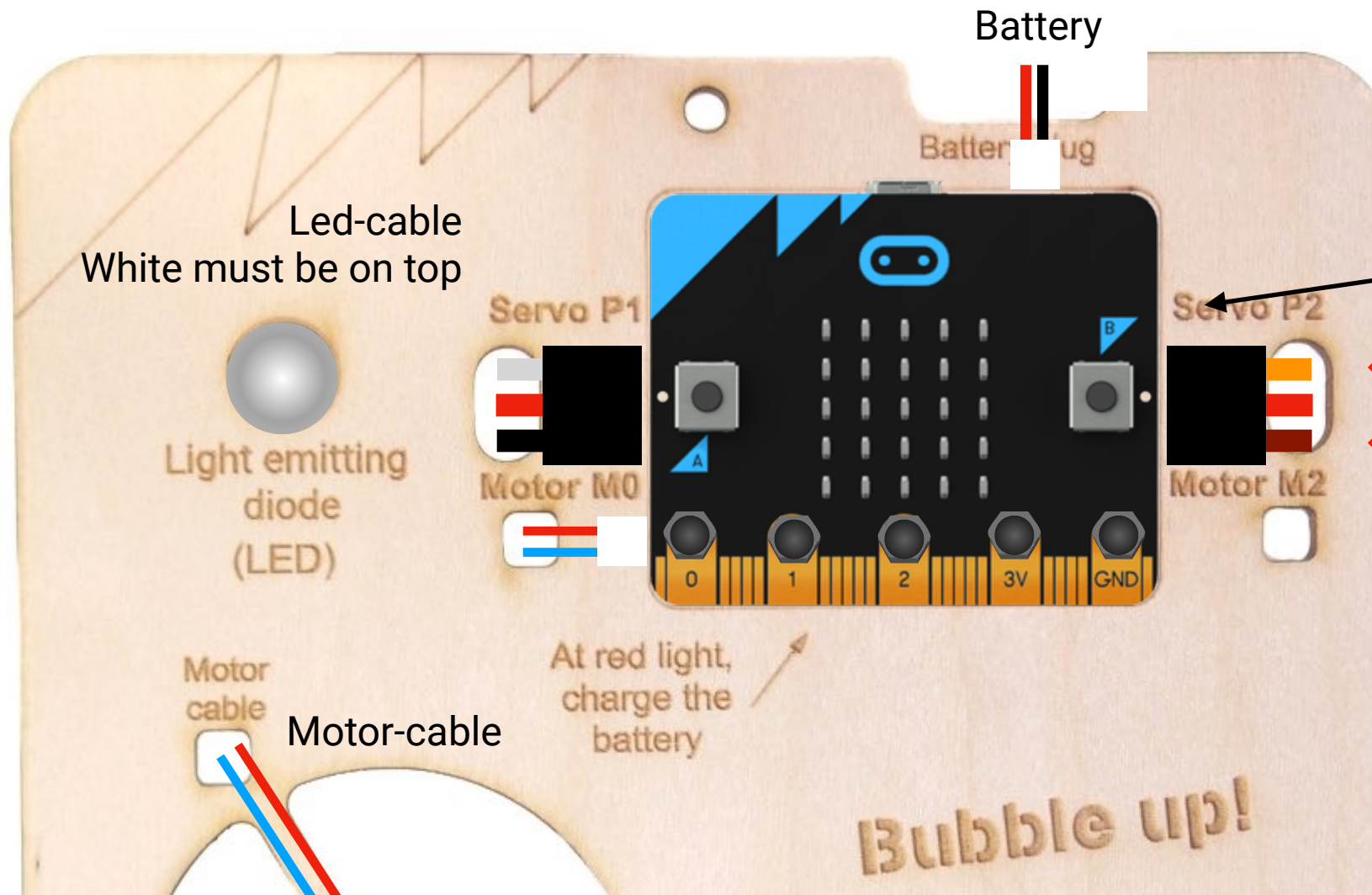
Servo cable:
Orange on top
Connect all 3 pins correctly
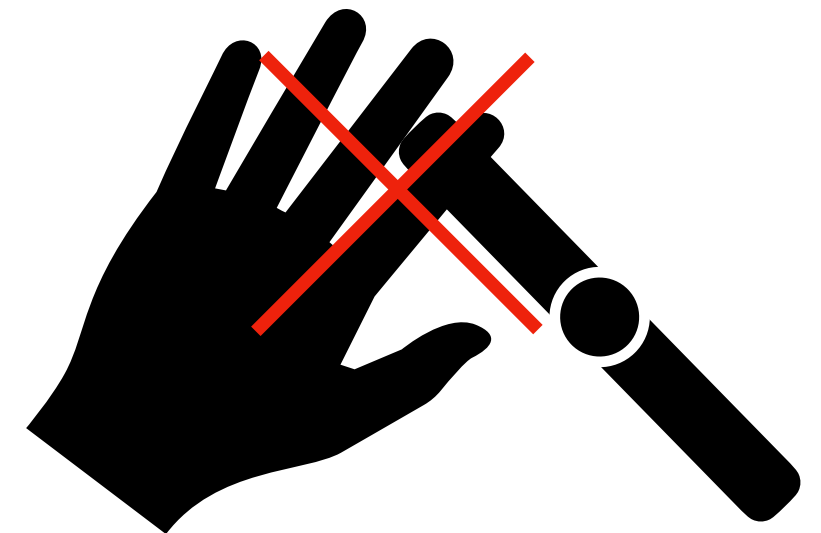
Connect the LED cable on the left side. White color must be up
Connect the servo cable on the right side. Orange must be up.
Connect the motor cable at the bottom left where it is marked "M0"

Attach the battery to the back and connect the power

ATTENTION! The propeller can spin very fast.
Keep your fingers away from the propeller when the battery is connected.

Bubble up!

Fill a small glass or cut-down plastic cup with soapy water or soapy bubble water from a toy/hobby store.

Connect the battery

Press button B to test. Stop with A again.

If the arm misses the airstream or cup, stop the machine, lift off the arm from the servo, adjust it, and press it back into place.

Do not force the arm to move and do not block the movement.

Disconnect the battery when finished.

About the code

The variables **topAngle** and **bottomAngle** indicate where the arm should start and stop. The bottom angle must be such that the arm is able to dip the "soap ring" completely into the water. The top angle must be "low" enough for the hand to lift the ring in front of the air from the propeller. **fanTime** is how many seconds the arm is in front of the propeller before the soap runs out. **fanPower** is the speed of the motor and can be up to 1023. If the power is too low, the bubbles will not be inflated. Too much force, and the bubbles burst. The running variable determines whether the machine should work or go into pause mode, and can be changed with buttons A and B.

To control the servo, we use the block **servo write** and select P2 as the servo is connected to P2 (see mounting plate). To control the motor, we use **analog write** and select P0. To control the LED, we use **digital write** and select P1. **Analog write** can also be used here, as long as the number is between 0 (darkest) and 1023 (brightest)
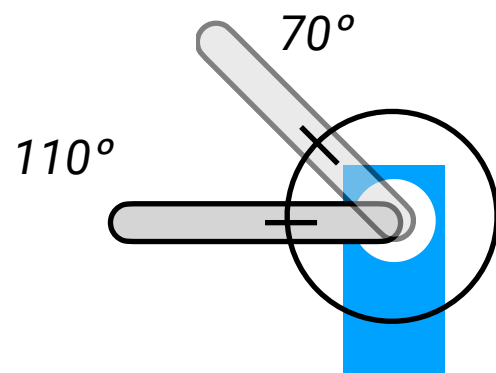
Different angles gives different rotation. Please note that decreasing the angle makes the servo rotate clockwise. Thats why the top angle is lower than the bottom angle.

Things to try:
Can you get the machine to start with a loud sound (micro:bit V2) or perhaps with extra bright light from a flashlight?

Basic operation (micro:bit V1 and V2)

Default values and measure ambient light

on start
set topAngle to 70
set bottomAngle to 110
set fanTime to 1
set fanPower to 150

Press B to start bubbles, A to stop

on button B pressed
set running to true

on button A pressed
set running to false

Flash the LED, more flash if running bubbles. It is controlled via P1

forever
if running then
  digital write pin P1 to 1
  pause (ms) 500
  digital write pin P1 to 0
  pause (ms) 500
else
  digital write pin P1 to 1
  pause (ms) 50
  digital write pin P1 to 0
  pause (ms) 1000

Control the motors and servo.
P0: Motor (0-1023)
P2: Servo (0-180)
Set the proper topAngle and bottomAngle for the servo to dip the cup and raise up to fan level.

Select fan power (default is 150 out of 1023). More power is more but smaller

forever
if running then
  servo write pin P2 to bottomAngle
  analog write pin P0 to 0
  pause (ms) 1000
  servo write pin P2 to topAngle
  analog write pin P0 to fanPower
  pause (ms) fanTime × 1000
else
  servo write pin P2 to topAngle
  analog write pin P0 to 0

Display bubble animation if running, else: advice to press button B

forever
if running then
  show leds
  show leds
  show leds
  show leds
else
  show string "Press"
  show arrow East

Sound and light activated code (micro:bit V2)

Default values and measure ambient light

Press B to start bubbles, A to stop

Enable/disable light detection

If loud sound, run bubbles for 1 sec

```
on start
    set topAngle to 70
    set bottomAngle to 110
    set fanTime to 1
    set fanPower to 150
    pause (ms) 100
    set ambientLight to light level
    pause (ms) 100
    set ambientLight to light level
```

```
on button A pressed
    set running to false
```

```
on button B pressed
    set running to true
```

```
on loud sound
    set running to true
    pause (ms) 1000
    set running to false
```

```
on button A+B pressed
    if lightDetection then
        basic.showString("LD OFF",50)
        set lightDetection to false
    else
        basic.showString("LD ON",50)
        set lightDetection to true
    set ambientLight to light level
    show number ambientLight
```

```
forever
    if lightDetection then
        if light level < ambientLight - 10 then
            set running to true
            pause (ms) 3000
            set running to false
```

See if a shadow appears above the micro:bit, the shadow must be below the ambient light in the room.

```
forever
    if running then
        digital write pin P1 to 1
        pause (ms) 500
        digital write pin P1 to 0
        pause (ms) 500
    else
        digital write pin P1 to 1
        pause (ms) 50
        digital write pin P1 to 0
        pause (ms) 1000
```

Flash the LED, more flash if running bubbles

```
forever
    if running then
        show leds
        show leds
        show leds
        show leds
    else
        show string "Press"
        show arrow East
```

Display bubbles if running, else: advice to press button B

```
forever
    if running then
        servo write pin P2 to bottomAngle
        analog write pin P0 to 0
        pause (ms) 1000
        servo write pin P2 to topAngle
        analog write pin P0 to fanPower
        pause (ms) fanTime x 1000
    else
        servo write pin P2 to topAngle
        analog write pin P0 to 0
```

Control the motors and servo. Set the proper topAngle and bottomAngle for the servo to dip the cup and raise up to fan level.

Select fan power (default is 150 out of 1023). More power is more but smaller bubbles.

Make a crazy bubble carousel!

1. Use the cup holder and wedge and mount the cup.
2. Hang the machine by a thread.
3. First put little or no liquid in the cup.
4. Start the machine.

Now the machine will start spinning for a while. Gradually the speed slows down. Then you can fill in soapy water.

If everything works, the machine should now spin around slowly while shooting bubbles in all directions.

Note! Watch your fingers (propeller) and take into account that there may be some spillage under the machine.

If you don't want a rotating machine, hang it on a thick wire, steel wire or use two wires.
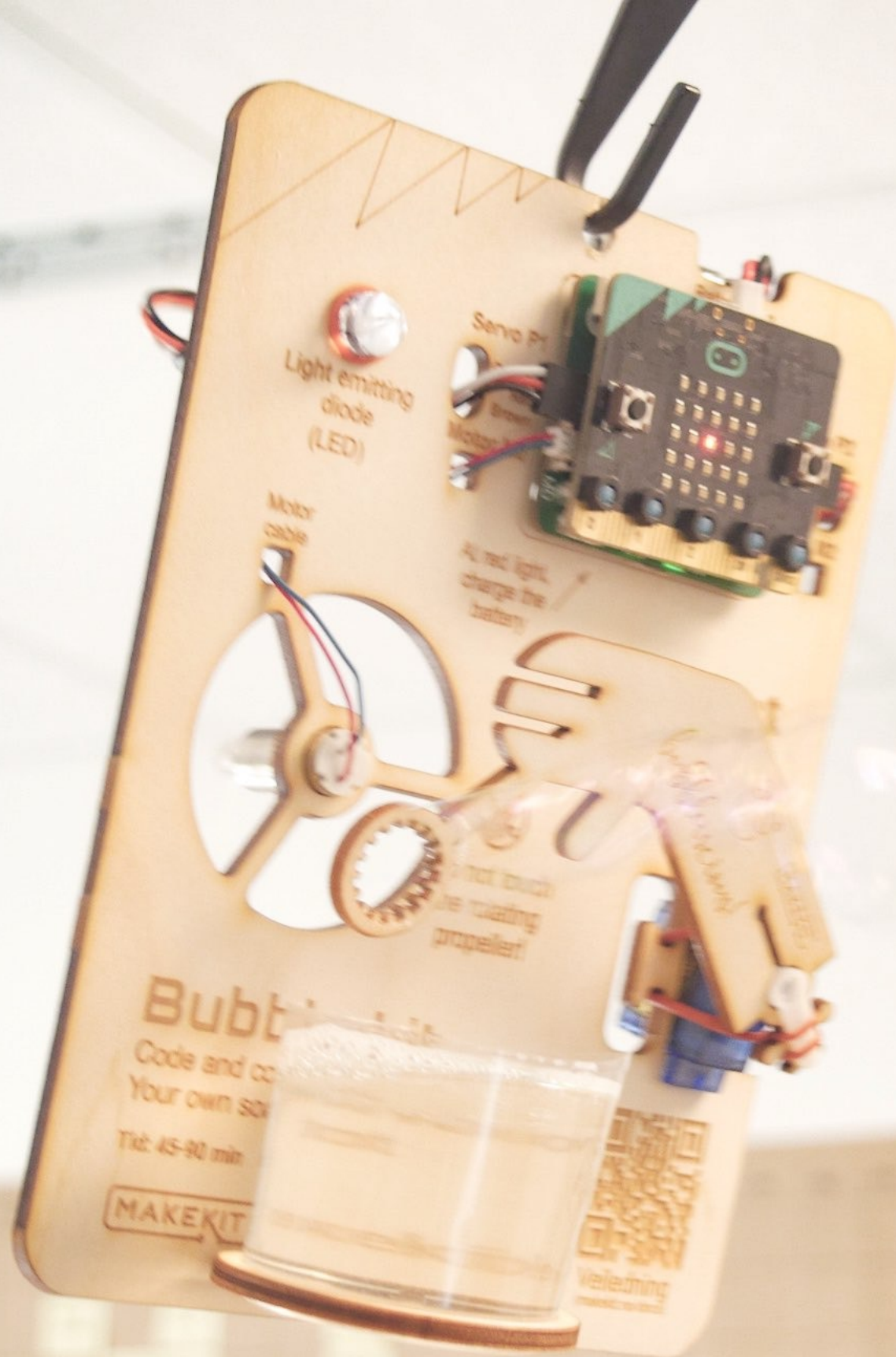
Contact us:

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,
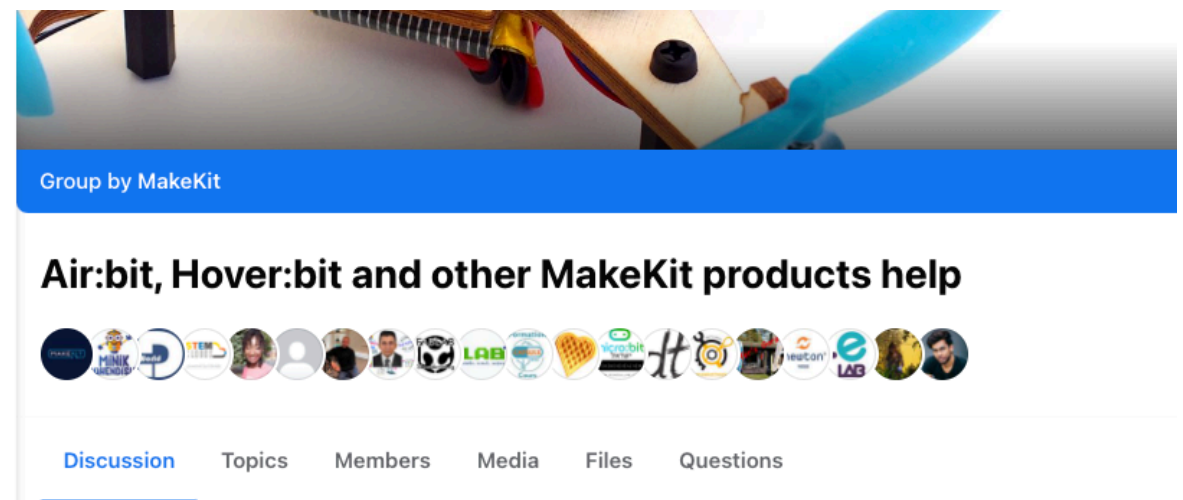Chief product
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