Snow:bit
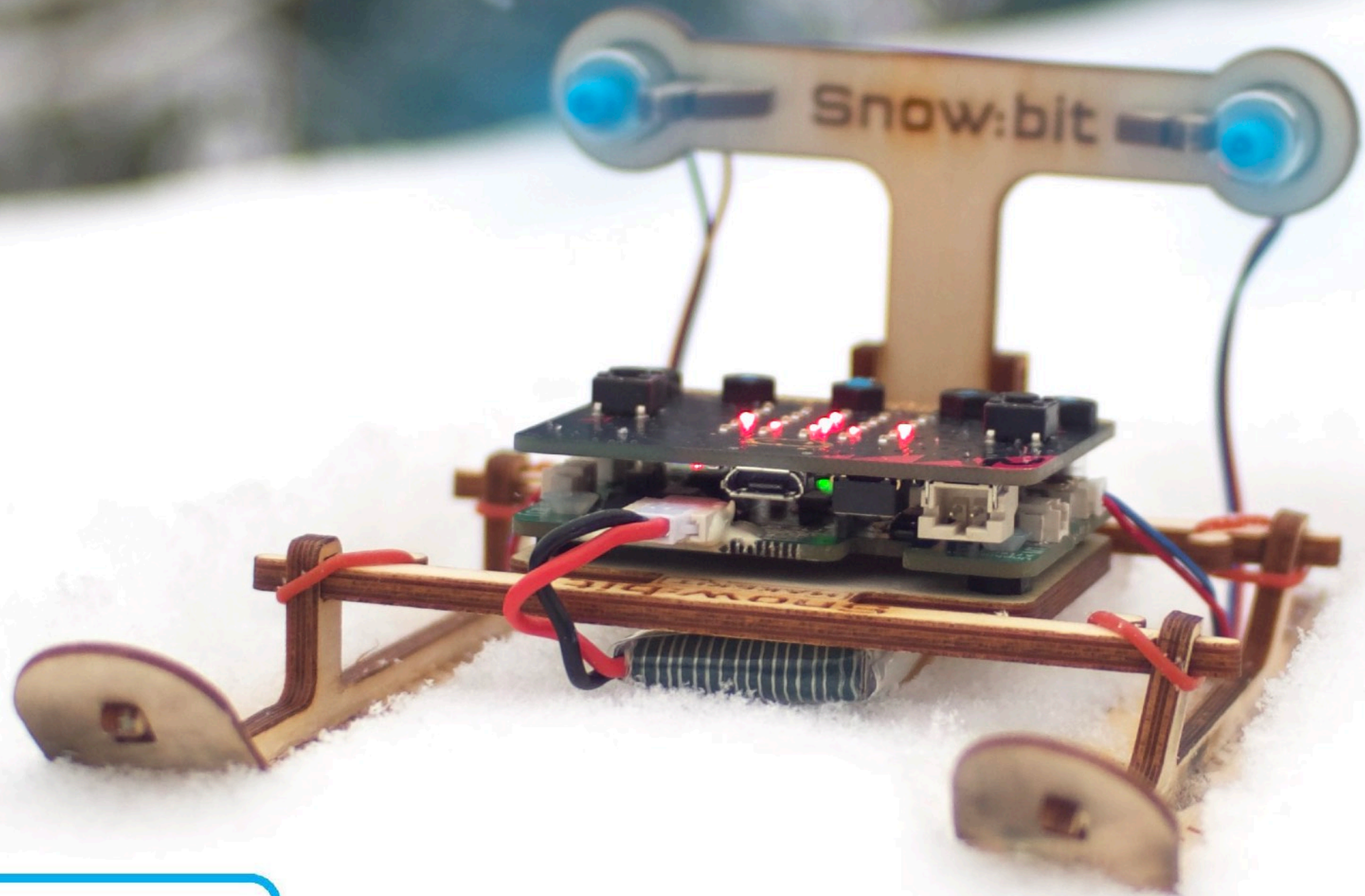
About us

Snow:bit is designed and manufactured in the old premises of Tanbergs Radio Factory at Skullerud in Oslo.

We welcome your questions and feedback. Please do not hesitate to contact us! Feel free to use our facebook chat as well.

🏠 www.makekit.no

✉ support@makekit.no

f makekit

📷 gomakekit (også twitter)

Store manager Connie does everything from order processing to soldering printed circuit boards
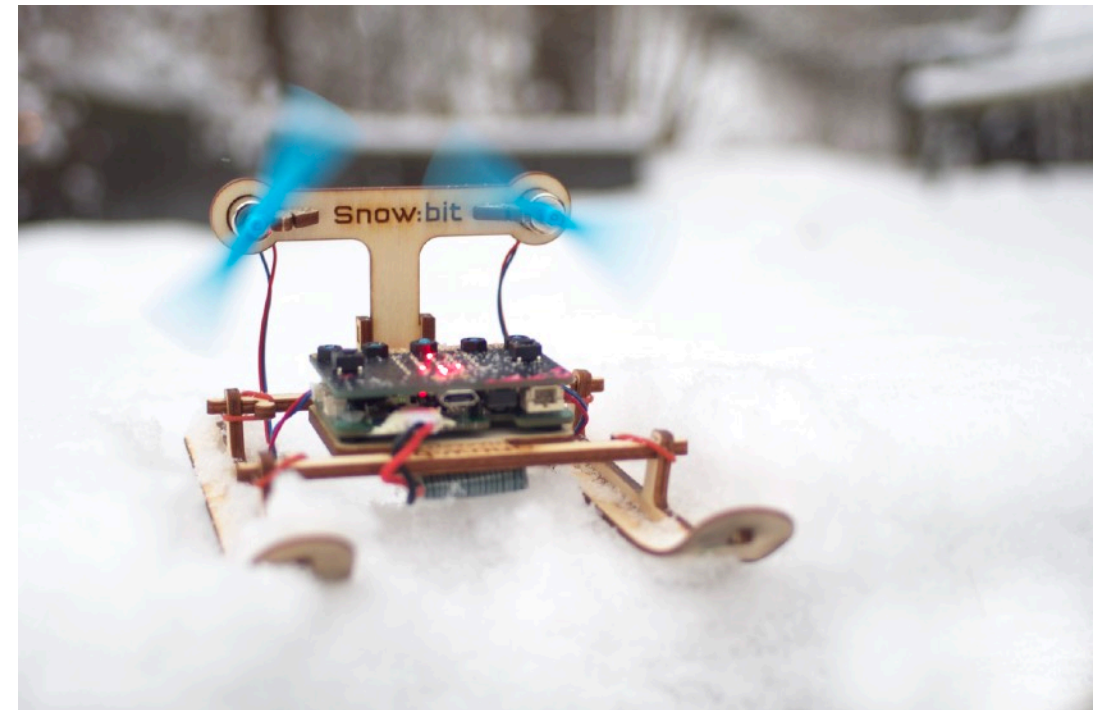
*Henning and Steinar
At the Tandberg-exhibition at Skullerud*

A true STEAM kit

Snow:bit is an electric sled for snow and ice. It uses two powerful engines/propellers for propulsion, and for steering. Snow:bit works best on flat, level surfaces.

Snow:bit is based on bent skis of thin birch veneer, which bend with steam.

Important safety measures

For the strong power needed, a rechargeable lithium battery is used in snow:bit. On rare instances, the lithium batteries can catch fire.
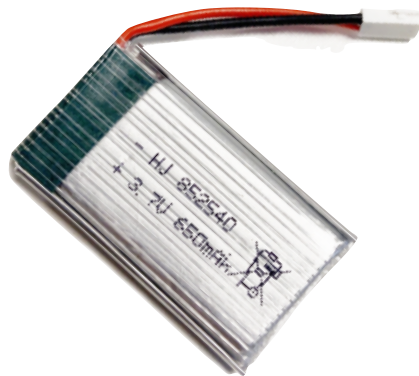
- Don't charge the batteries unattended
- Never puncture and never use a damaged battery
- Do not short circuit the battery
- Avoid temperatures below -10 and +50 degrees celcius.
- Always have a plan for what to do in case of a fire: If you are indoor, open a window and get the battery outside to prevent smoke or fire.
- Do not open or modify the battery in any way.
- For optimal performance, store the battery at around 50% capacity and between 10 and 20 degrees celcius
- Follow airport regulations for carrying lithium batteries on airplanes. (Usually hand luggage only)
- Don't use batteries that are colder than 15 degrees celcius, to prevent excessive wear.
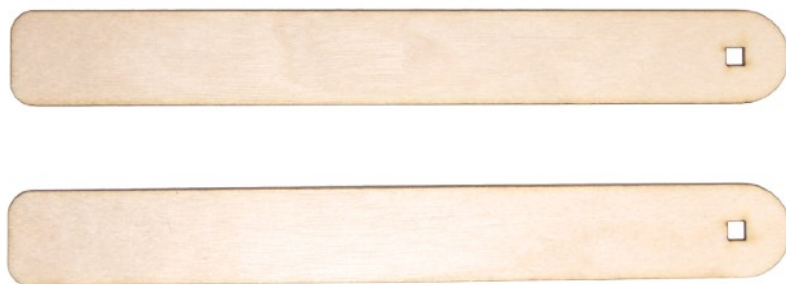
Teacher: If you are a teacher, you can keep the battery in a separate place until the snow:bits are built and ready to be programmed.
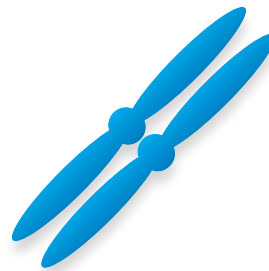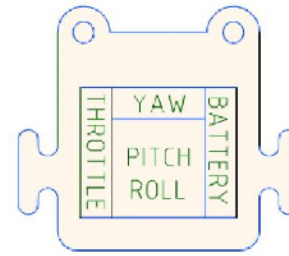
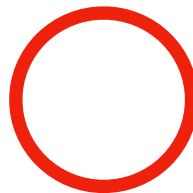# Parts

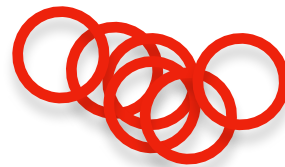## In the box (Standard kit):
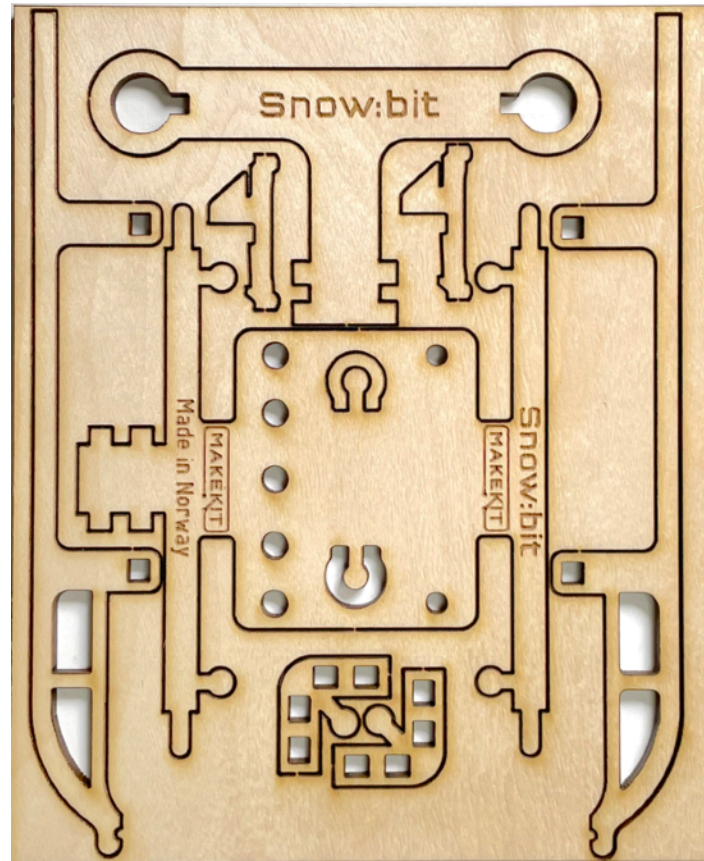
Wood parts

Ski

2 CW propellers

Remote holder

Large rubber ring

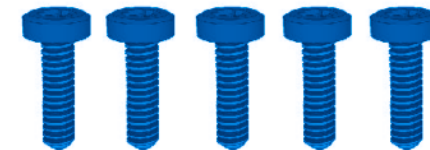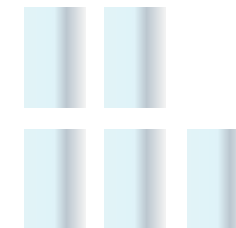5 small rubber rings

Rubber Band

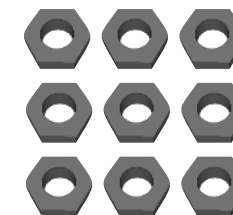1x Zip-bag 6x8 cm

1x Zip-bag 12x8 cm

2x 6 nylons screws m3x8

5x m3x12 nylon screws Blue
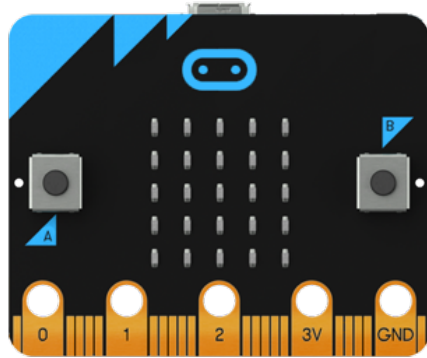
2x m3x12 screw, white
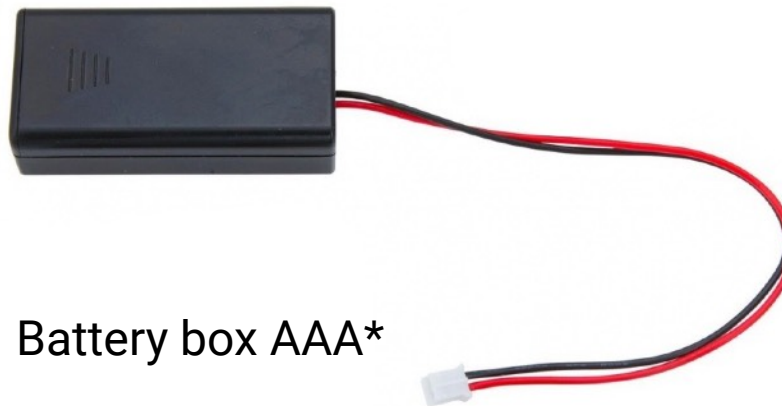
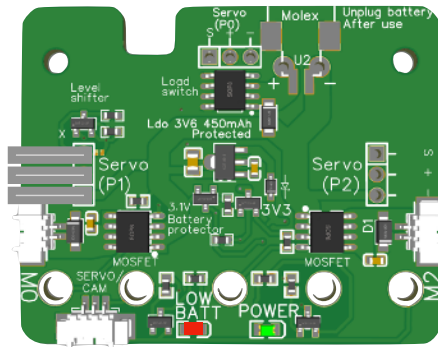5x spacers, aluminium

11x Nuts
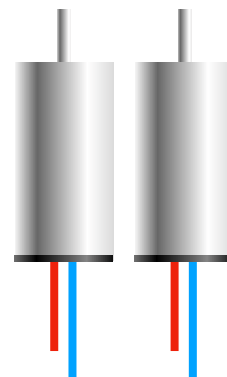
Parts

Electronics

1 x micro:bit*

Battery box AAA*

1 x Green control board*

2x Motors

1 x USB Charger

Re-chargeable battery (LiPo)

*Micro:bit, green card and certain small parts comes with certain kits and might not be included

Recommended tools

Clamps
(Possibly Wood Clamps)

Pot and Stove
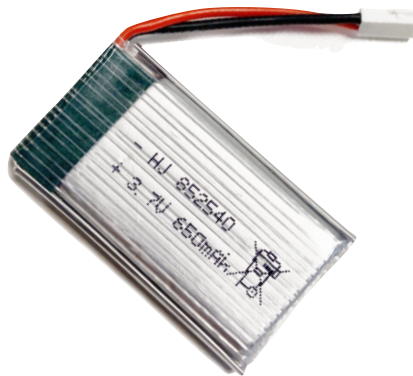
Pliers

Wood Glue

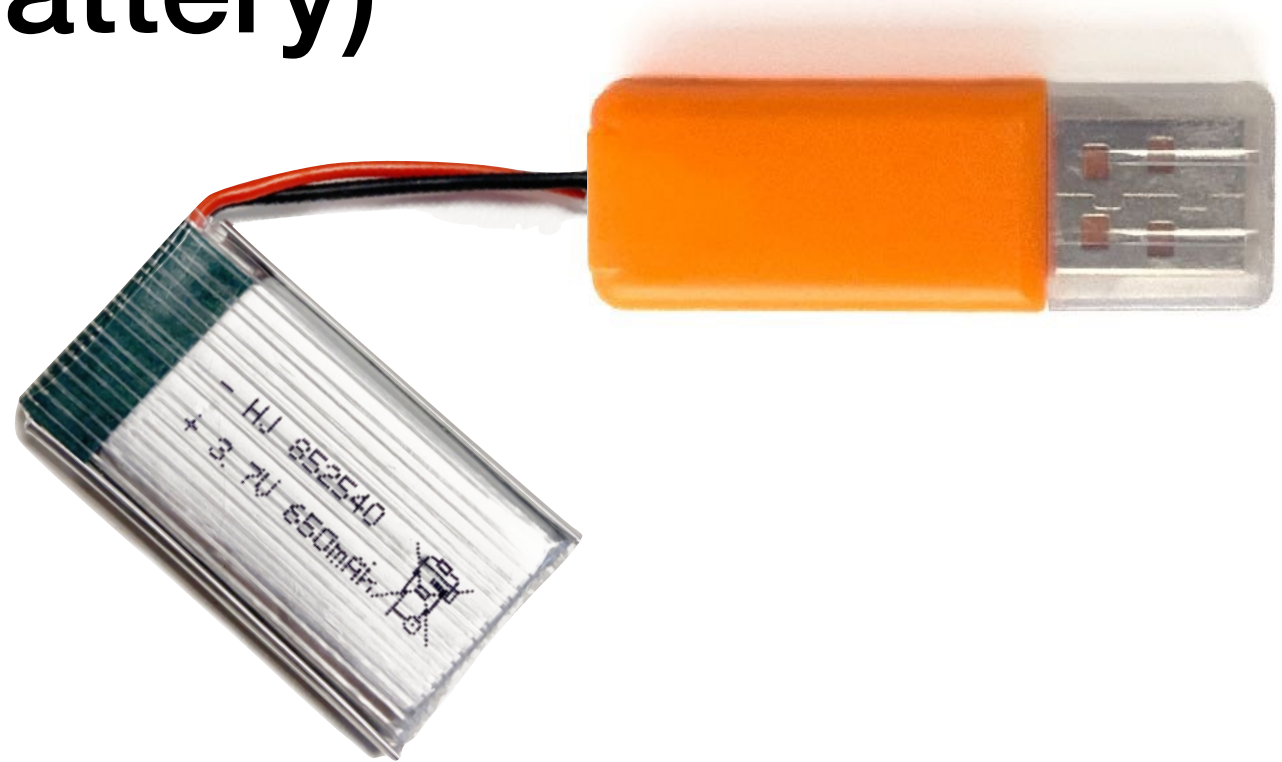Scissors

Charging (grey battery)

Parts:

Usb-charger

LiPo-Battery

An orange charger comes with the green card. First, plug the battery into the charger. Next, plug the charger into a USB outlet. The orange lights come on until the charger is finished after 1-2 hours.

Note! For safety reasons, lithium batteries should always be charged under supervision.
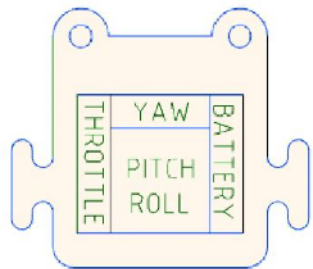
Assemble the remote

Tools: Philips Screwdriver

Parts:

2 nylon screws m3x8

2 nylon nuts m3

Remote holder
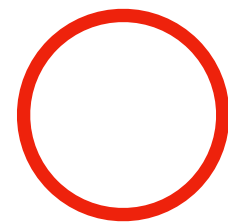
Red silicone ring
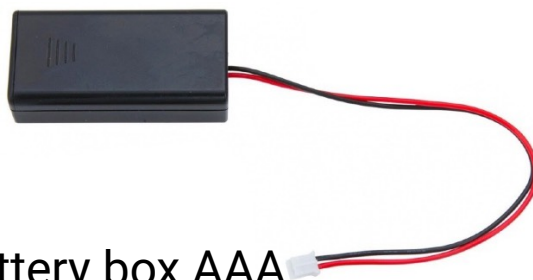
Battery box AAA
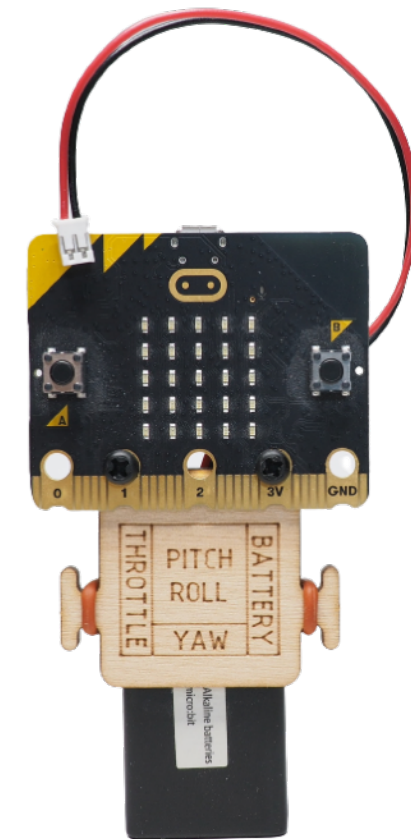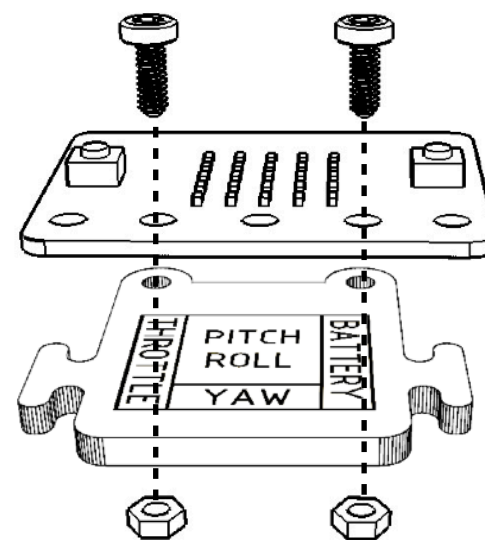
- Place the micro:bit with screen facing up on top of the holder and mount it with the screws somewhat tightened
- Mount battery box with the silicone ring
- You can use different battery boxes

Connect control board

If you have already made this part, for instance hoverbit or wheelbit, you can use a ready-made card + micro:bit. Jump three pages ahead.
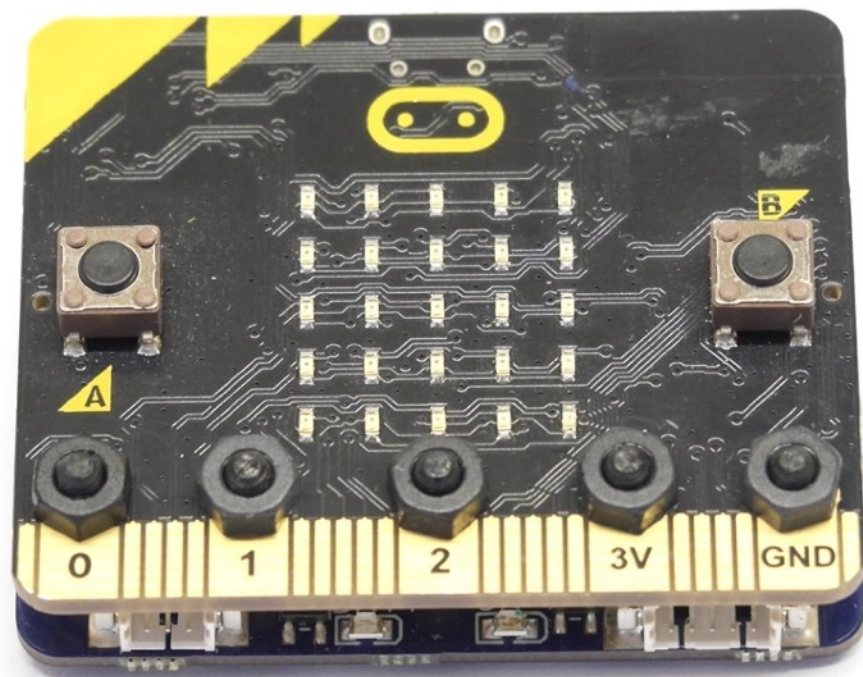
Front side

Back side

Connect control boards

Tools: Small Phillips screw driver, socket wrench

Deler:

2 stk
nylons screws

2 stk
Nylon nuts m3
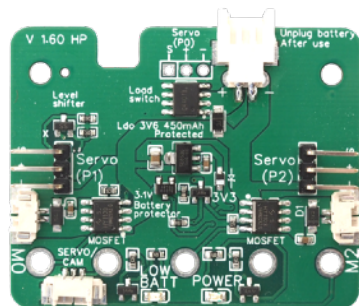
Control Card
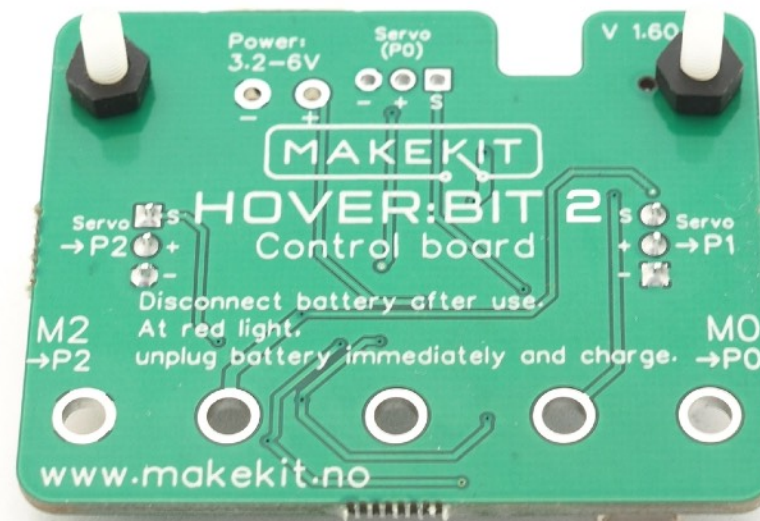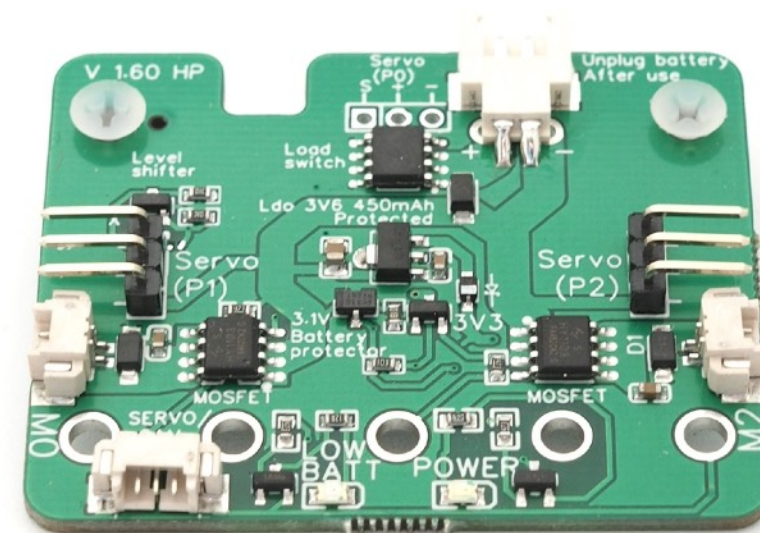
Insert the screws from above. Screw a nut to the bottom of the card.

Spacer

Tools: Small Phillips screwdriver
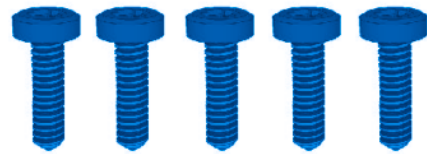
Parts:

5x m3x12
nylon screws, blue
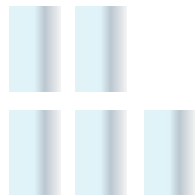
5 stk
Alu-spacers
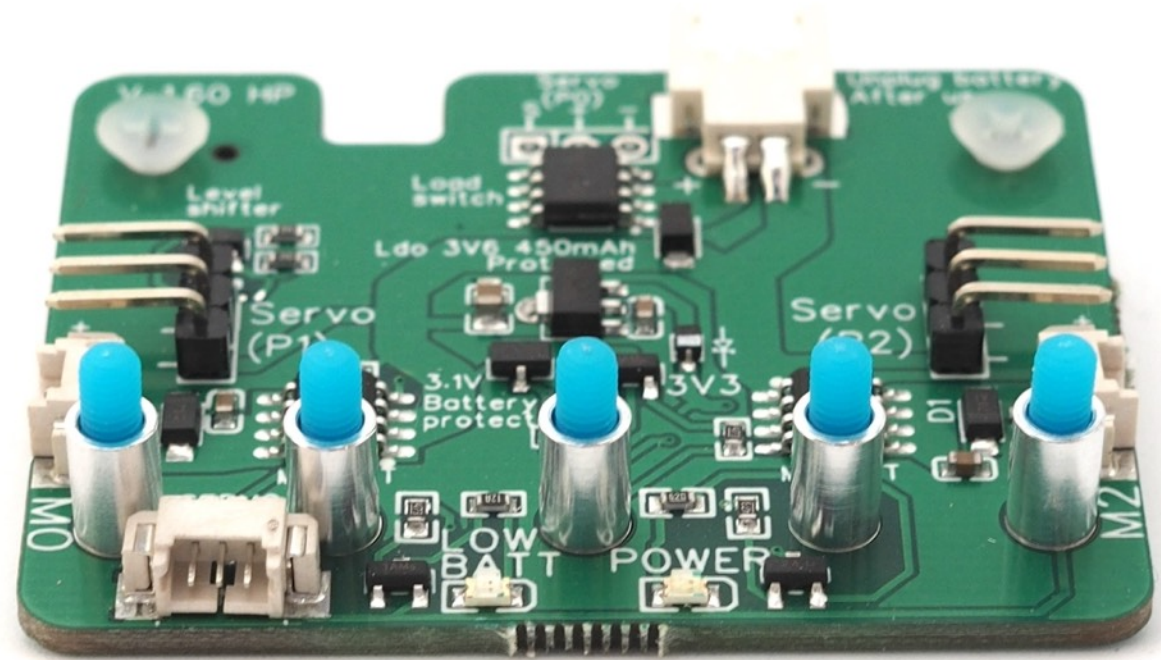
Put in five screws, pointing upwards. Thread on an aluminium spacer on each screw

Attach the micro:bit

Tools: Small Phillips Screwdriver, socket wrench

Parts:
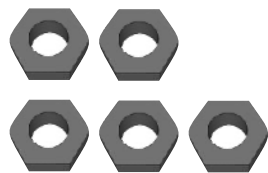
5 nuts
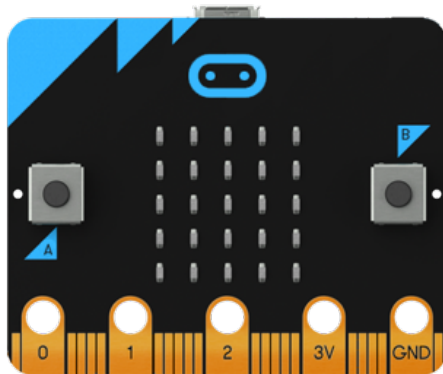
micro:bit
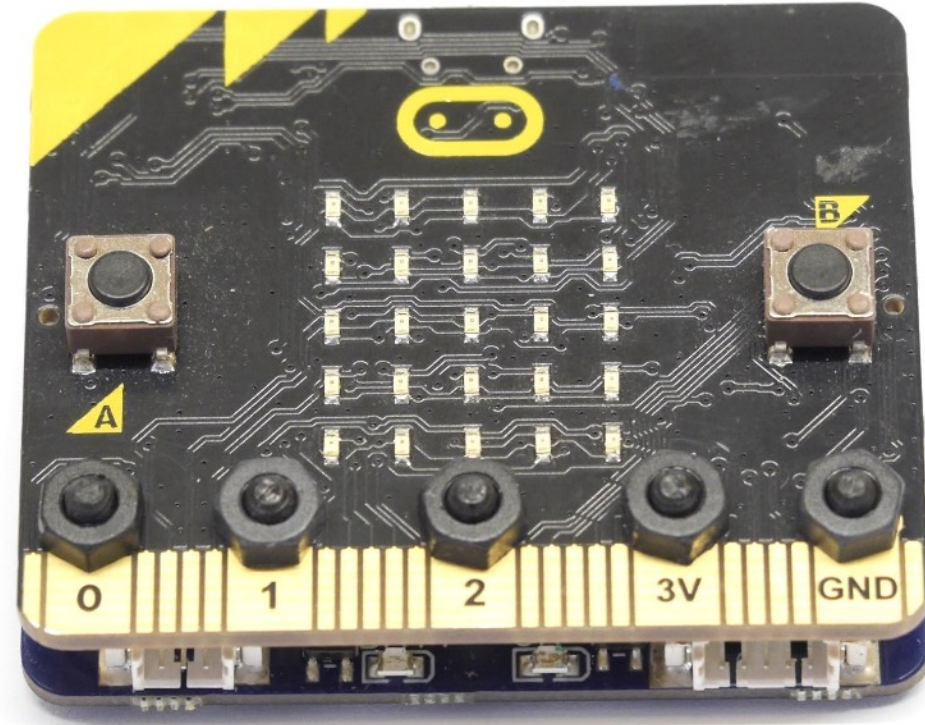
Place the micro:bit over and screw on the five nuts on top. Tighten the nuts on top (a little), so there will be close and good contact.

Bending the skis

Tools:
Pot of boiling water, cooking tongues

Parts:
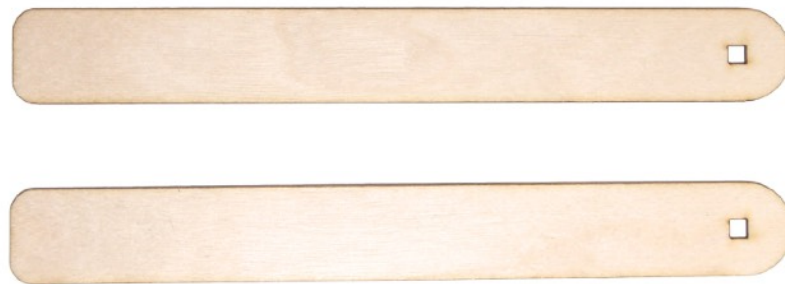
Ski

Fill up about 5 cm with water in a saucepan and bring the water to a boil.

Hold or leave the tip of the ski into the boiling water for at least 3 minutes.

Use tongs or sausage clips so you don't get hot steam on your hands.

Take up the ski and let it dry for a few seconds. Now you can soon bend the tip upwards without burning your fingers.

Take care not to crack the ski. Repeat on the other ski.

Gluing the Skis

Tools:
Wood Glue, Kitchen Roll, clamps

Parts:

Ski
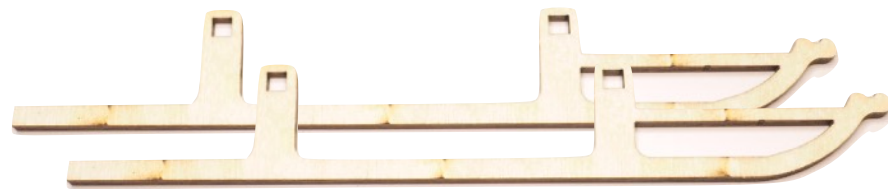
Runners

Hook/click the tip of the runners on the ski so it's stuck.

Place a thin strip of glue over the entire center of the ski or the runner

Pinch together so there is pressure all the way under the ski. Wipe off glue that comes outside. Repeat on the other ski.

Assembly 1

Tools:

Parts:
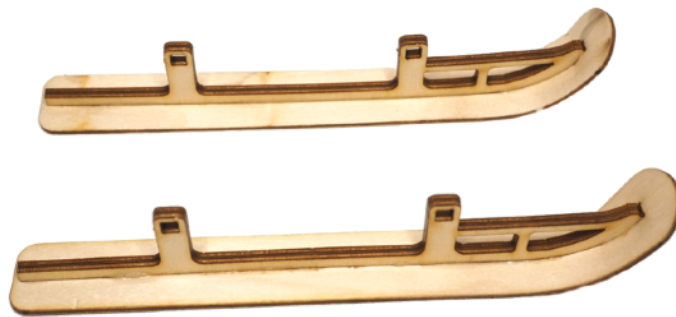
Ski with Mows
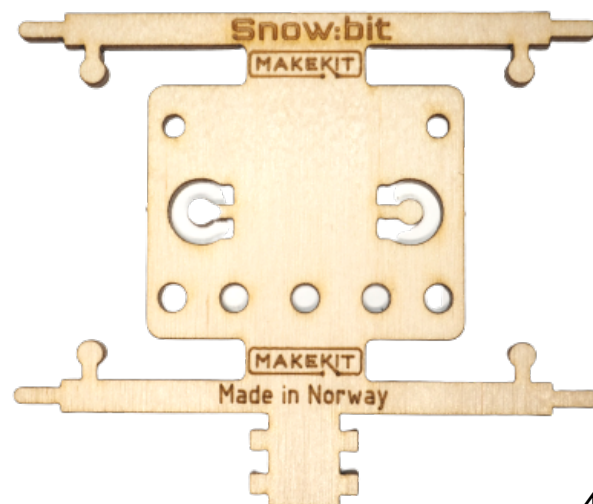
Senter plate

4 small rubber rings
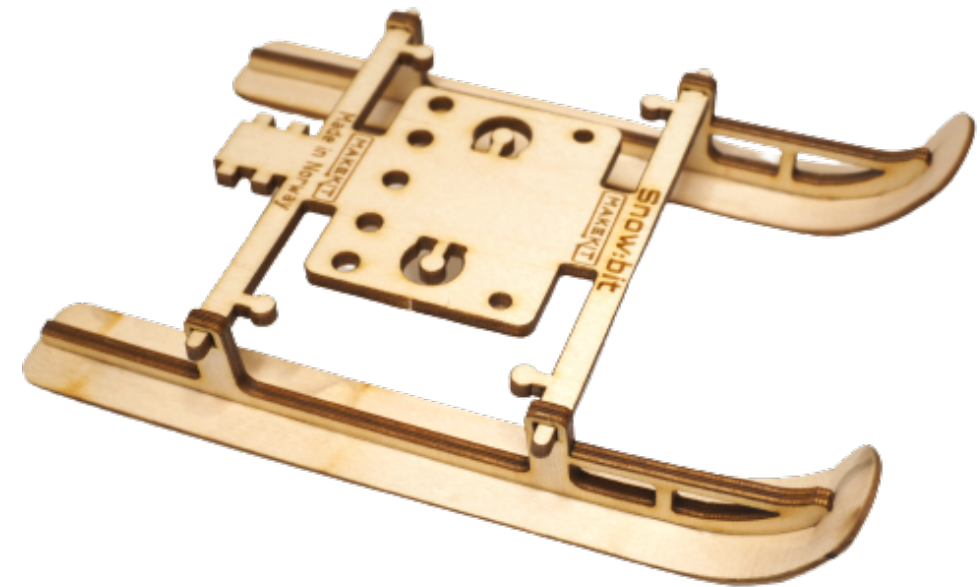
Put on the on the center plate so that the "snowbit" writing is at the front.
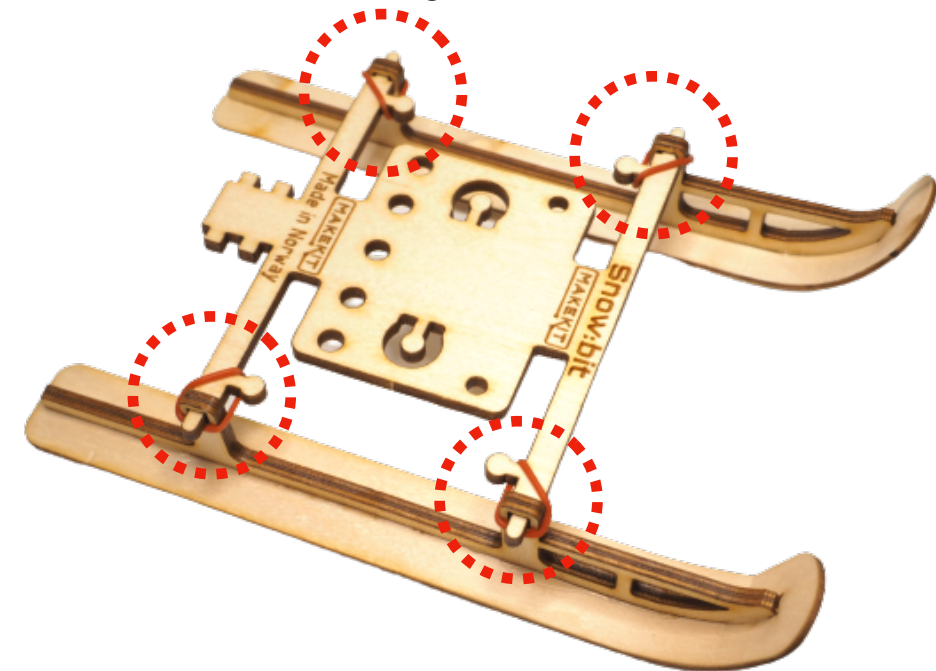
Put on the rubber rings to hold it all together.

Assembly 2

Tools:

Parts:
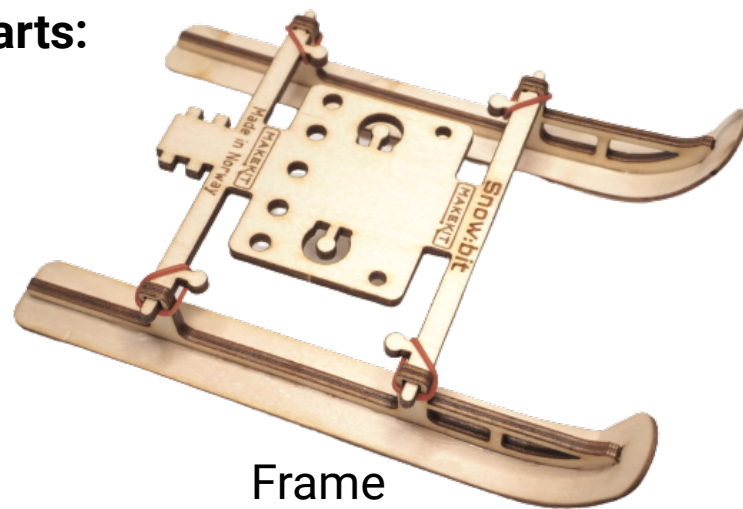
Frame

Motor holder

Small rubber ring

Corner mounts

Wedges
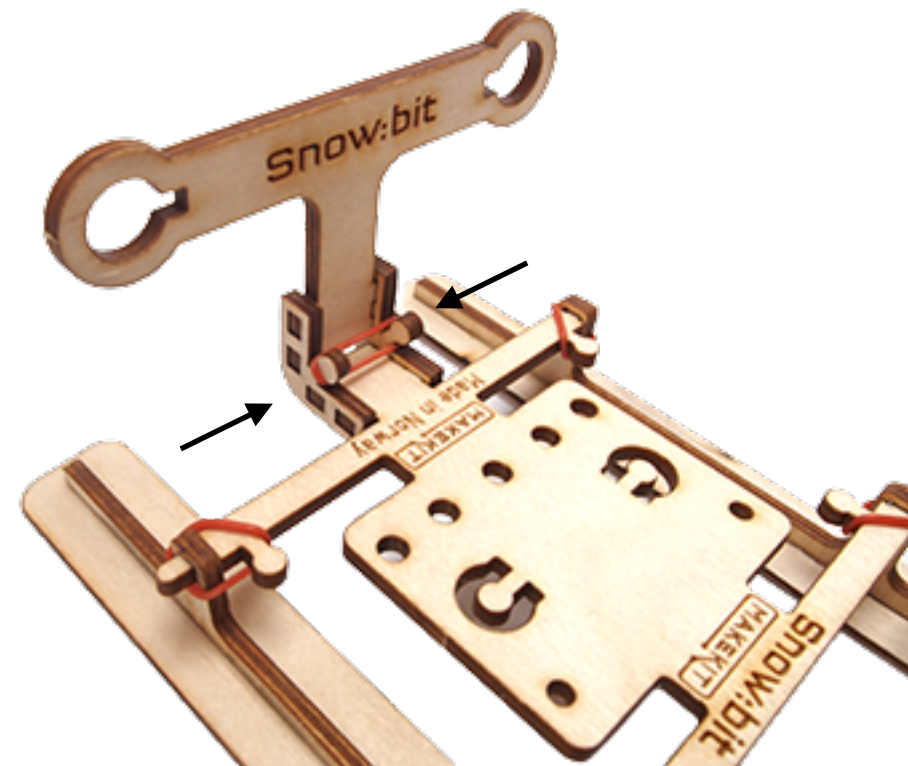
Secure the engine holder with the corner mounts. Pull over a rubber ring to hold them together.
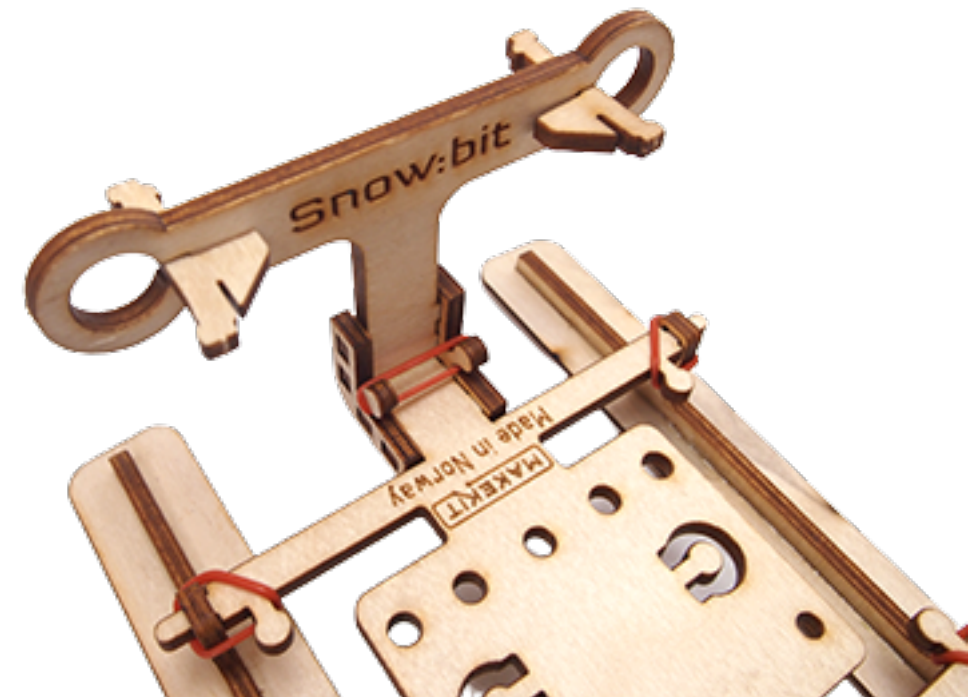
Press the wedges on top of the engine holder. They should be fully inserted to make room for the motors.

Assembly 3

Tools:

Parts:
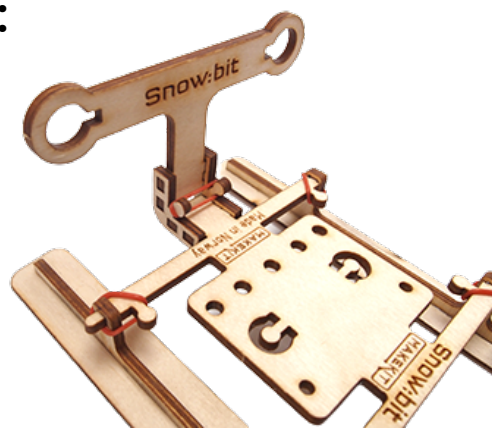
Frame
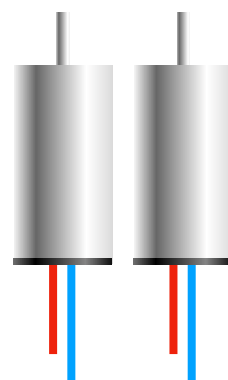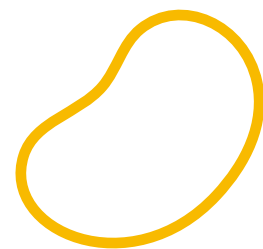
2x Motors   Rubber Band
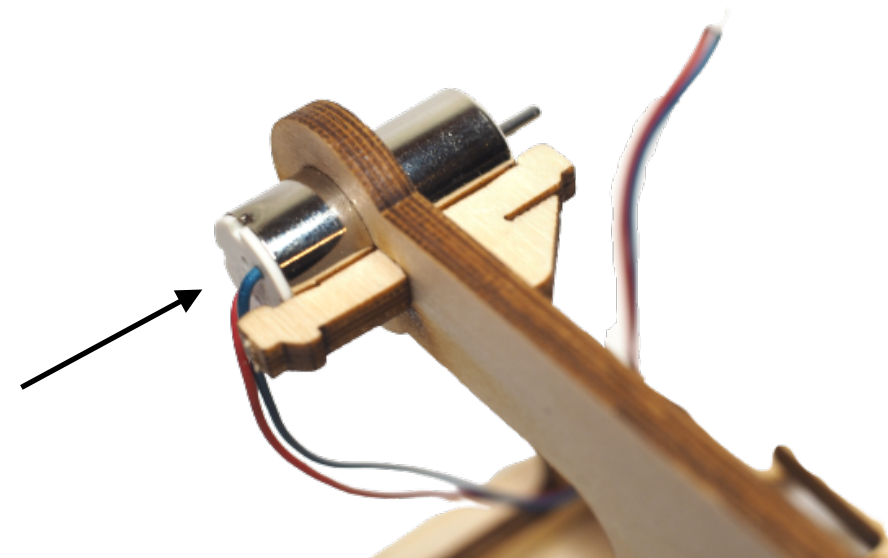
Push the engines forward so they click into place. If it's slow, try pressing the wedges more to make room for the engine.
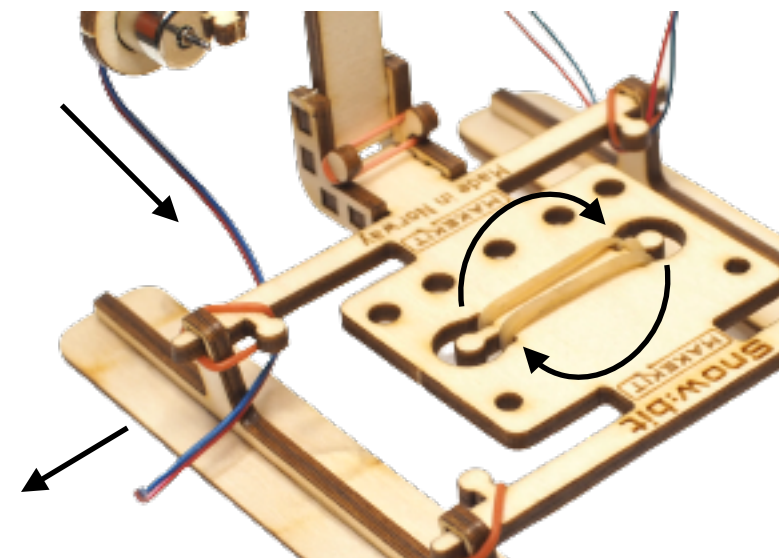
Pass the rubber band between the knobs on the underside and the top side of the plate so that it becomes tight.

Guide the wires through the frame as shown in the picture so they go clear of the propellers that come later.

Assembly 4
Protection

Tools:
Scissors

Parts:
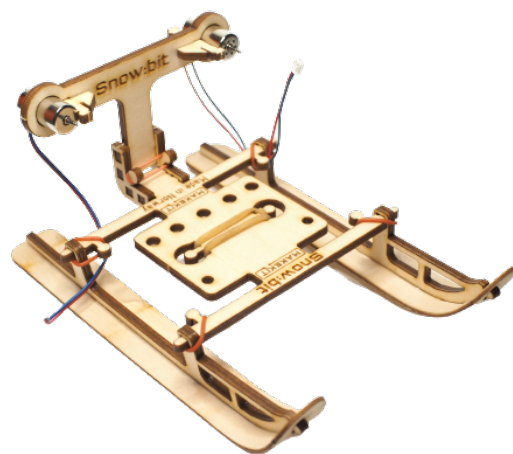
Frame
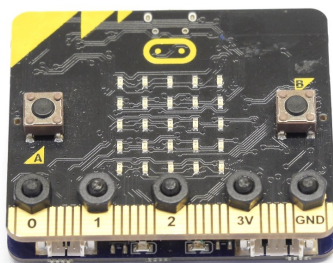
2x Nuts

Micro:bit +
green or black
card

Small zip-bag
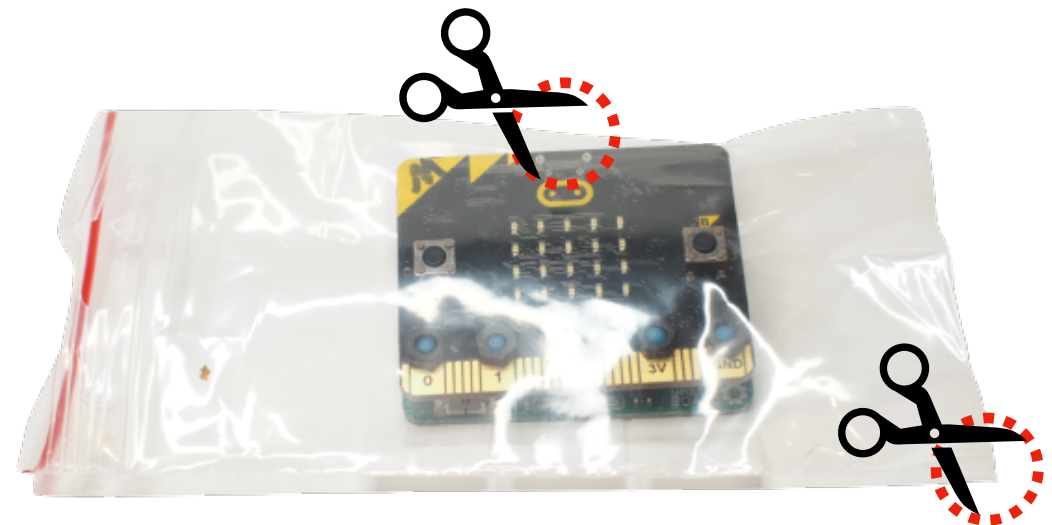
Place the micro:bit in the middle of the bag. Cut a small hole in the lower right corner and in the centre for the wires to enter.

Bottom side
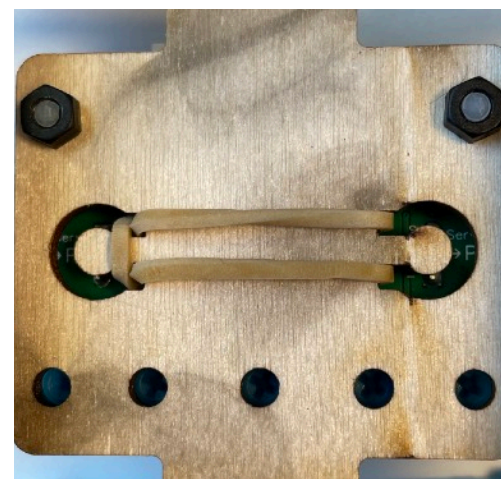
Top side
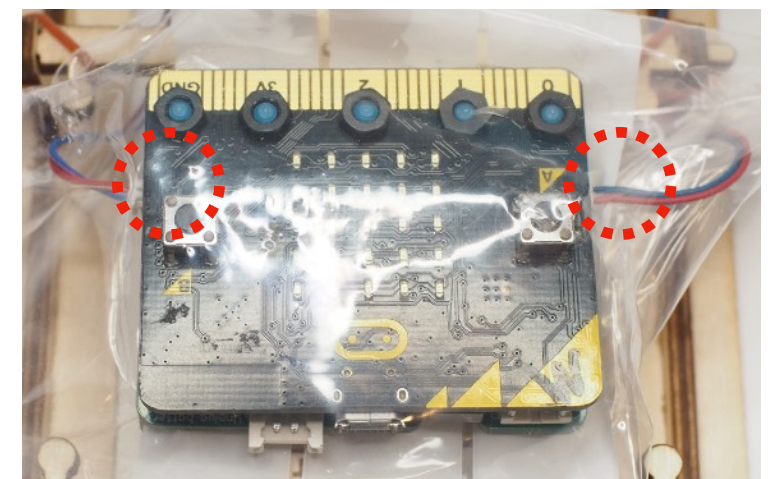
Screw firmly with two nuts on the underside. Connect the motors on either side. The nearest motor connects to the nearest plug.

Assembly 5

Tools:

Scissors

Parts:
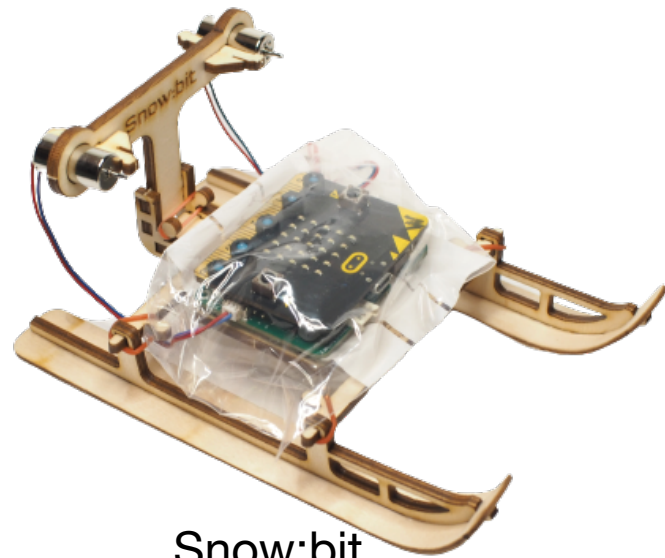
Snow:bit
without
propellers

LiPo-battery

Small zip-bag
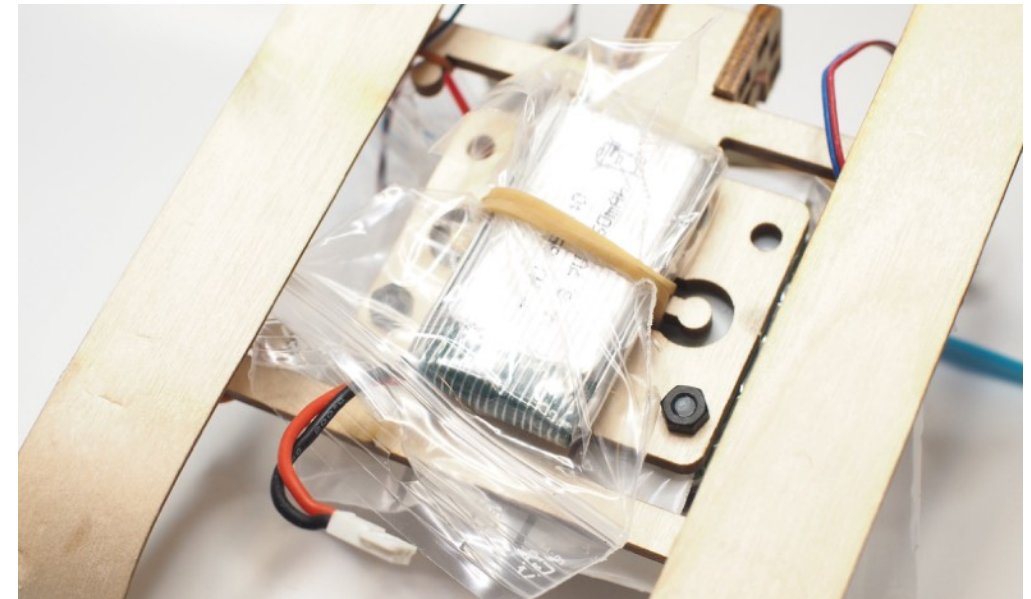
Place the battery in the bag and secure it under the elastic band on the underside so that the wire comes out on the front of the sled..

Note! Do not attach the propellers until you have downloaded and tested the code.

Watch your fingers - do not touch the rotating propellers!

Code

Motor control:
Throttle + turn = speed of engines

Choose radio channel

```
on button A ▼ pressed
    set arrow ▼ to  true ▼
```

```
on button B ▼ pressed
    set arrow ▼ to  false ▼
```

```
on start
    set arrow ▼ to  true ▼
    set radiogruppe ▼ to  7
    radio set group  radiogruppe ▼
    show number  radiogruppe ▼
    while  arm ▼
    do
        show icon [icon] ▼
    show icon [icon] ▼
```

```
function direction  plot x ... ⌄
    ● ● ●
```

```
forever
    if  arrow ▼  then
        if  roll ▼  < ▼  -10  then
            show arrow  North West ▼
        else if  roll ▼  < ▼  10  then ⊖
            show arrow  North ▼
        else ⊖
            show arrow  North East ▼
        ⊕
    else ⊖
        plot bar graph of  throttle ▼
        up to  100
        call direction
    ⊕
```

```
forever
    if  arm ▼  then
        motor M0 ▼ power  20  + ▼  throttle ▼  + ▼  roll ▼
        motor M2 ▼ power  20  + ▼  throttle ▼  - ▼  roll ▼
    else ⊖
        stop all motors
    ⊕
```

```
on radio received  name  value
    if  name  = ▼  'A'  then
        set arm ▼ to  value
    ⊕
    if  name  = ▼  'R'  then
        set roll ▼ to  value
    ⊕
    if  name  = ▼  'T'  then
        set throttle ▼ to  value
    ⊕
```

Radio reception:
Arm = start and stop
Roll = turn
Throttle = the gas (speed)

Alternate screen. (Press B-button)

The screen shows arrows indicating different directions

Assembly 6

Parts:
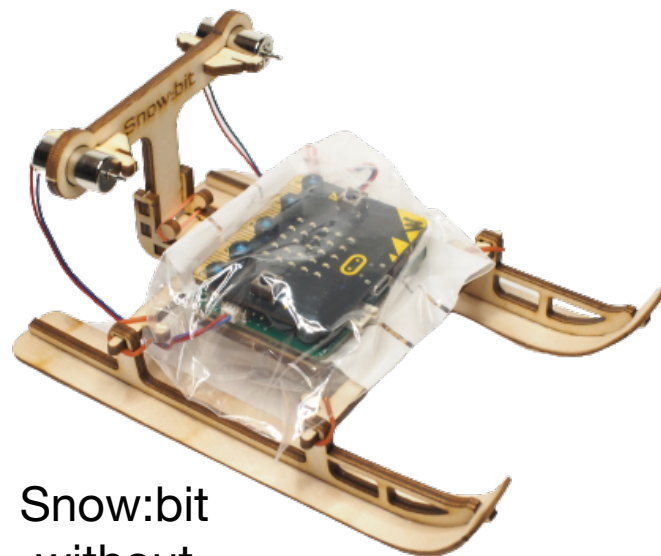
Snow:bit
without
propellers
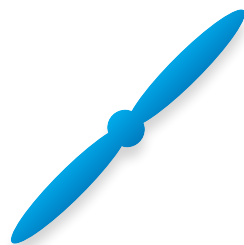
2 CW
propellers
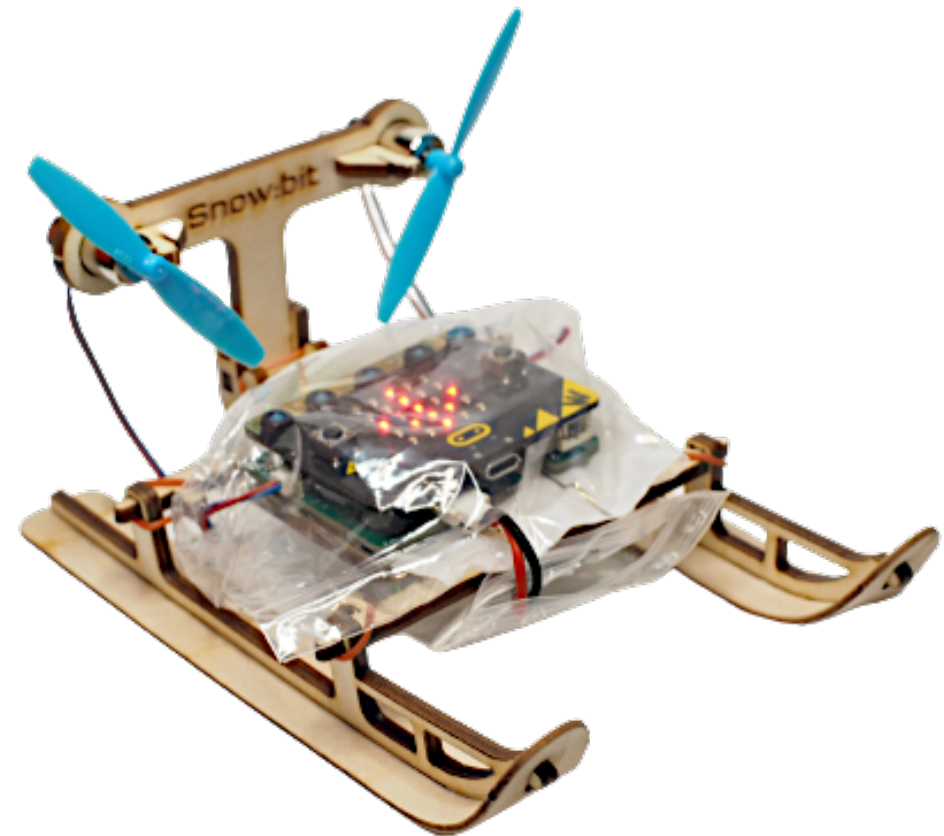
Attach the propellers to the engines.

To turn the power on and off, plug the battery into the battery plug near the USB connector.
Watch your fingers from the propellers!

Removing friction under the skis

Tools:

Ski wax, alternately fine sand paper.

Snow:bit relies on a perfectly smooth ski. The following methods can be used:

-Sanding/polishing with fine sandpaper from 300 and up to 800
-Waxing with candle wax or ski wax
-Attach a clear and shiny tape under both skis

Feel that the skis are completely smooth before testing!

Secret tip:
Lazy? Use tape

Driving snow:bit

Less Speed   More speed

To turn, first hold control horizontally. Then turn the controller to the side you want to swivel. The more you twist, the more you turn.

Snow:bit is controlled just like hover:bit and with the same remote control. (Air:bit control can also be used)

Start and stop: A + B button (press and release)
Less gas: Button A
More gas: Button B
Turn: Turn sideways like a key (see photo)

Battery Recommendations
Fully charge the battery and allow it to maintain room temperature until it is ready to use.

Low temperature affects the effect. Try keeping the battery warm until use.

Want to know more?

Connection for Battery

Servo (P0)

Unplug battery After use

Level shifter

Load switch

Ldo 3V6 450mAh Protected

Servo (P1)

Servo (P2)

3.1V Battery protector

3V3

Connection for Left motor

MOSFET

MOSFET
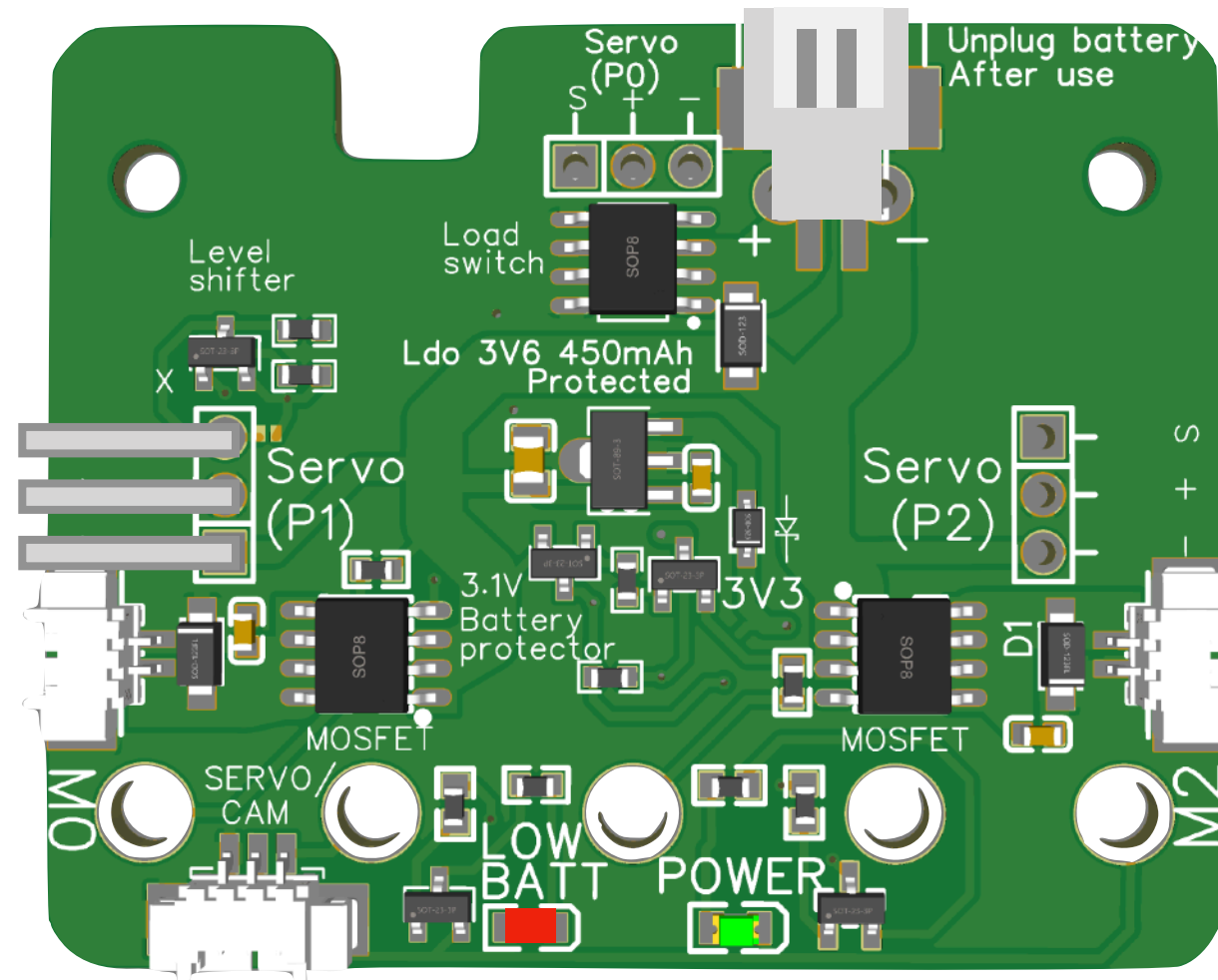
Connection for Right motor

SERVO/ CAM

LOW BATT

POWER

Battery Warning Light

The control board amplifies the current from the micro:bit out to the motors. It also ensures that the micro:bit gets the right amount of voltage from the battery. If the battery is nearing empty, the red light will start blinking. Disconnect the battery to protect it. This is so as not to drain and damage the rechargeable battery.

Note that if the red light flashes, the battery must be charged.

Electrical connections

LiPo battery

Micro:bit

Left motor

Throttle Rudder Battery

0 1 2 3V GND

SERVO/CAM LOW BATT POWER M2

Right motor

Control Card
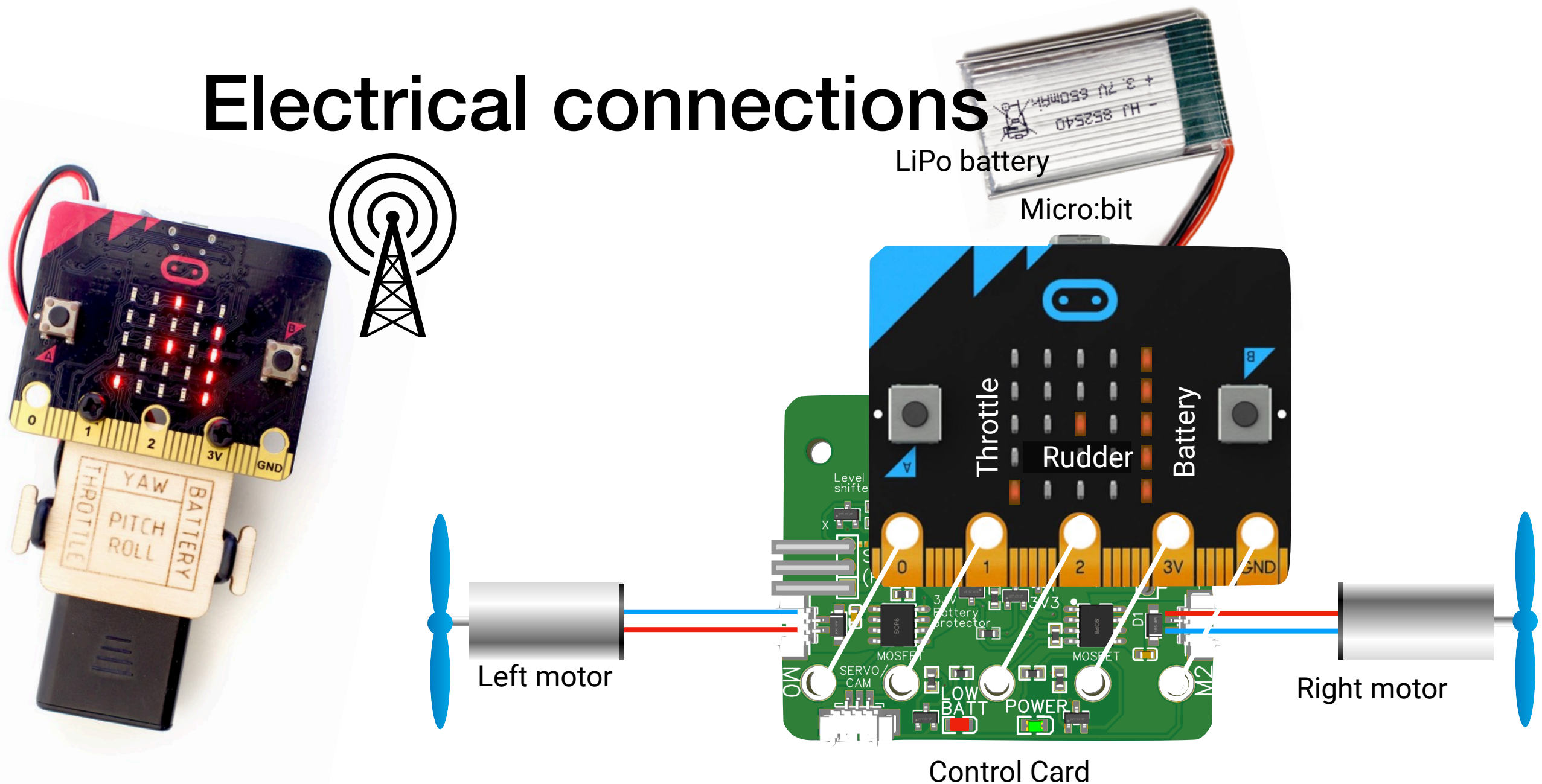
The microbit on the left transmits the three parameters Arm (start and stop), Roll (angle of taileror) and Throttle (gas) over radio.

The second micro:bit receives the signal, and then controls the M0 and M2 motors. The signals are amplified with the control board and sent to the motors.

MAKEKIT

Students challenge

Water protection:
When the snow melts, it can generate a short circuit and make an electronic malfunction. Find out how you can protect electronics from snow and still use buttons and connectors. It can be plastic bags, 3d-printed chassis or something else.

Battery protection:
The battery works poorly in temperatures below 15 degrees celcius. How can it be protected from the cold, and how can it stay warm until use?

Friction:
Reduce friction under the skis. It can be sanding, polishing or using chemicals like ski wax.

Air resistance:
Reduce air resistance to increase speed by making the design more aero dynamic. It can be 3d-printed or made from cardboard, foamboard etc

Maneuverability: Make the vehicle drive more straight by changing the design or adding fins.

Surfaces: Try different surfaces and also flat surfaces compared to hills. Is there a big difference what surfaces works better?

Measure the speed:
Find out how to measure the speed and see who can go faster based on the modifications

Redesign and invent: Can you create a brand new vehicle, like a boat, with a small modification? Or what about a fan for helping a fire in a fireplace or a propeller driven cable car?

Rebuild your Snow:Bit for other things!
See more fun projects On makekit.no/docs

Snow:bit is designed and manufactured in the old premises
of Tanbergs Radio Factory at Skullerud in Oslo.

We welcome your questions and feedback.
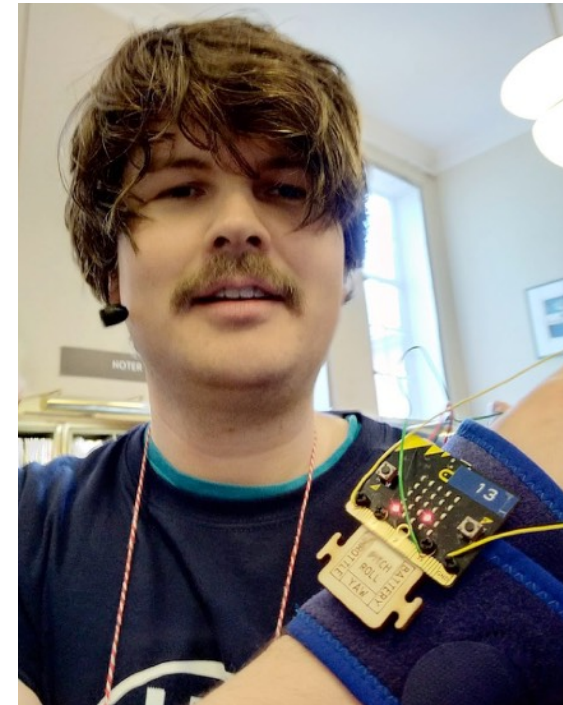Please do not hesitate to contact us!
Feel free to use our facebook chat

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