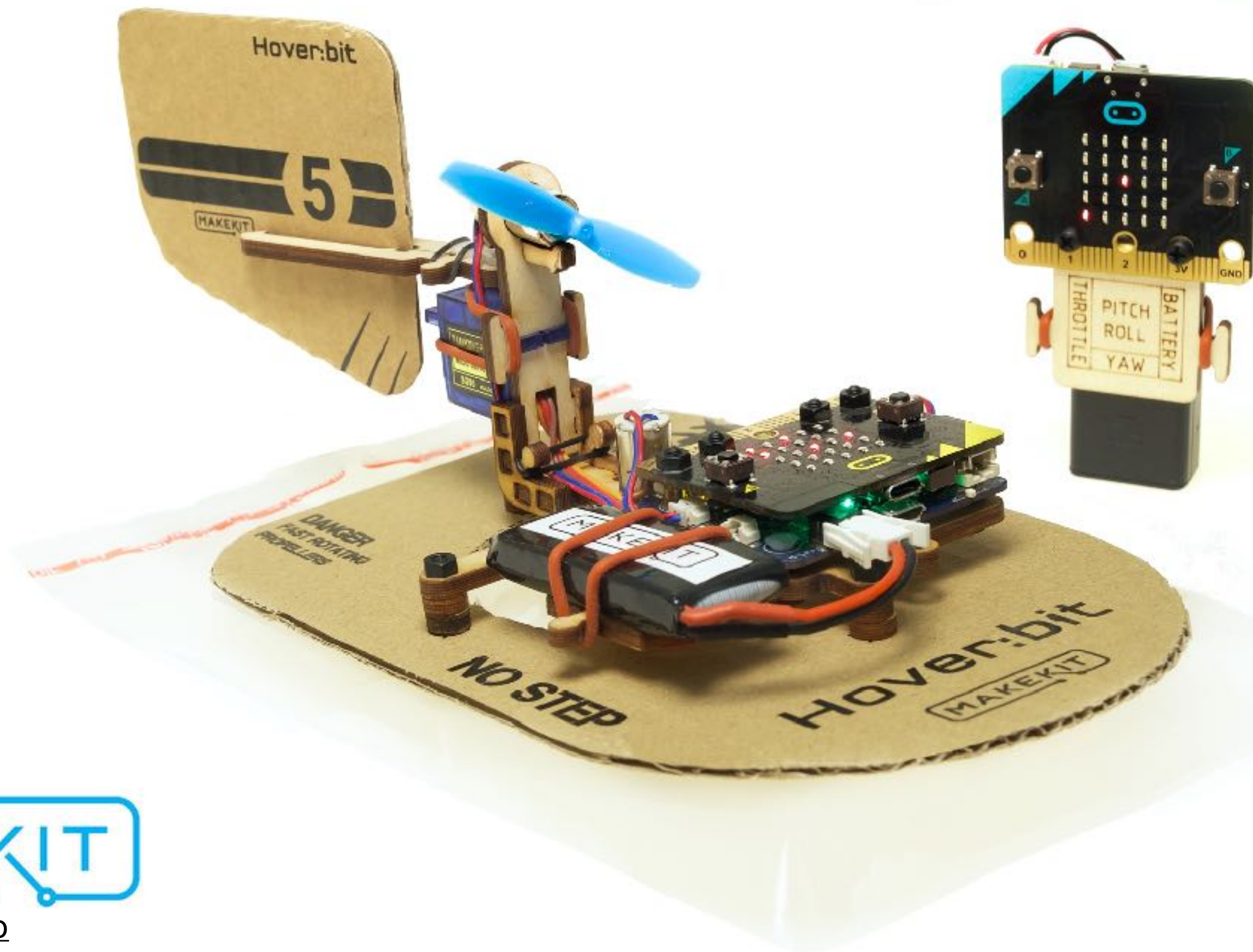
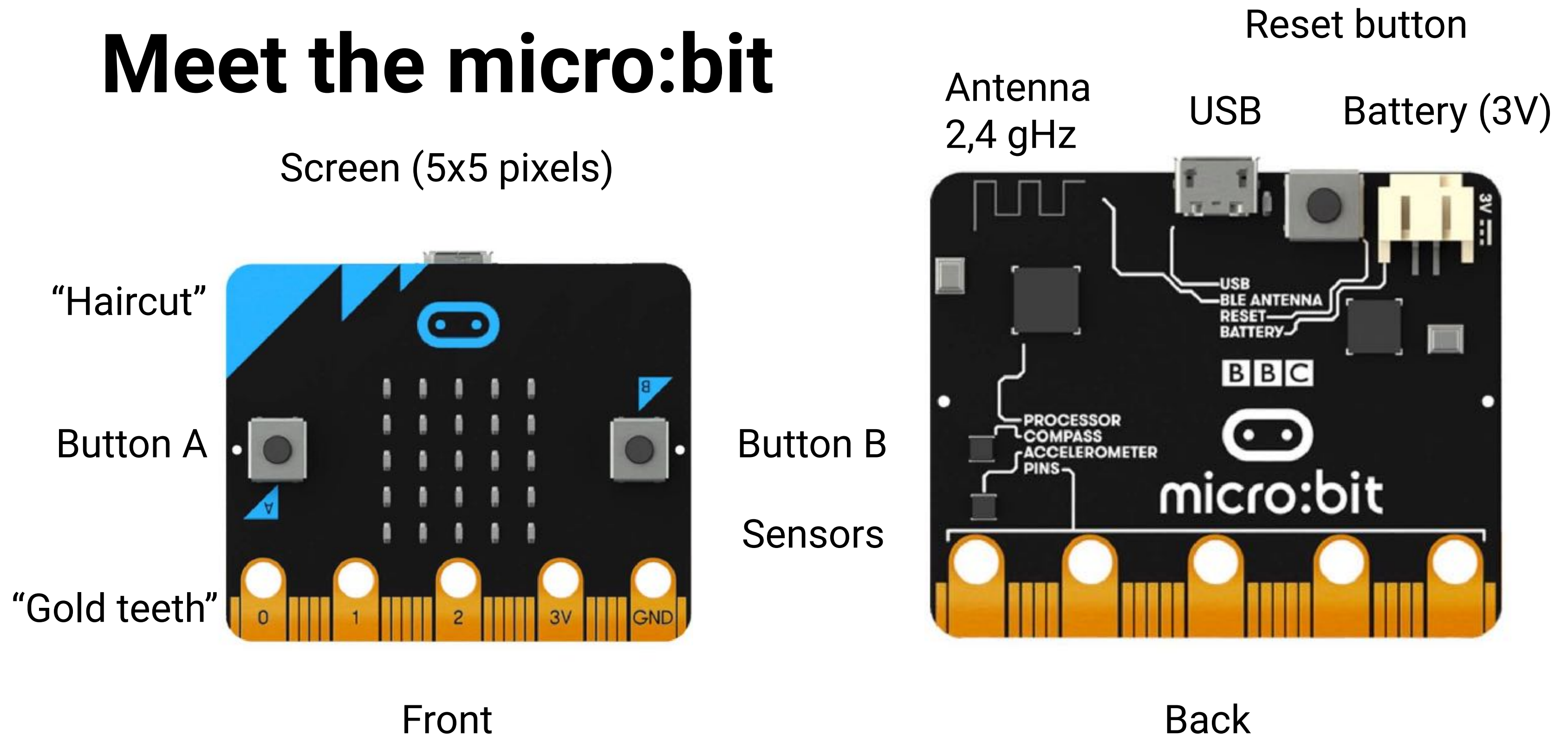


# Hover:bit

Coding the micro:bit hovercraft



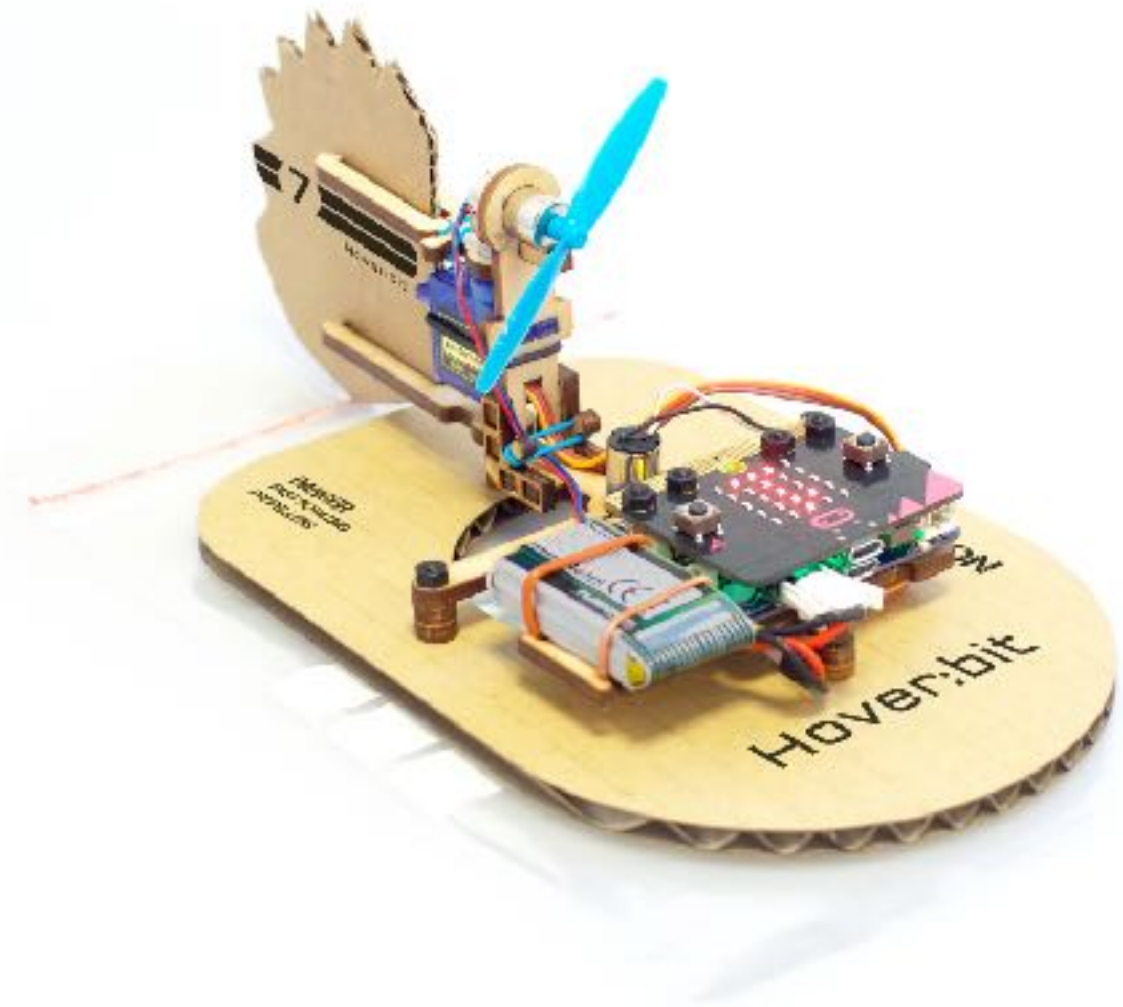
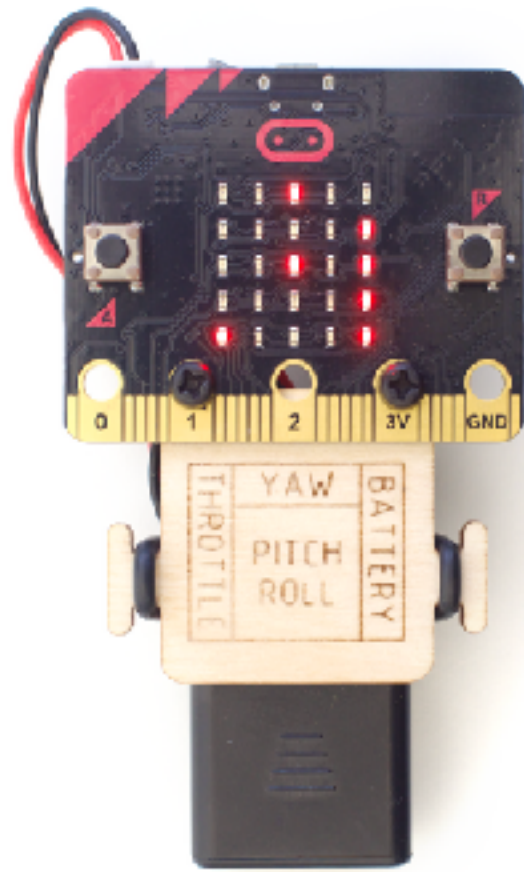
# Meet the micro:bit



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

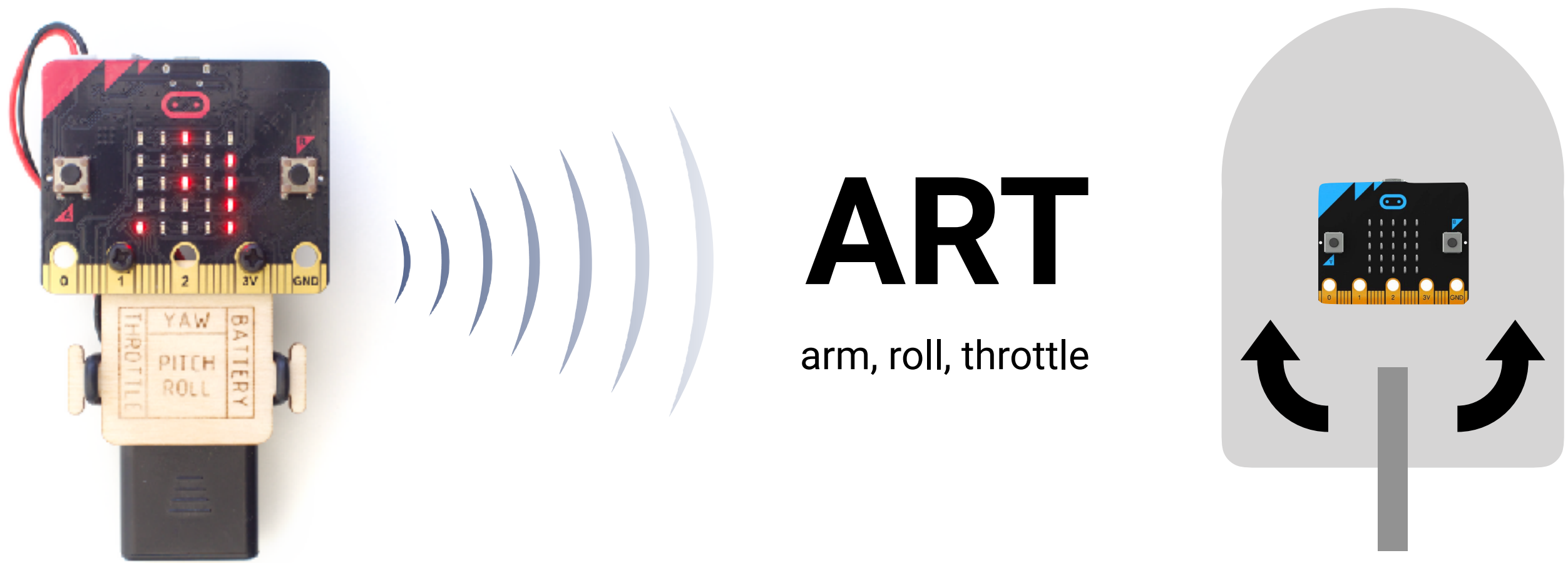
# ART

Rule

Three values that controls the hover:bit

# Controls

Arm starts and stops motors.  
Roll controls the rudder and steering  
Throttle control the speed.  
The values are being transmitter from remote control to the receiver (hovercraft)



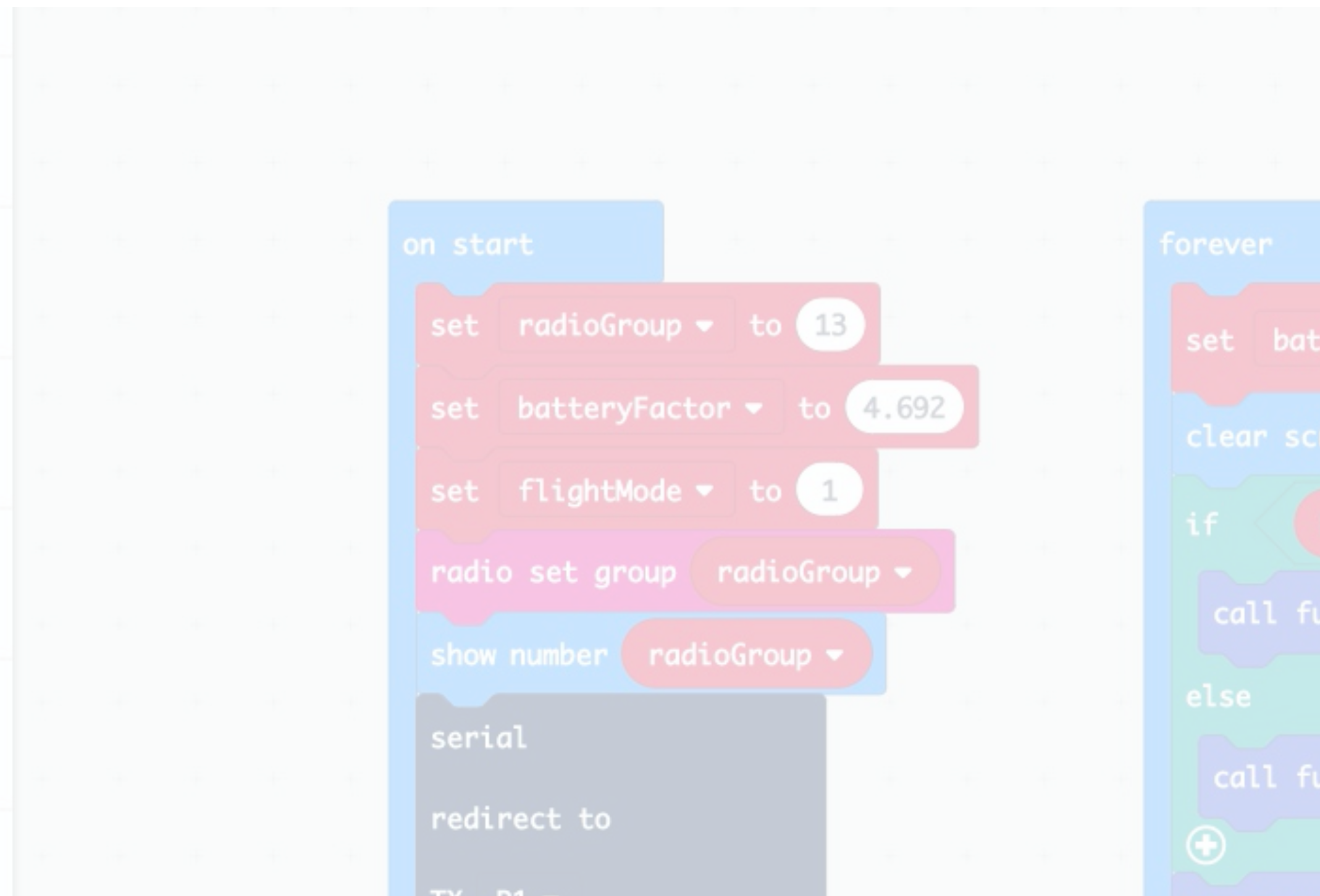
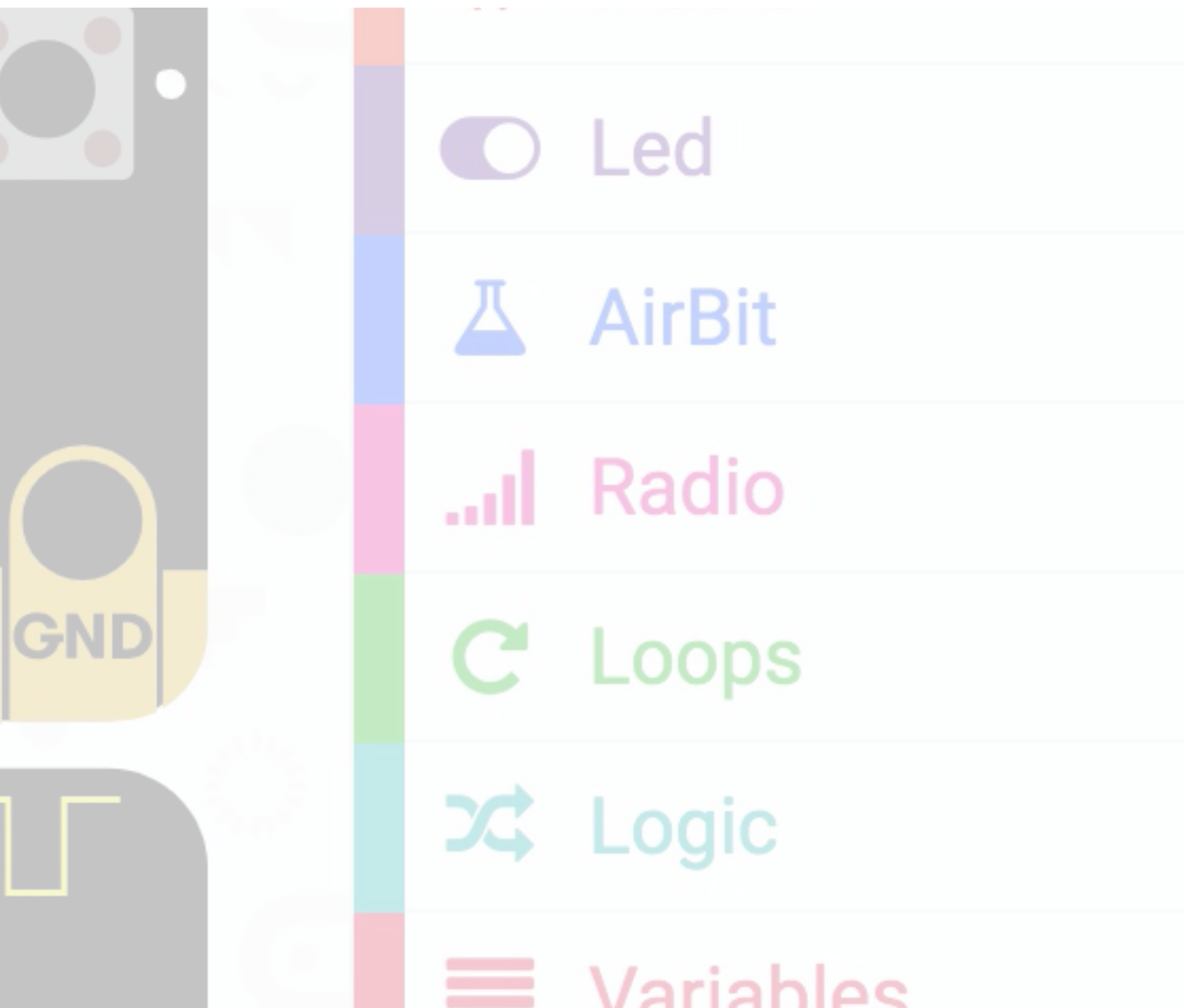
These 3 values control the hovercraft:

Variable:	Type	Minimum	Neutral	Maximum
Arm (start/stop)	Binary	0		1
Throttle (speed)	Percent	0	50	100
Roll (steering)	Degrees	-45	0	45



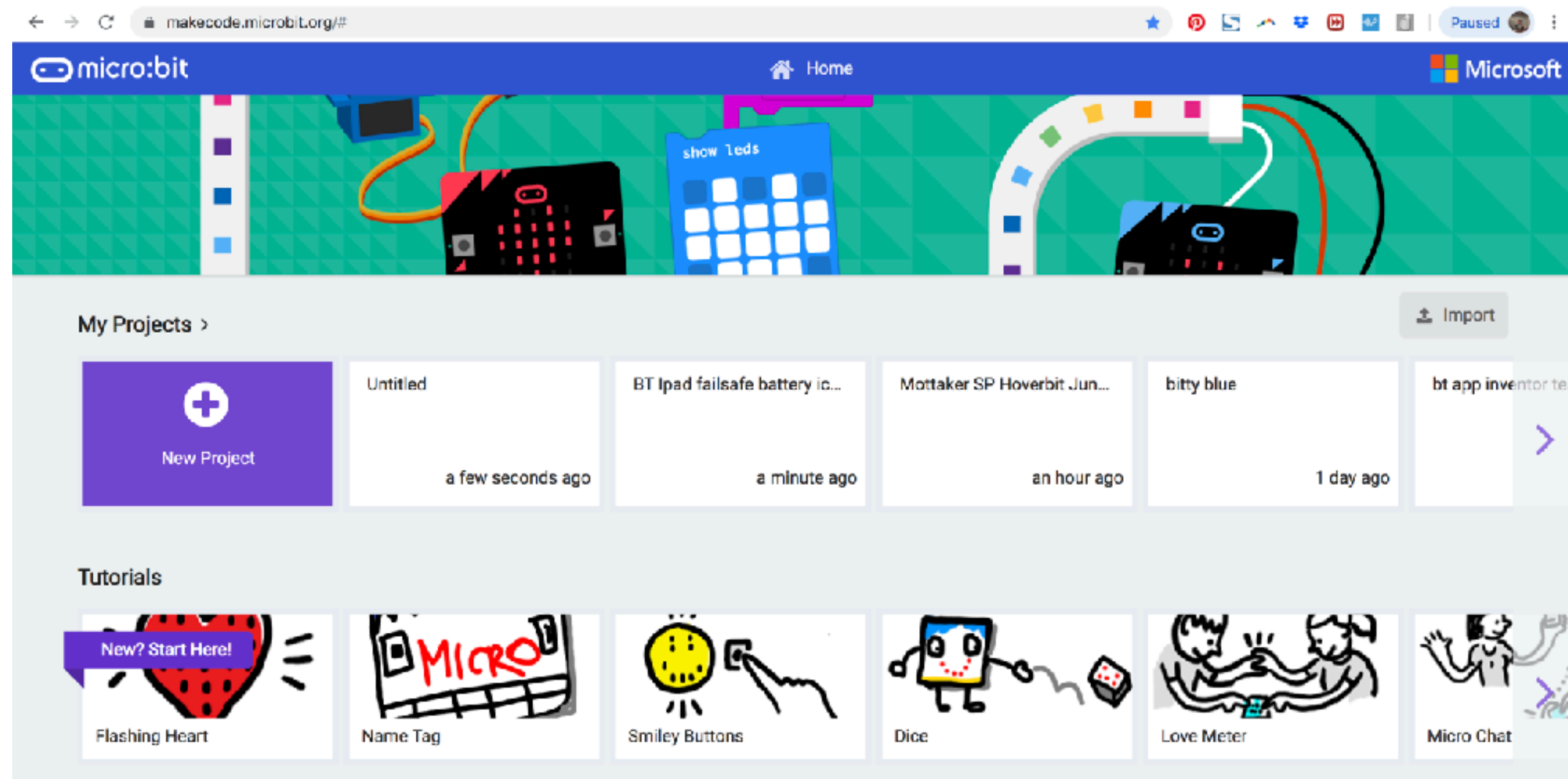


# Let's code!



# Start at [makecode.microbit.org](https://makecode.microbit.org)

Chrome is recommended for better connection with the micro:bit



Select “New project”.

PS. If you’re new to micro:bit you should try one of the tutorials above first.

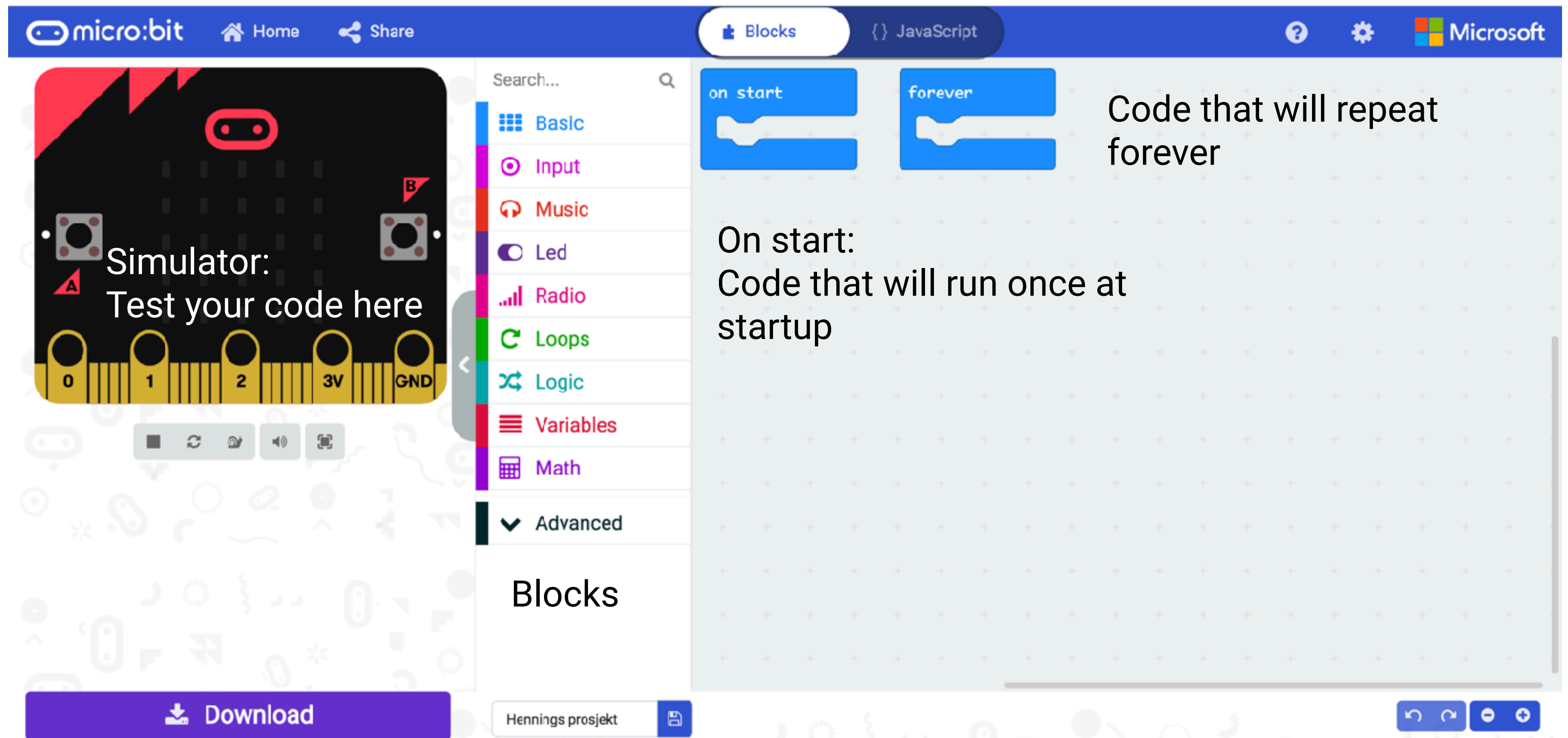
# The editor

Main menu

Share your code

Block mode   Javascript mode

Settings



Download to micro:bit

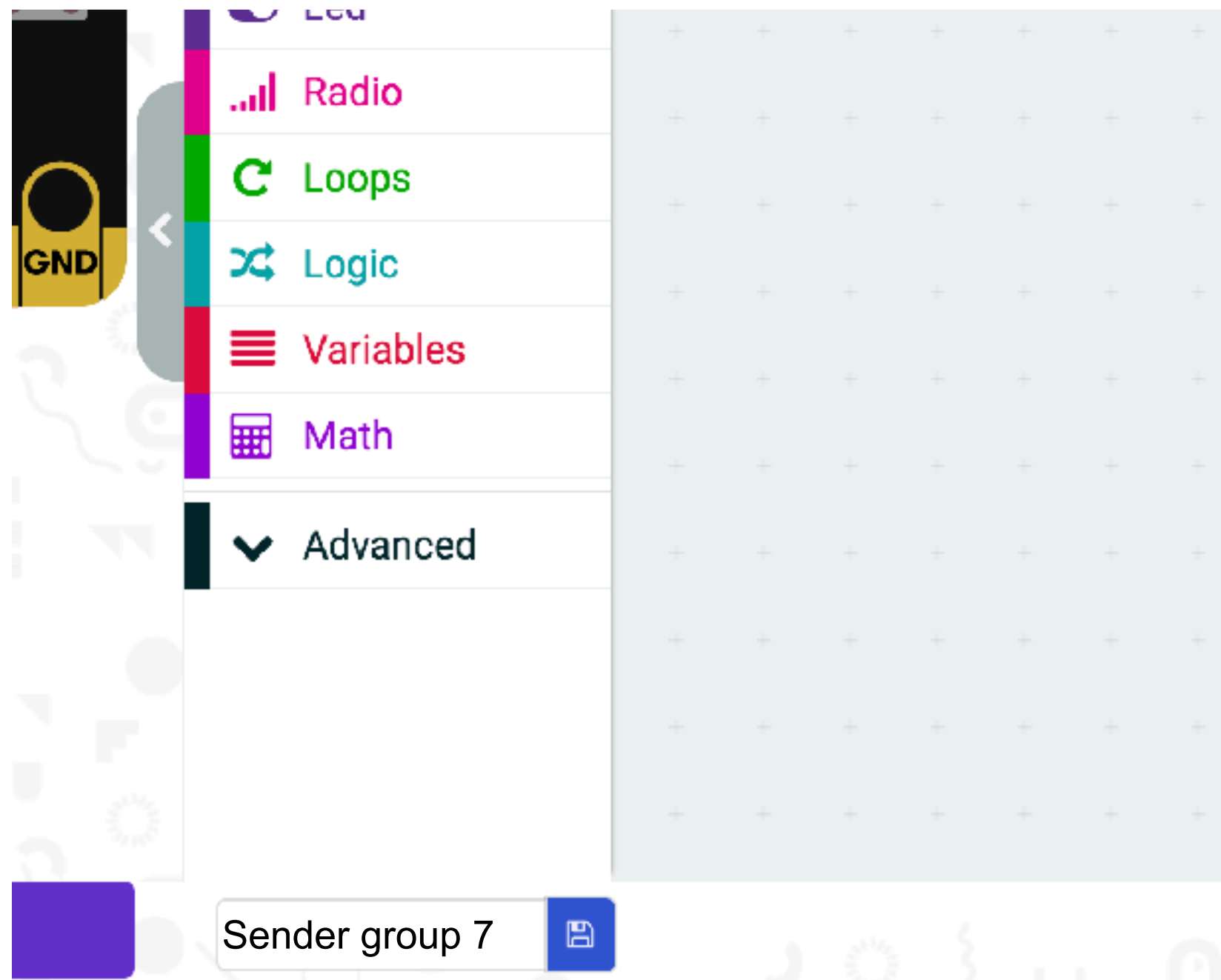
Save a backup  
Name your project

Undo   zoom



# Name your project

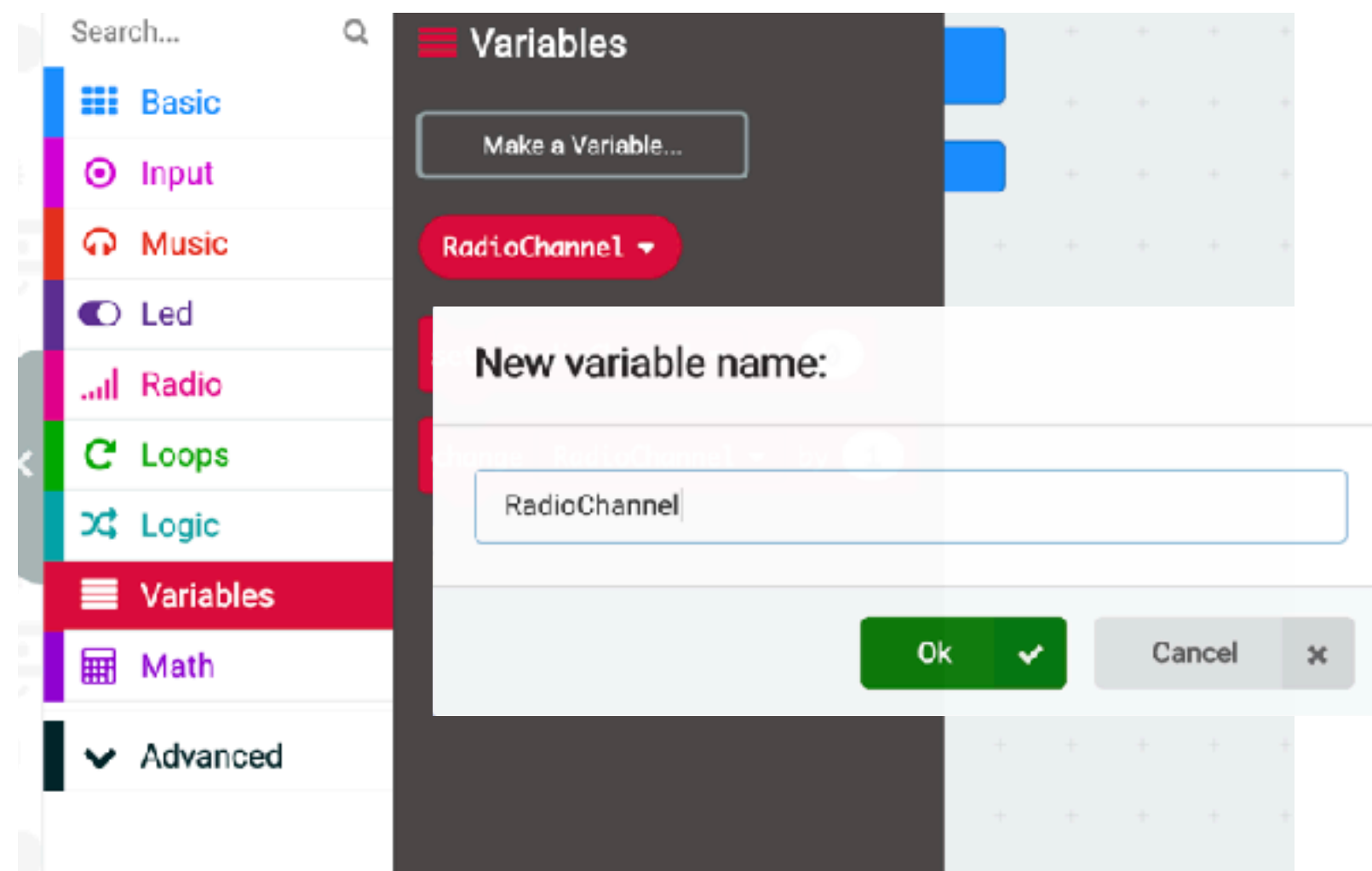
Start by giving your project a name like "Sender group x".  
This is your unique radio channel. If you are alone you can use  
channel 7



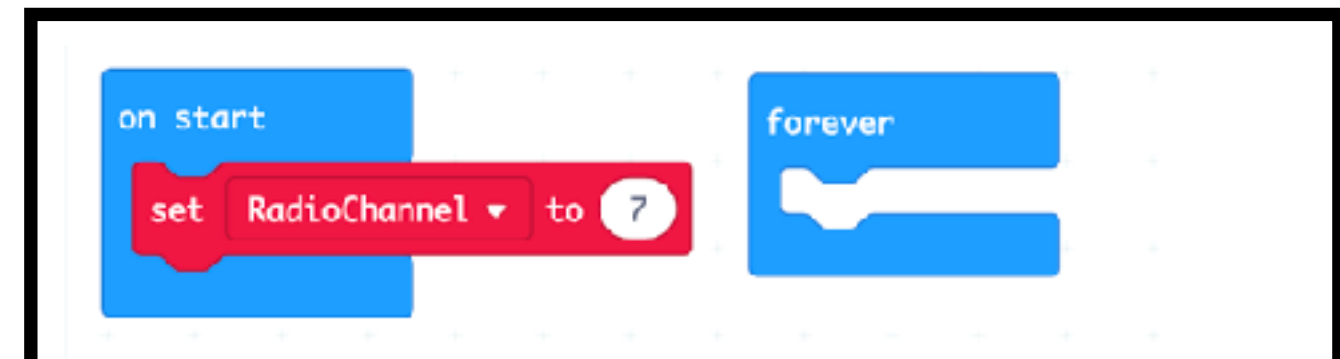
# Radio

1. Make a variable called radioChannel
2. Set the radioChannel to 7 (or a number between 0 and 255). This number must also be used on the hovercraft later
3. Use Show Number (in the forever loop) to verify that Arm is changing correctly
4. Use the "radio set group" to make the radio channel take effect

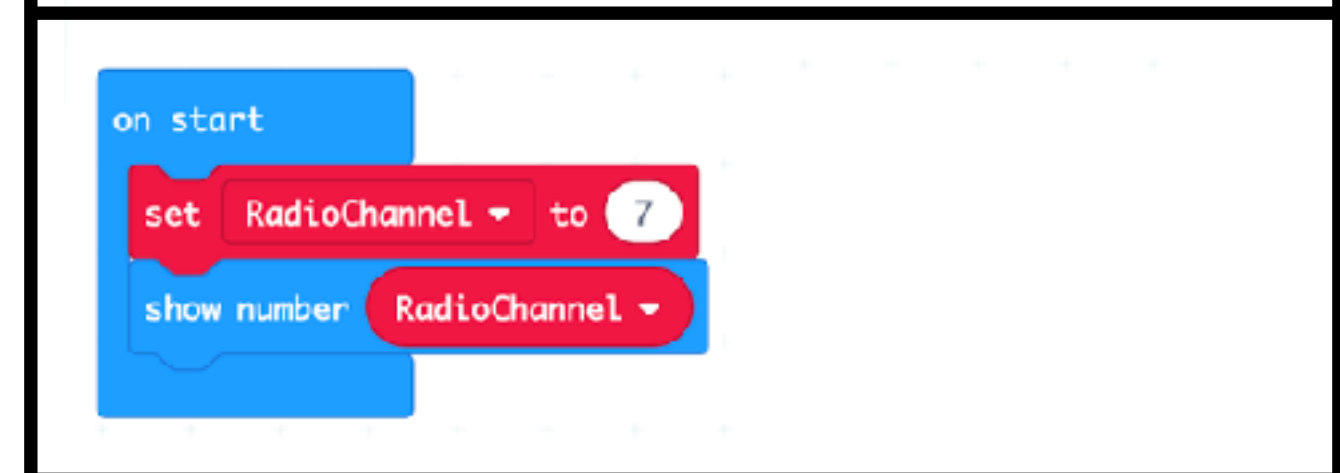
1



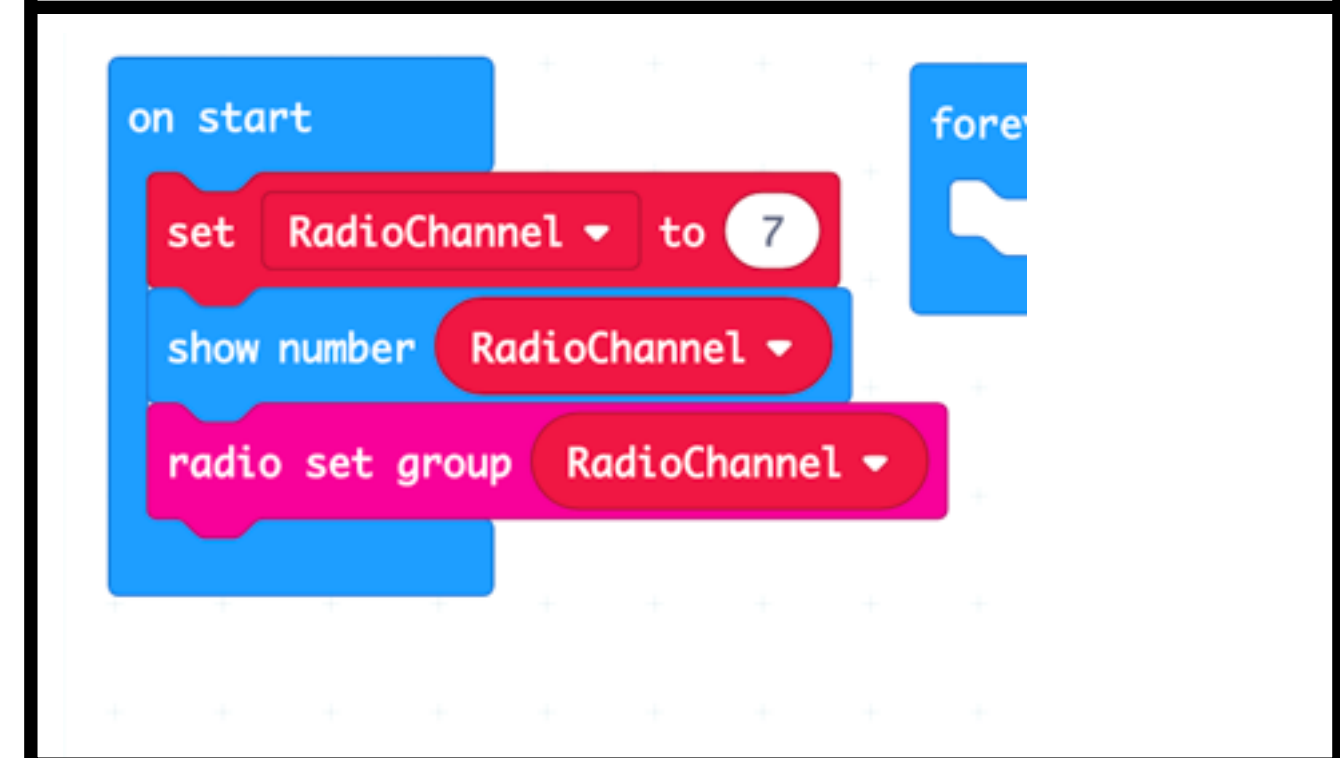
2



3



4

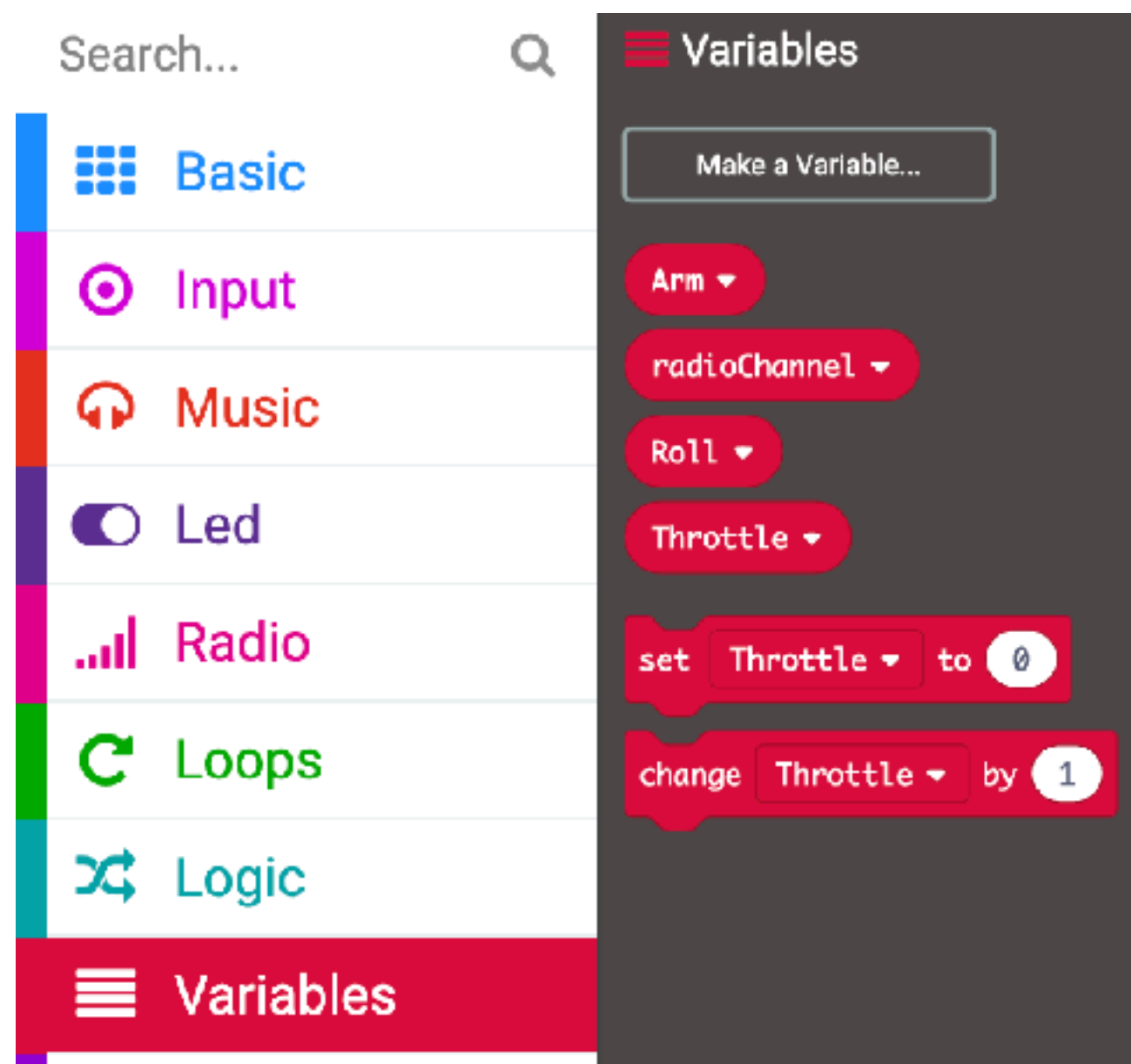


# ART

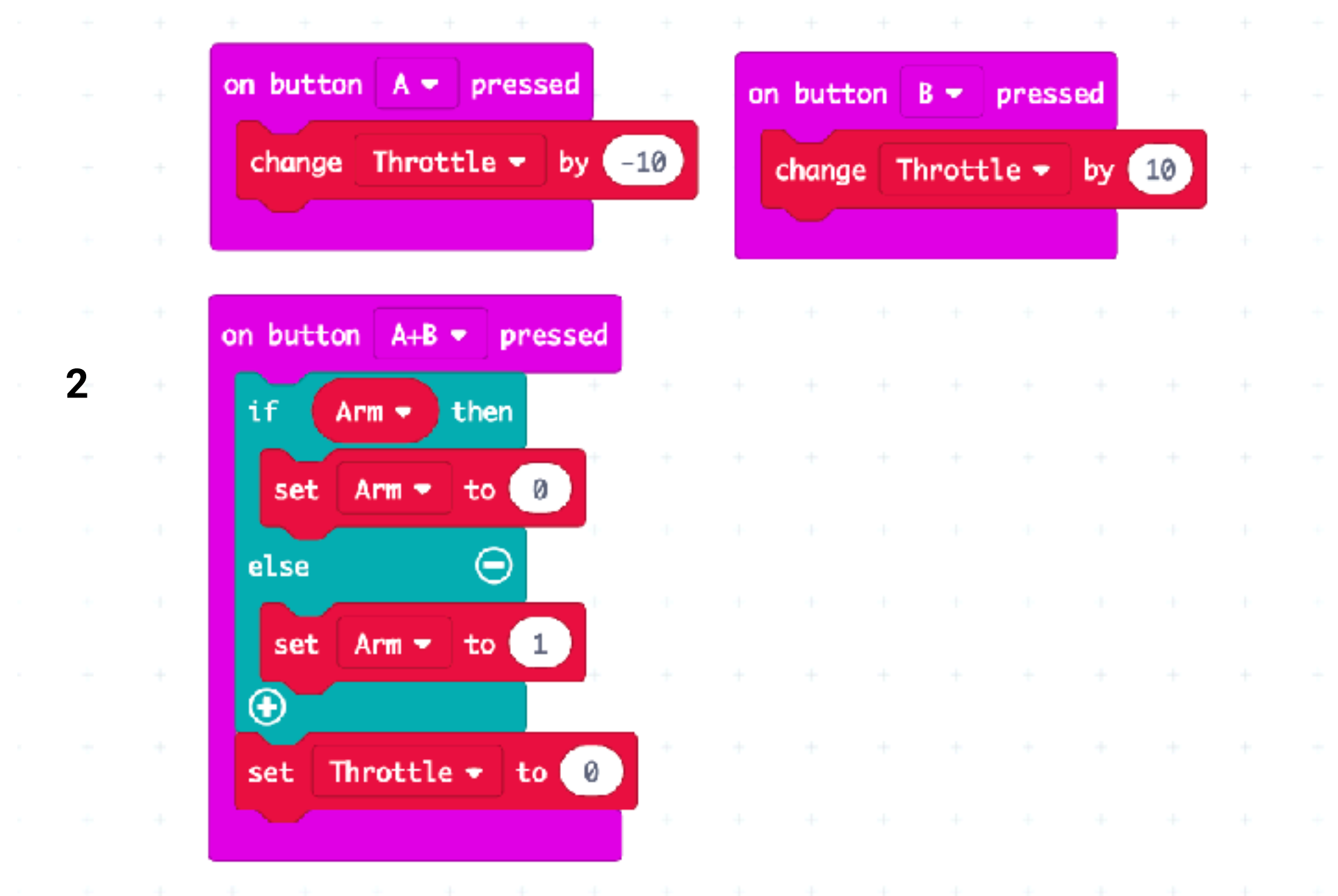
arm, roll, throttle

1. Make 3 variables called arm, roll and throttle
2. Use the button functions so button A makes throttle 10 (%) less, and button B makes it 10 more. Use “change”, not “set”
3. Use the buttons A + B (a combination) to change the Arm between 0 and 1 everytime A + B is pressed

1



2

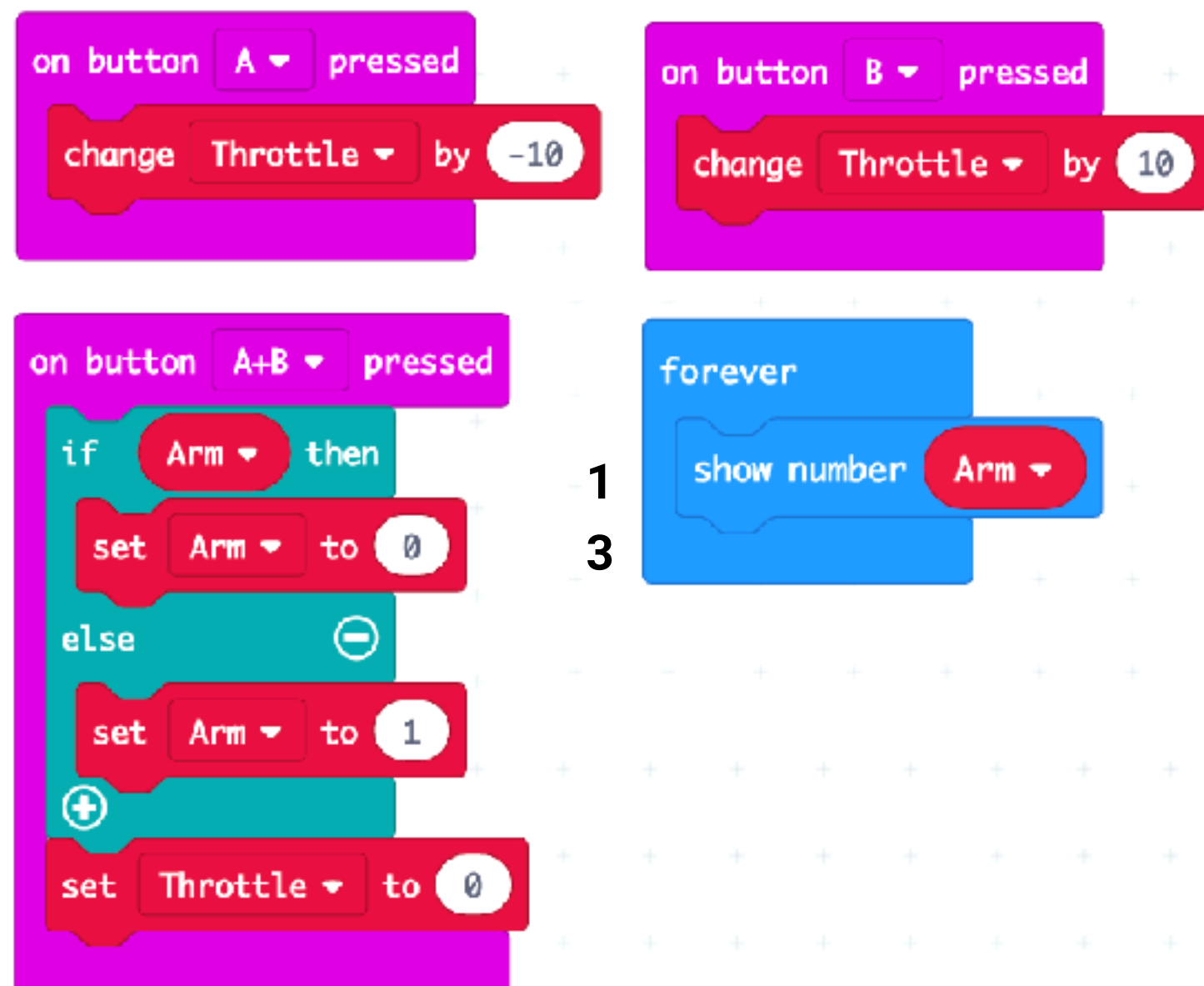




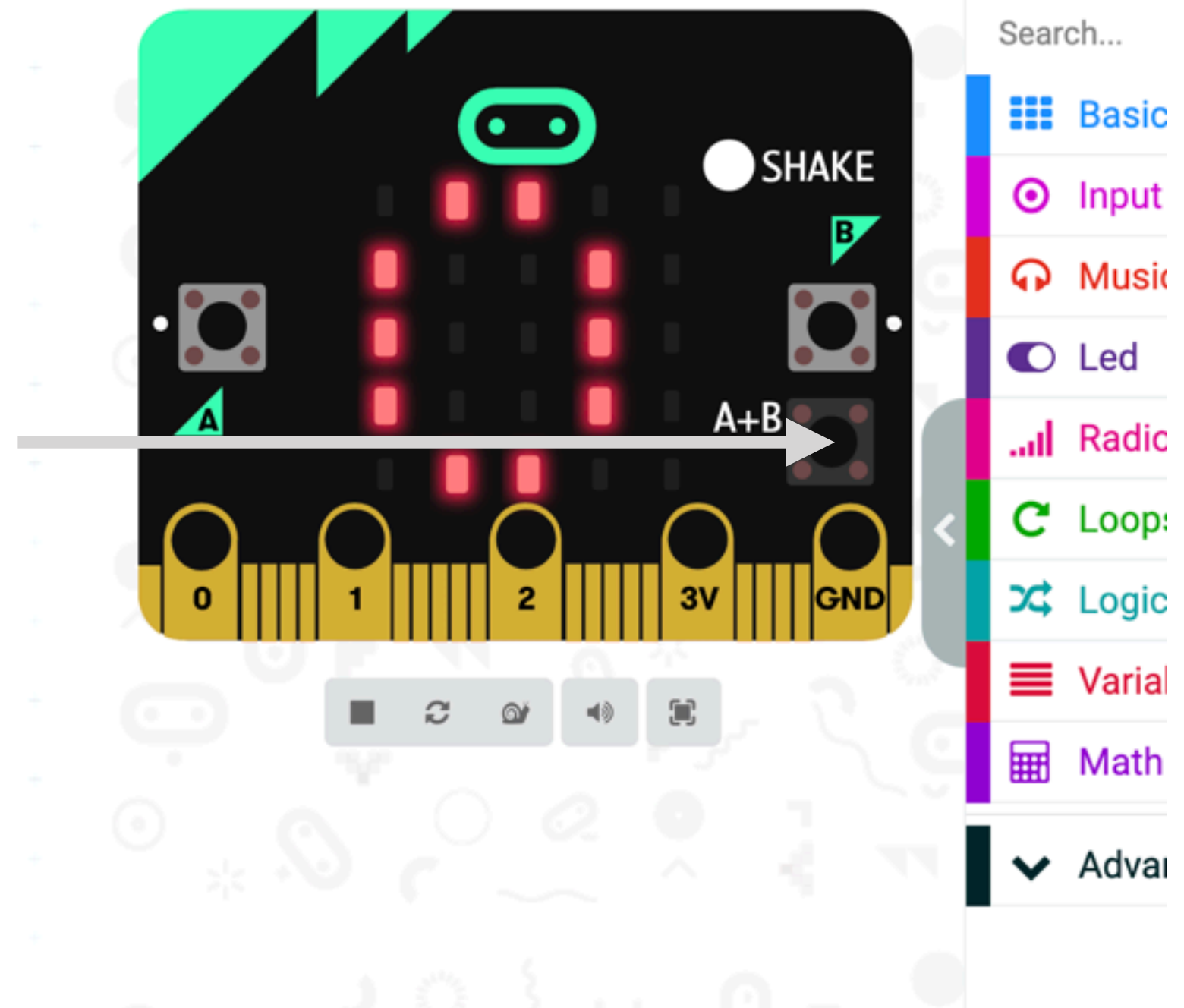
# Arm

arm, roll, throttle

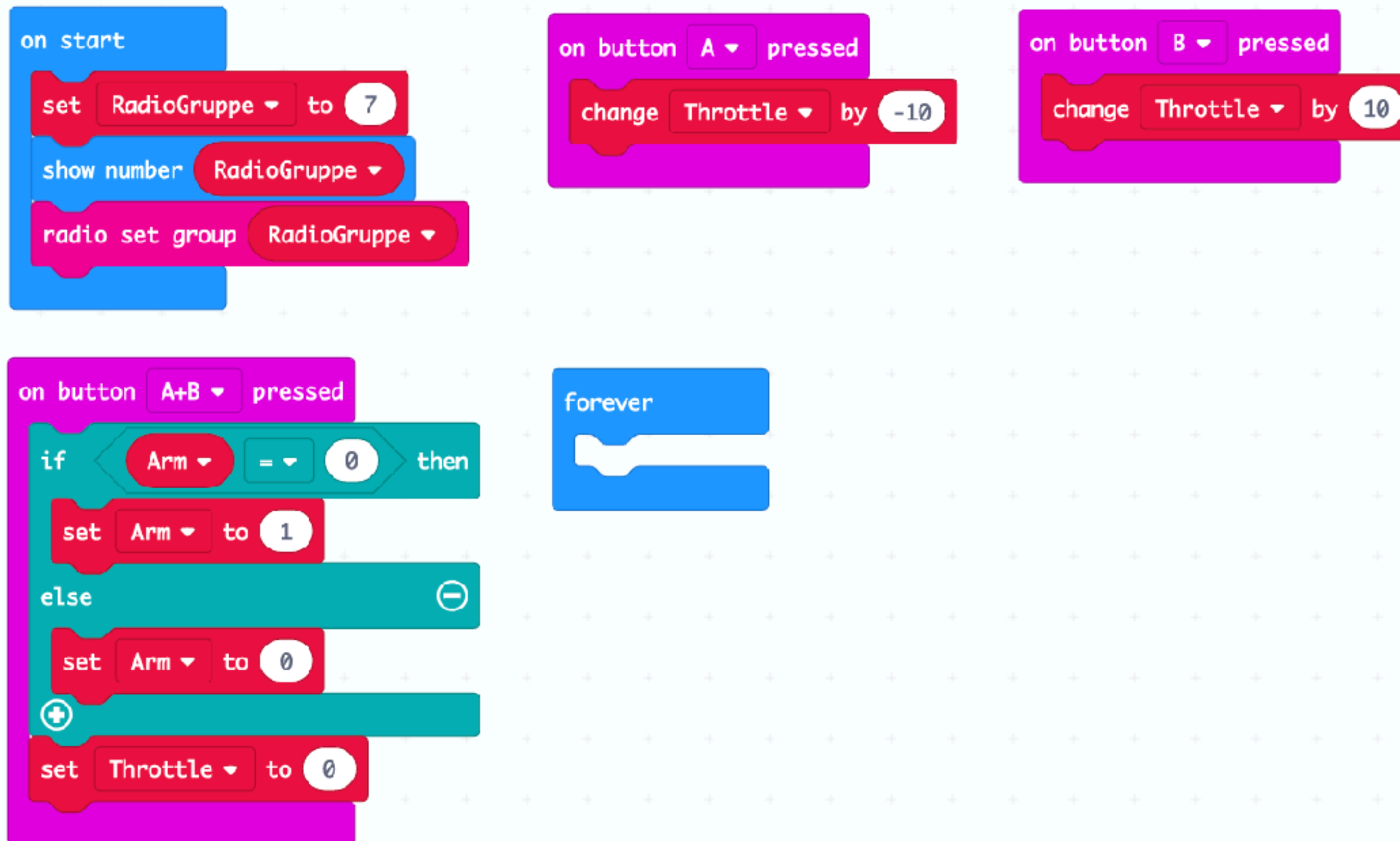
1. Put a Show Number (in the forever loop)
2. Use the simulator to test the A+B function (the number will switch between 0 and 1 and back)
3. Delete the same show number block when you have tested it. (use delete button or right click - delete)



Simuator



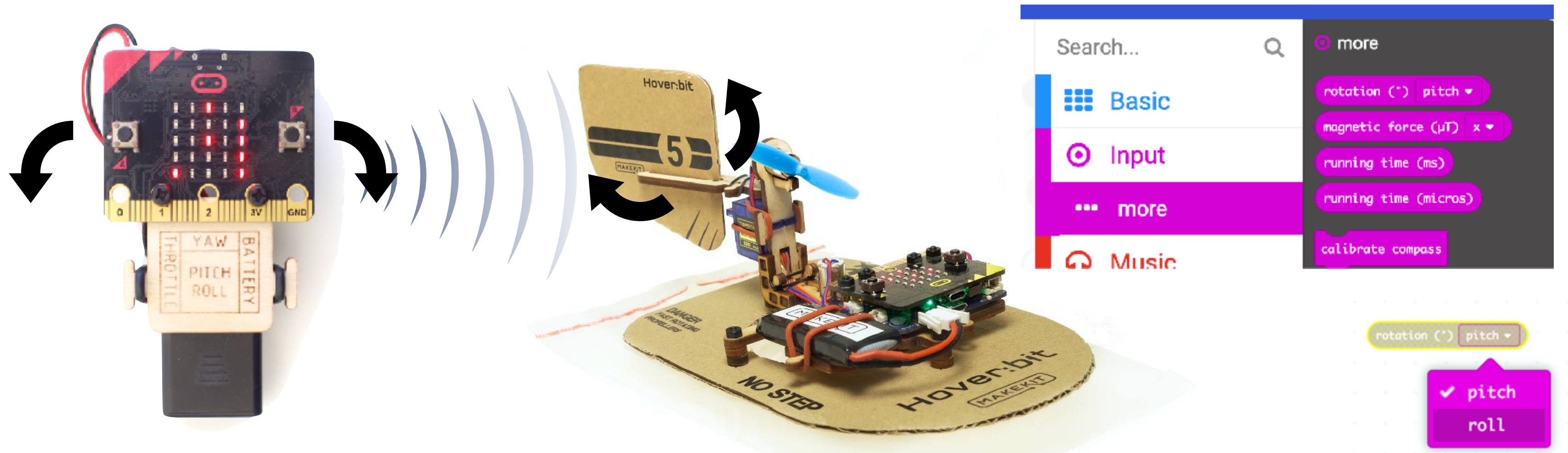
This is the code so far



# Roll and rudder

We want to control the hovercraft's steering by using the orientation sensor on the micro:bit. This is called roll. This will control the rudder on the hovercraft.

Task: In the forever block, set the roll variable to the rotation roll. The block is called "rotation pitch". Drag it out and change it to "roll" by clicking the small triangle at the right.



The diagram illustrates the setup for controlling a hovercraft's steering using a micro:bit. On the left, a micro:bit is shown with a custom PCB that has labels for YAW, BATTERY, THROTTLE, PITCH, and ROLL. The micro:bit is connected to a hovercraft made of cardboard. The hovercraft has a propeller and a rudder. A search bar on the right shows the 'rotation pitch' block being changed to 'roll'.

This is what you should end up with:

```
forever
  set Roll ▾ to rotation (°) roll ▾
```



# The display: Arm

In the beginning of our code, our radio channel will be shown.

We want to use the display to also show our Arm, Roll and Throttle values as they change.

Before we plot, we use clear screen to prevent the screen to get filled with pixels.

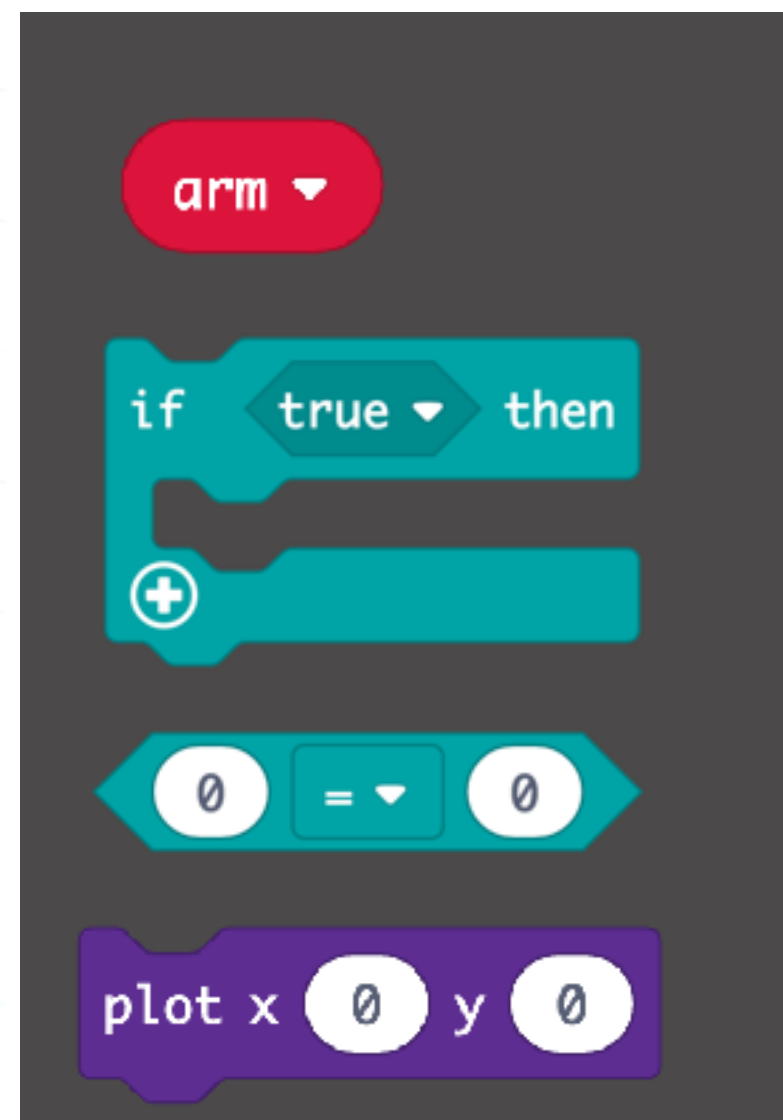
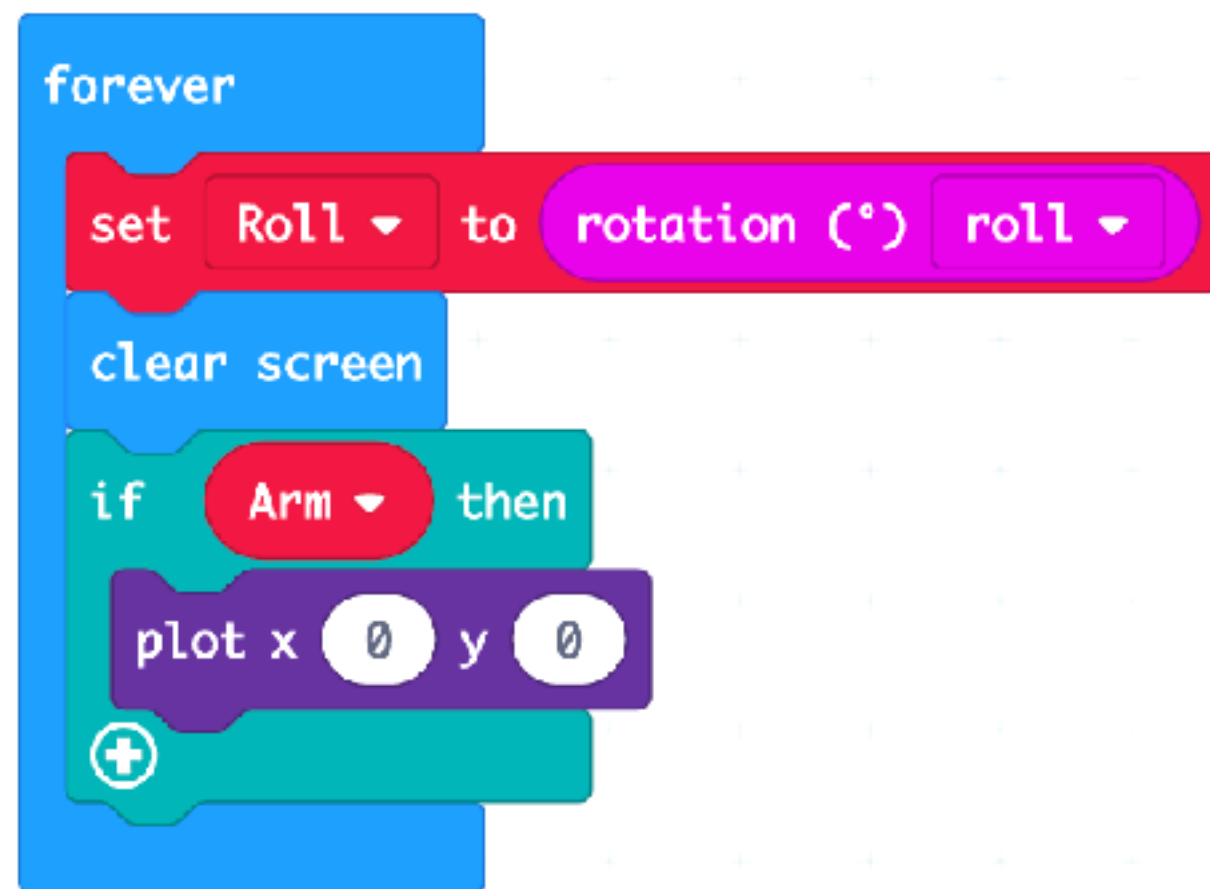
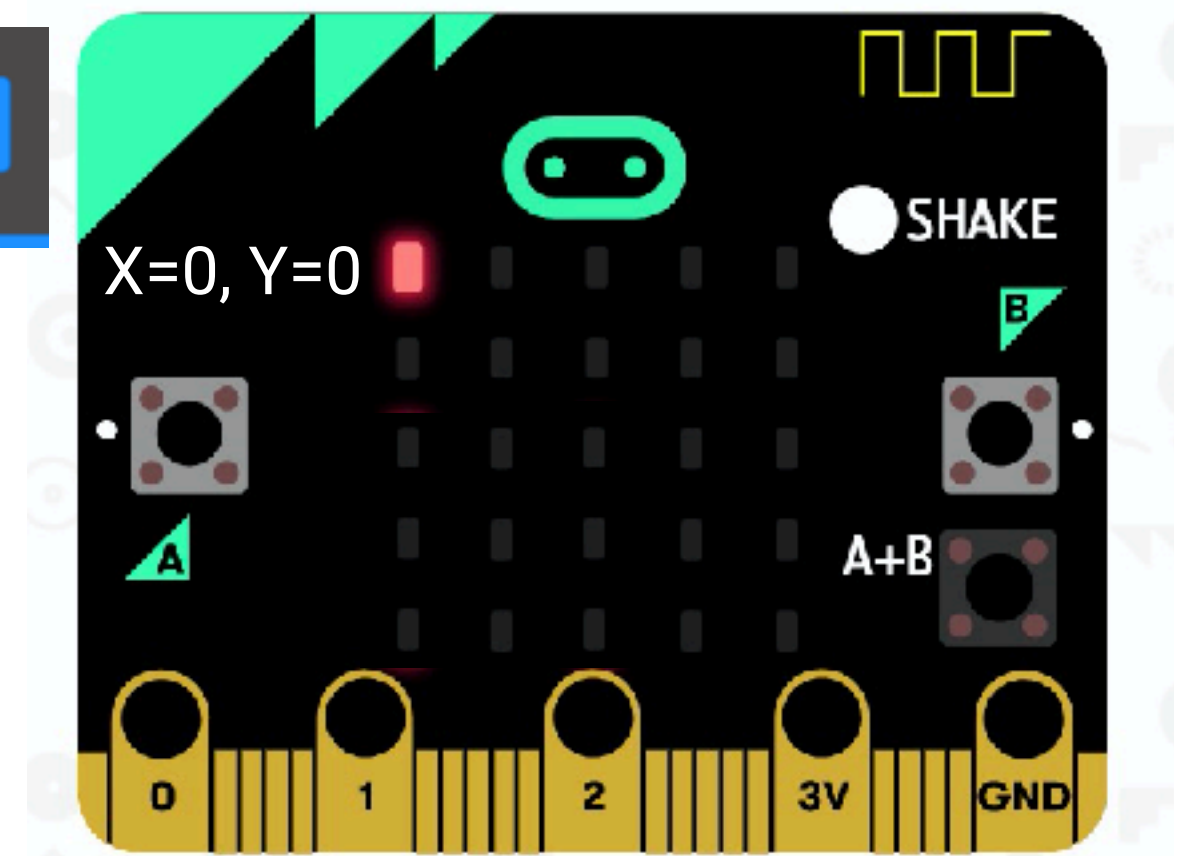
## Show arming

Find the forever-block.

Insert a clear screen block under the roll block.

Use the if-block to check if arm is not zero (armed).

If armed plot at coordinate 0,0 (or another place of your choice)



# The display: Roll and Throttle

We also want to show roll and throttle in the display. Use the blocks below to convert roll and throttle into values that can be plotted on the screen. We want the throttle pixel to move upwards, starting at coordinate 0,4, then climb towards 0,0. We want the roll pixel to slide across the screen, from 0,2 (middle left) to 4,2 (middle right)

## Show Throttle

Continue with the forever-block.

Insert a plot-block. In the y-section, insert a map block.

In the map block, insert the Throttle variable, then 0,100,4,0.

This will take a number between 0 and 100, and stretch it down to a number between 4 and zero.

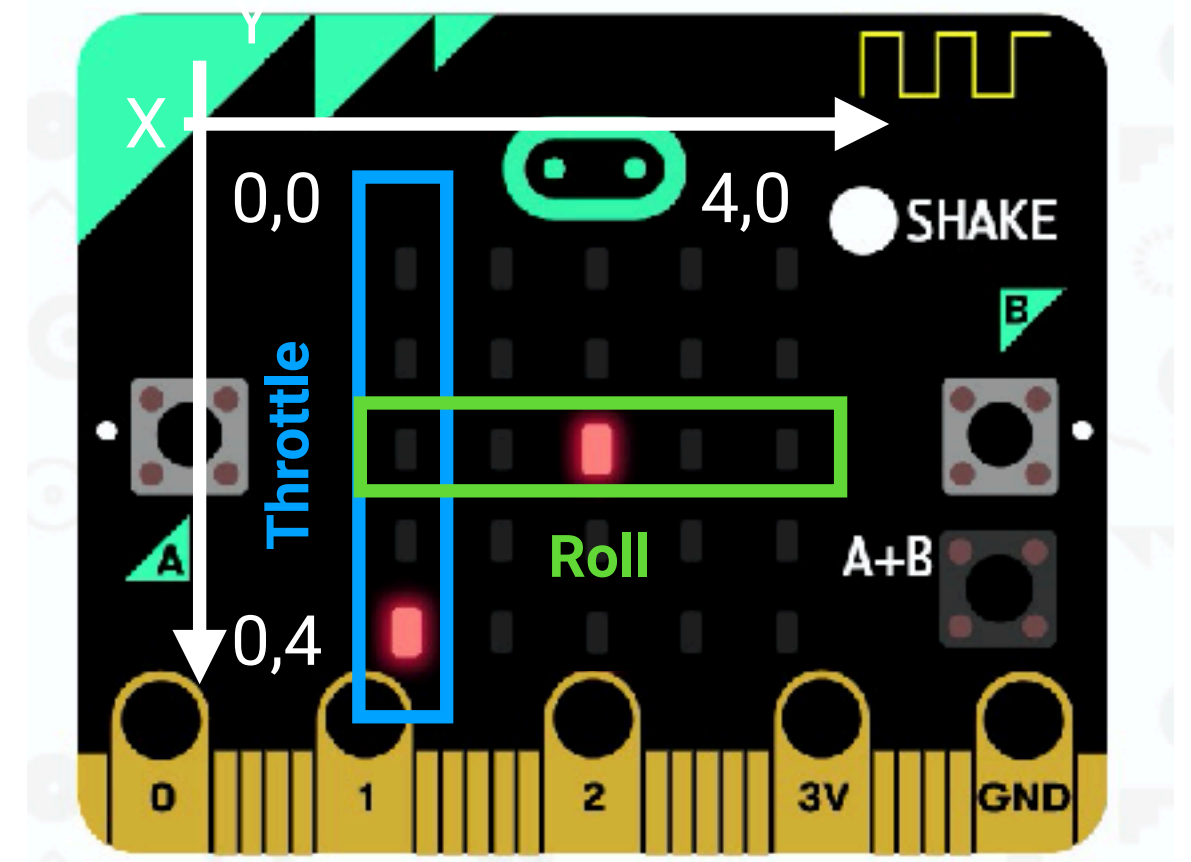
## Show Roll

Continue with the forever-block.

Insert a plot-block. In the y-section, insert a map block.

In the map block, insert the Roll variable, then -45,45,0,4.

This will take a number between -45 and 45 (roll degrees), and stretch it down to a number between zero and 4

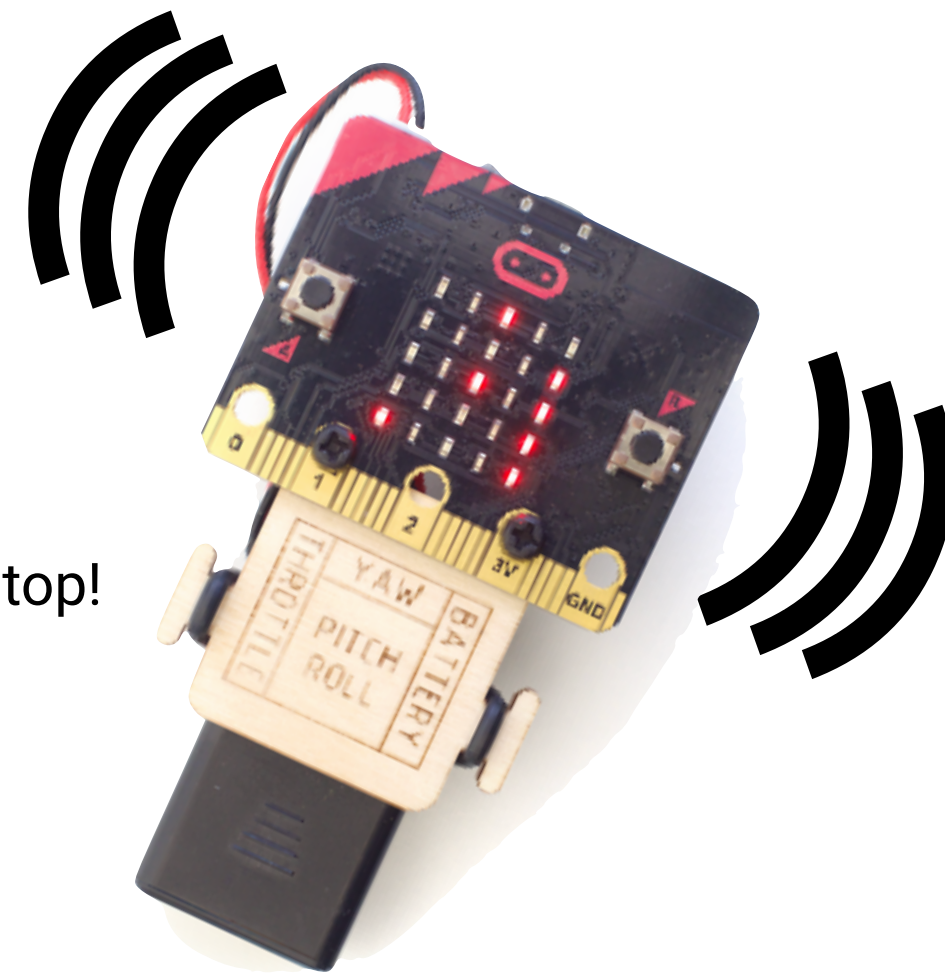


# Emergency stop

Make this little code to create a quick and effective way to stop your hover:bit. All you need to do is to shake your controller and the motor will stop.



Shake to stop!

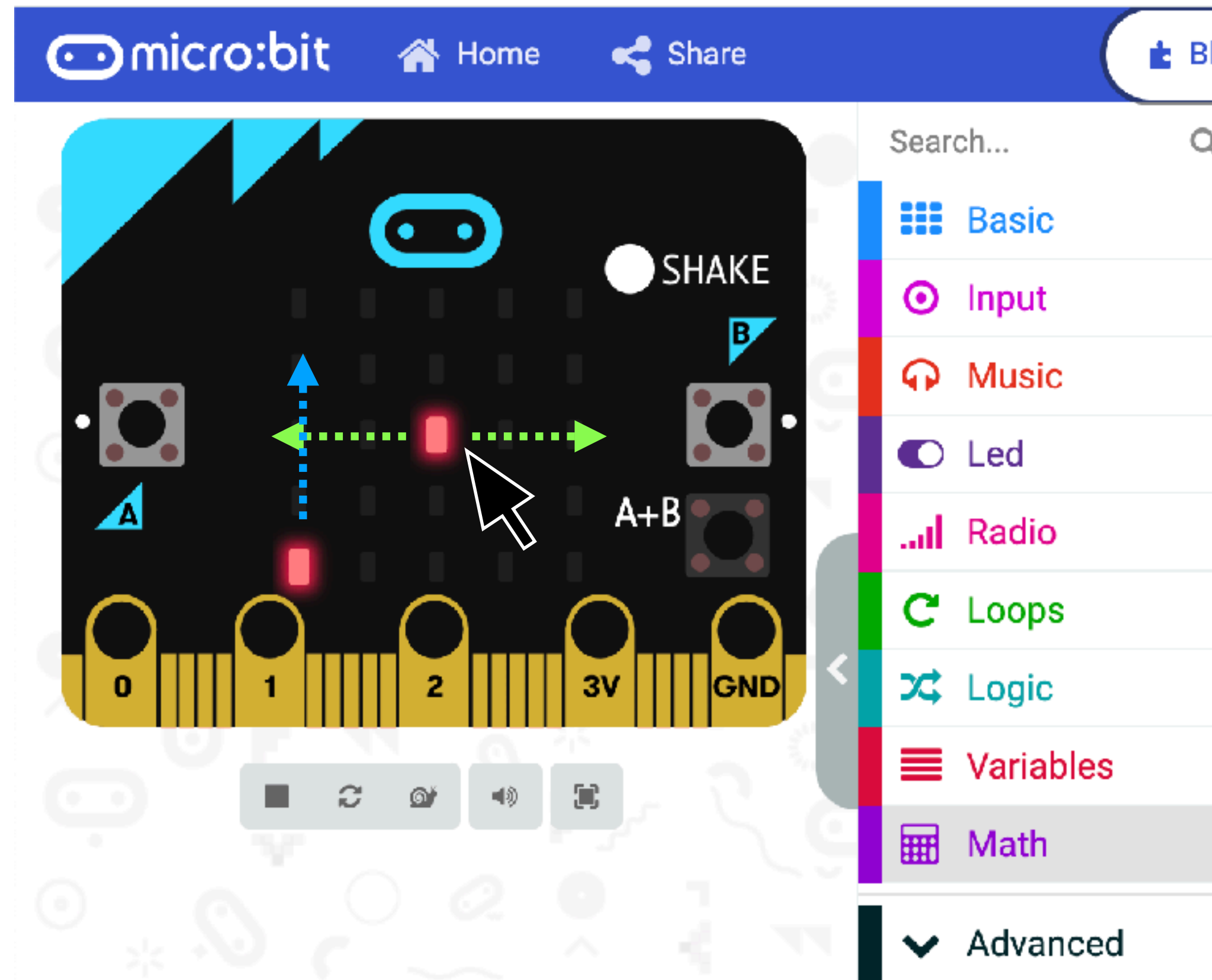




# Test it!

Use the simulator (left side of make:code) to test your code.

- Move the mouse cursor sideways over the micro:bit. Make sure the dot moves along your mouse arrow. (Green span)
- Press B button numerous times. Verify that the throttle is climbing upwards as in the blue span
- Press the A+B button to make the arming light to turn on (top left on your screen)
- Press "Shake" to simulate a shake that will turn off arm and make the throttle go down.

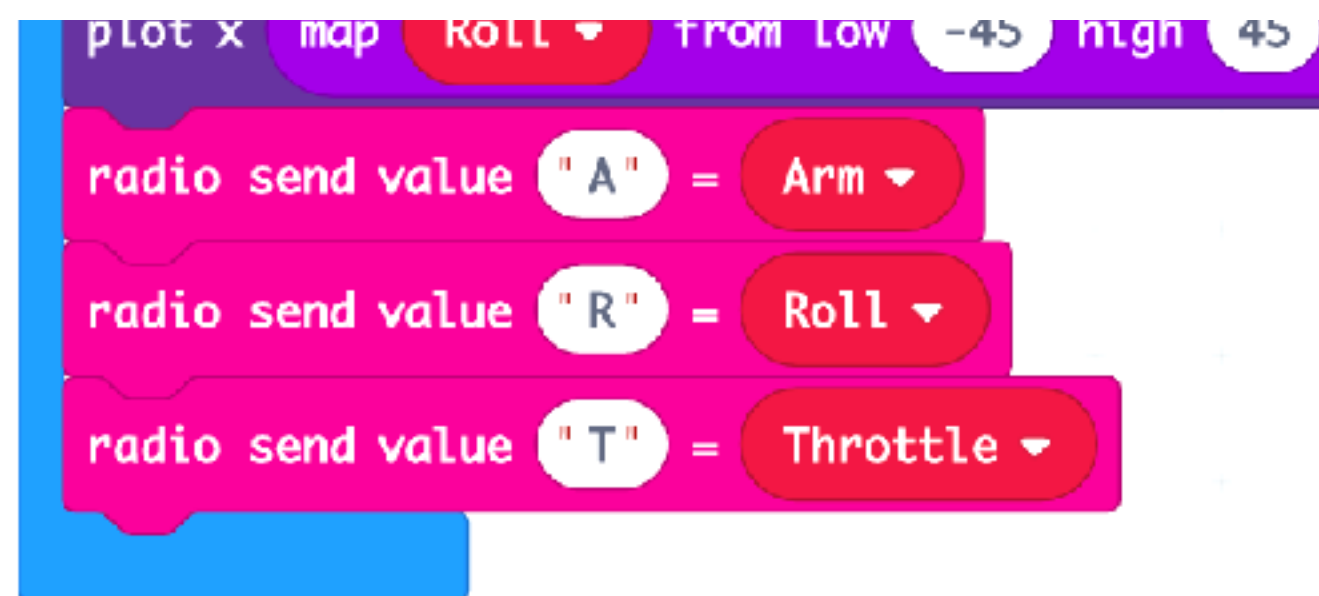
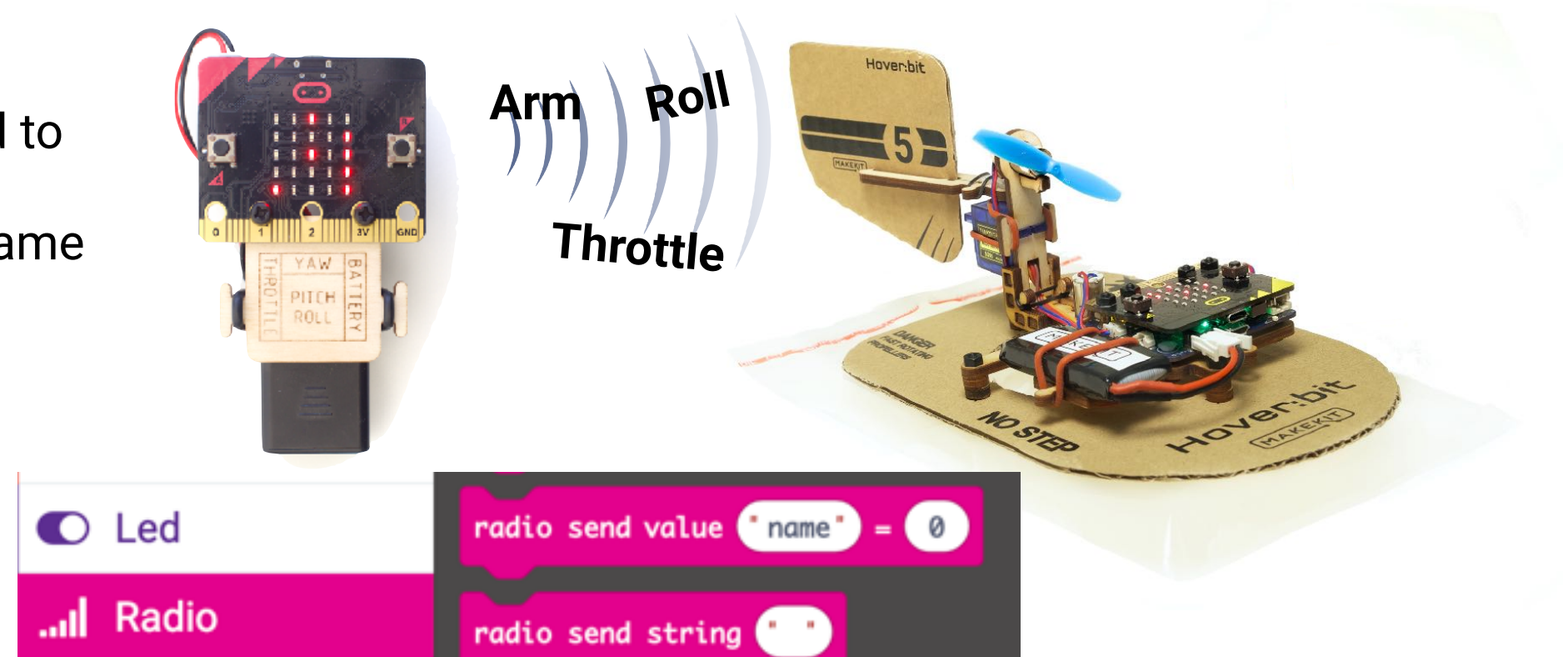


# Send the values over radio

To make our remote control work wirelessly, we need to use the radio to transmit our ART-values. They will be sent as separate numbers, with a little name tag on them so the receiver can tell them apart.

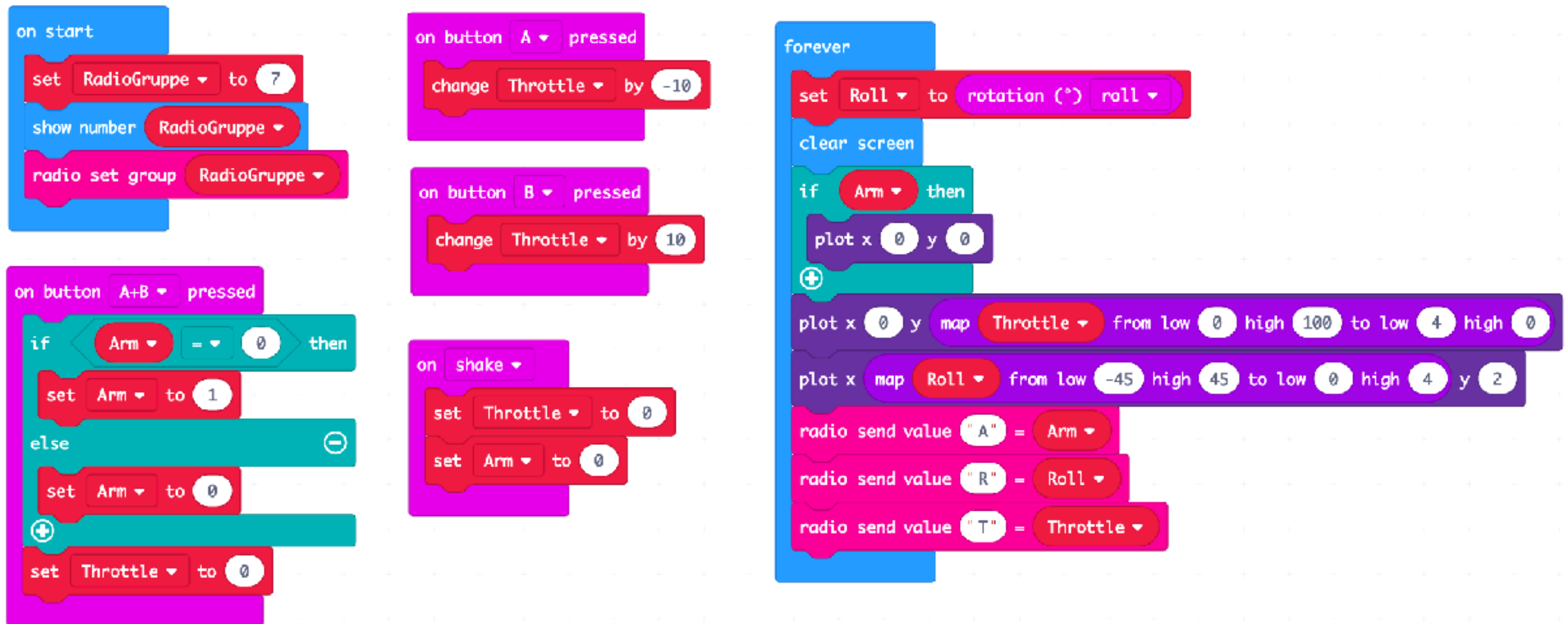
At the bottom of the Forever-loop:

- Use the radio send value = 0 block
- Make one block where you send the letter "A" (must be capital) together with the Arm value.
- Do the same with Roll (R) and throttle (T)



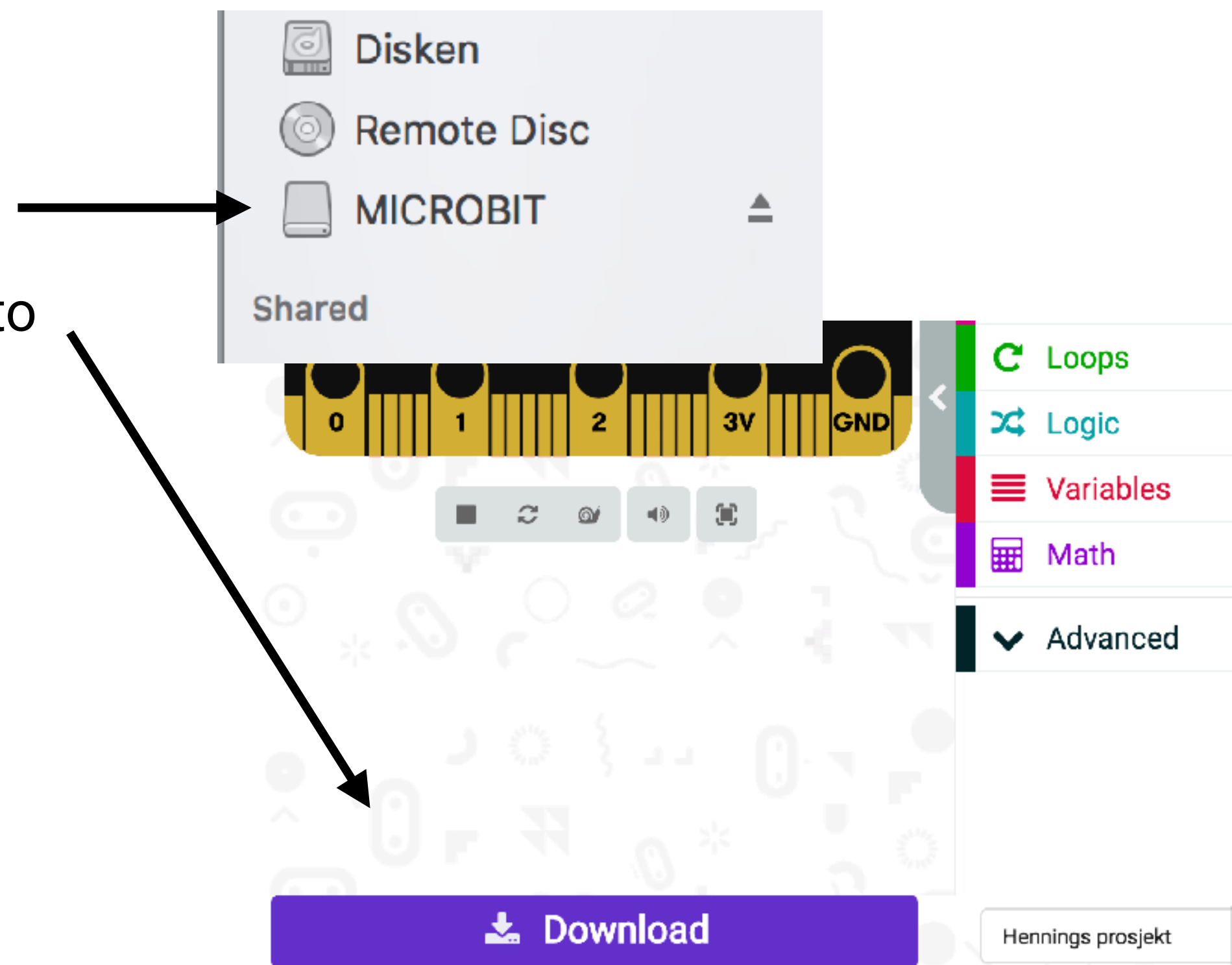
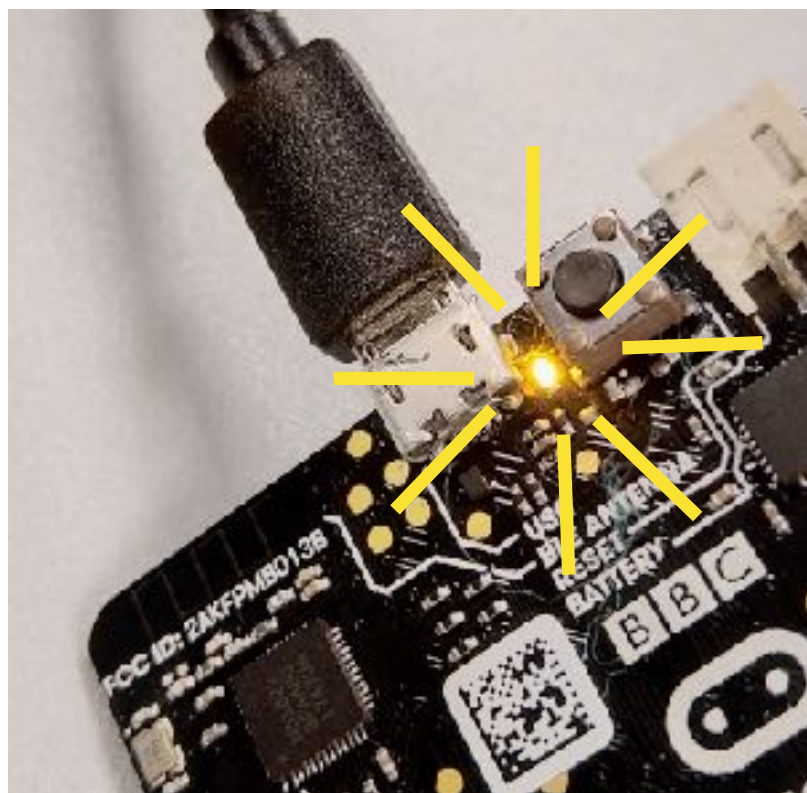
# Summary

This is the full code



# Download the code

1. Connect your micro:bit to the micro usb
2. Microbit appears as a drive
3. Press “Download” and copy the file to the MICROBIT drive.
4. Watch the orange light on the back and make sure it flashes when code is downloaded

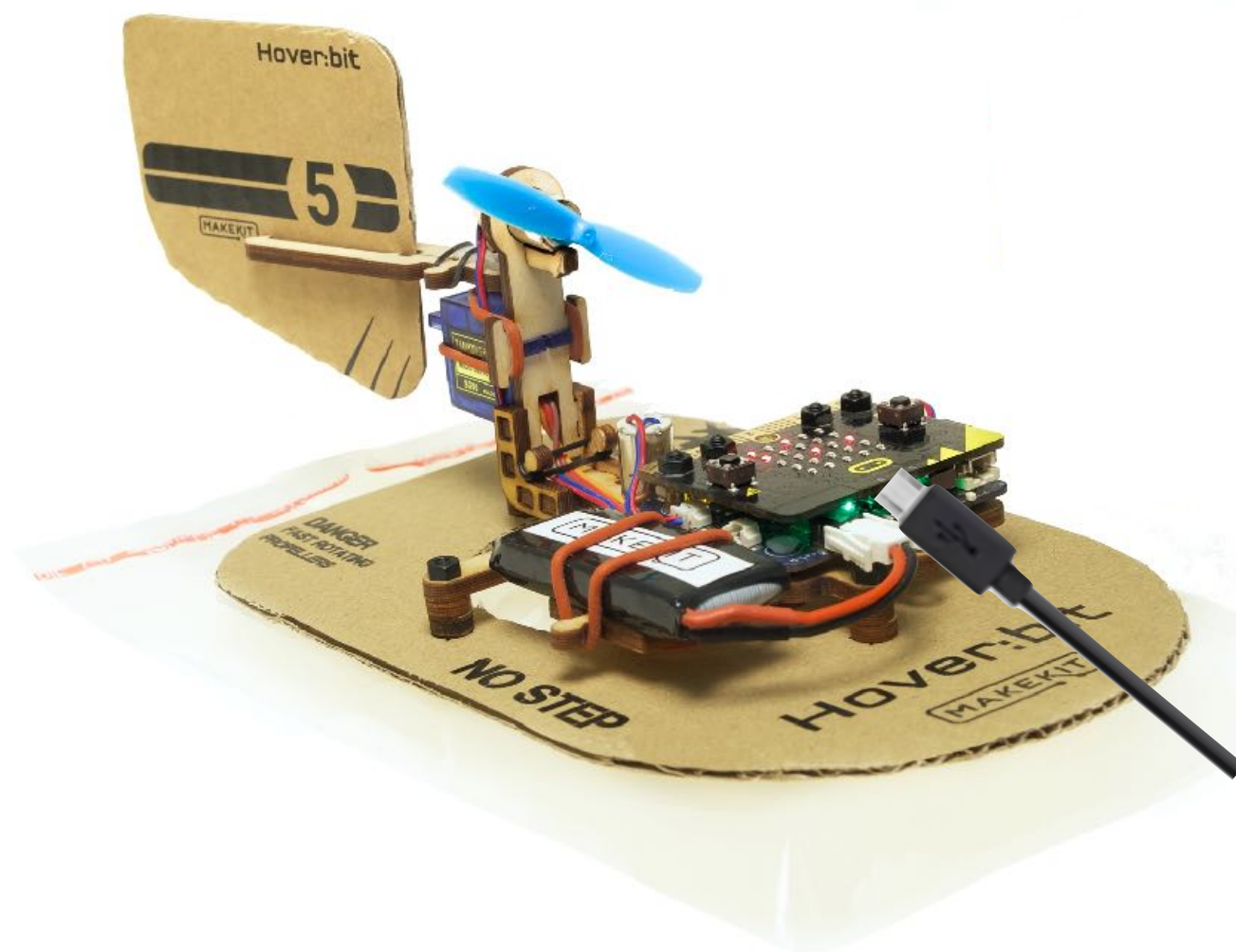


Read more about connecting the micro:bit See the micro:bit introduction at [makekit.no/](https://makekit.no/)

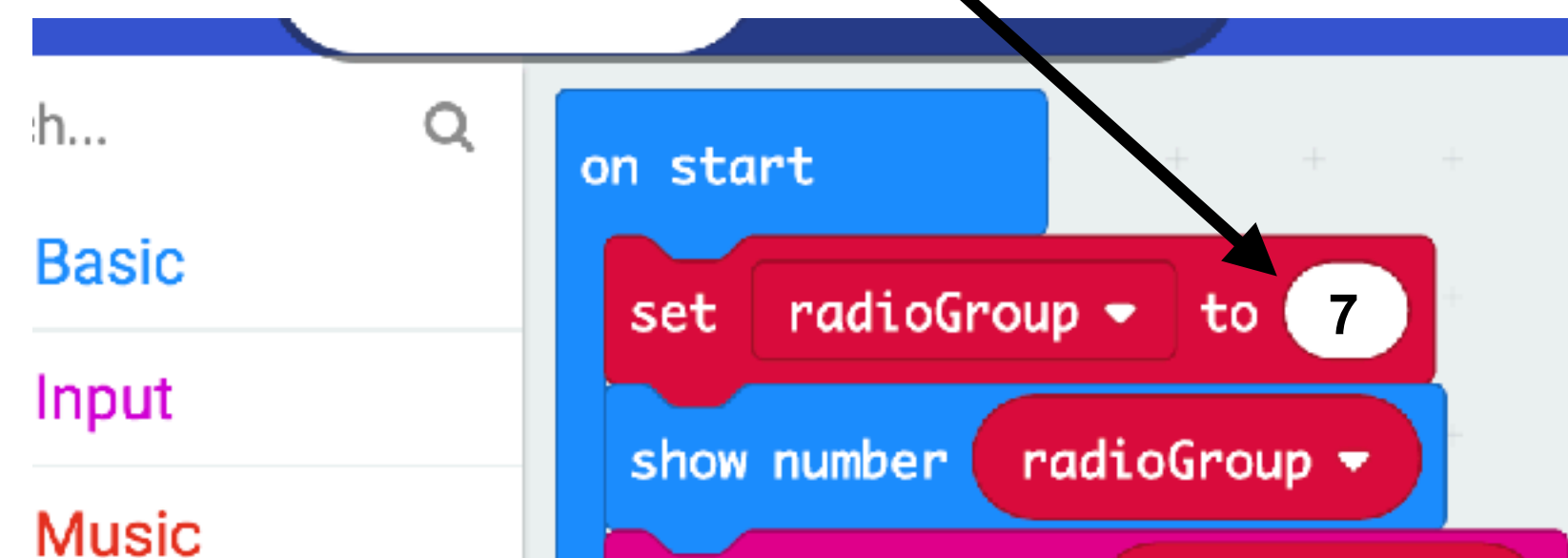
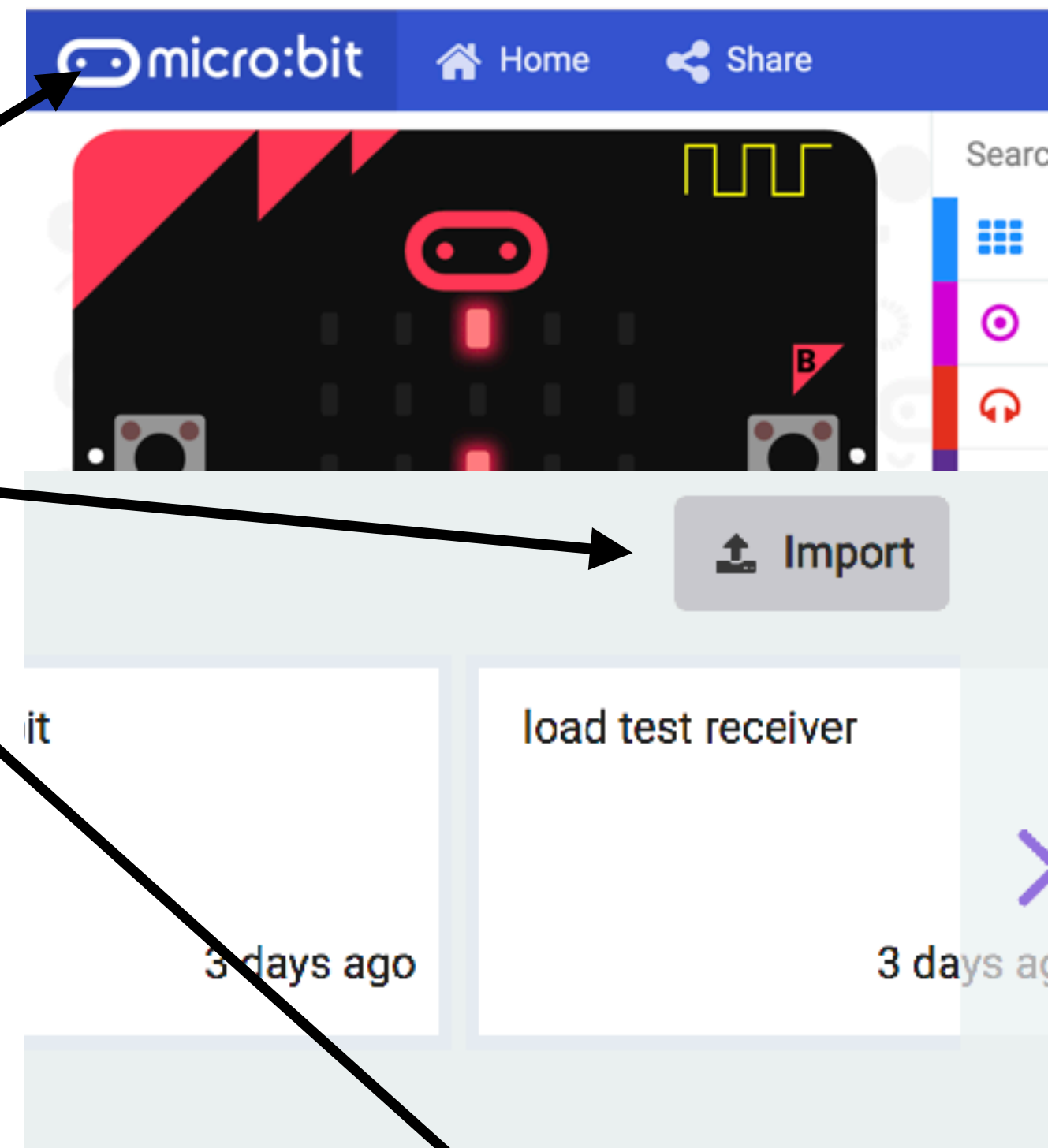


# The receiver code

1. Go to [makekit.no/docs](https://makekit.no/docs)
2. Download the hovercraft code called **"Code for hover:craft"**
3. Open the file in the editor. Click "import" and select the file
4. Make sure you have the right radio group to match your transmitter
5. Download the code as seen on the former page

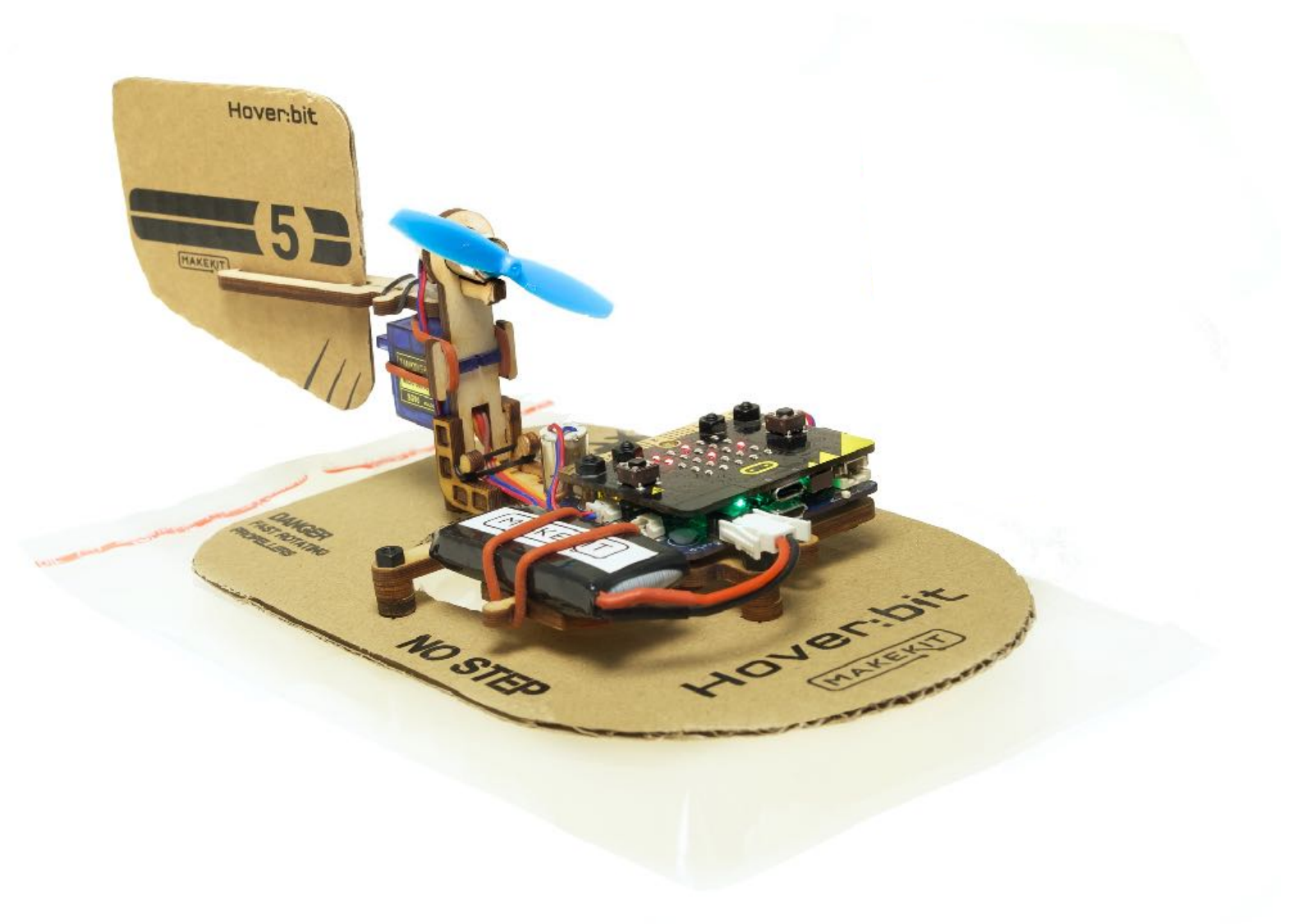
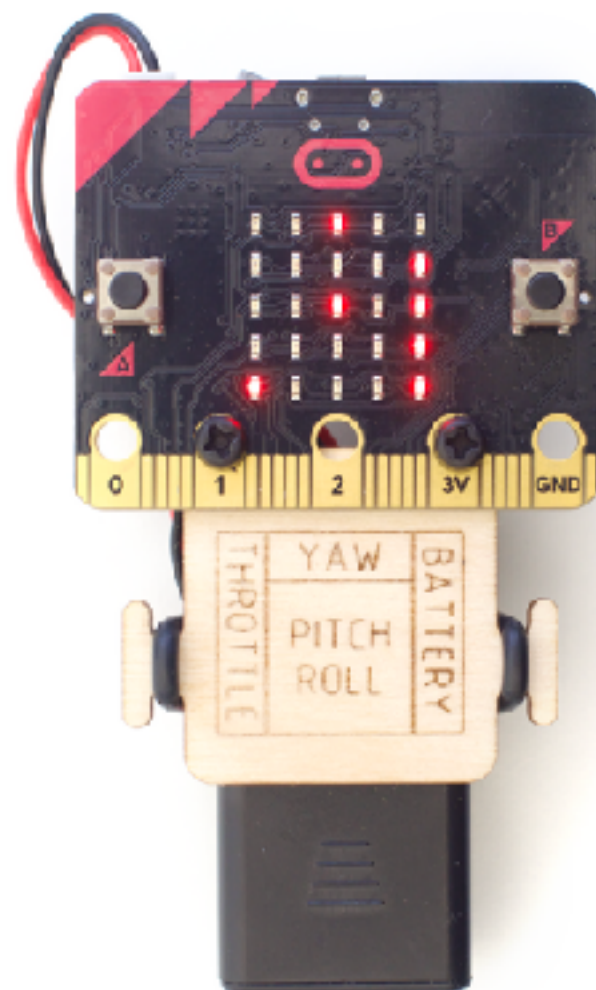


Connect the micro:bits USB plug



# Test it

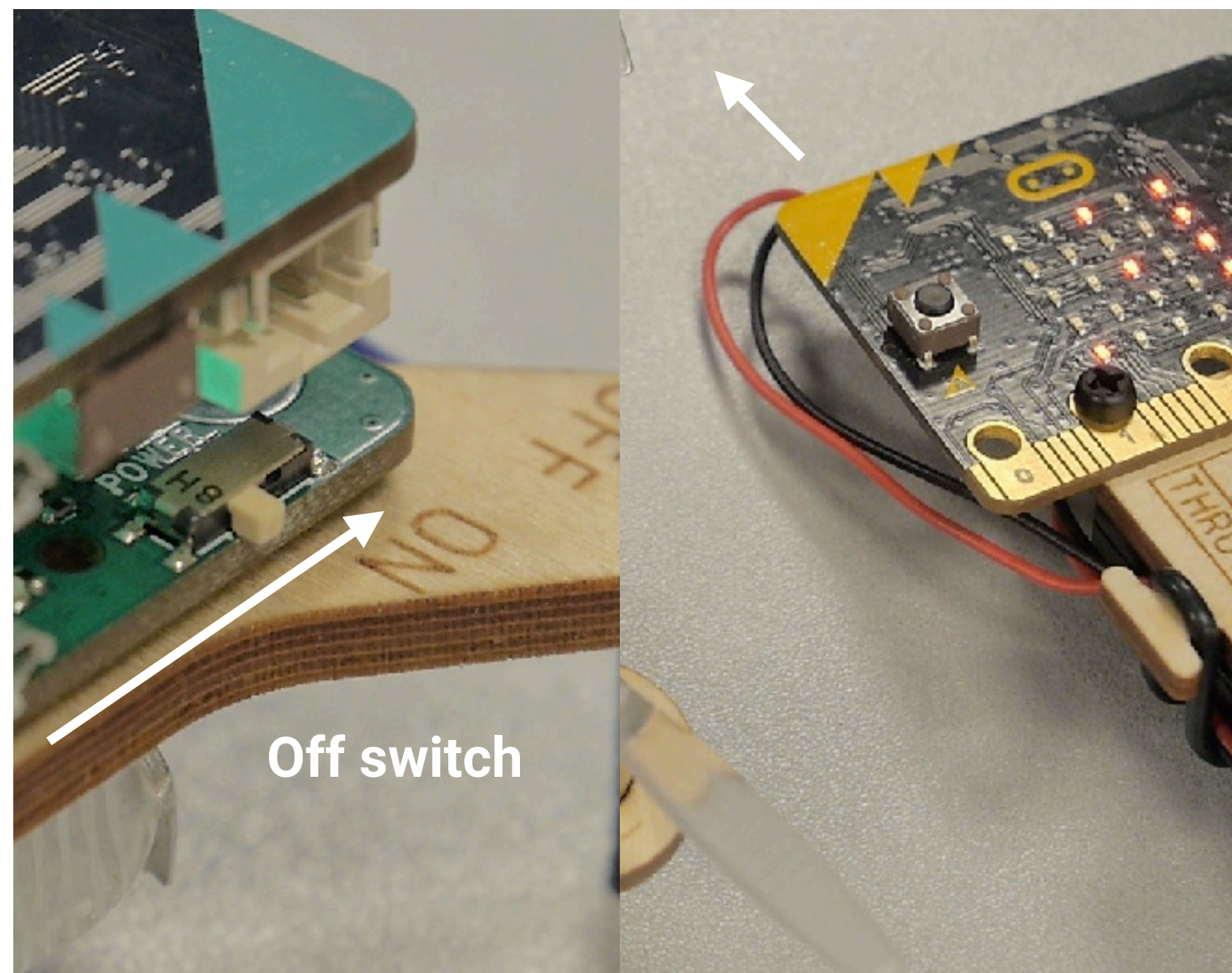
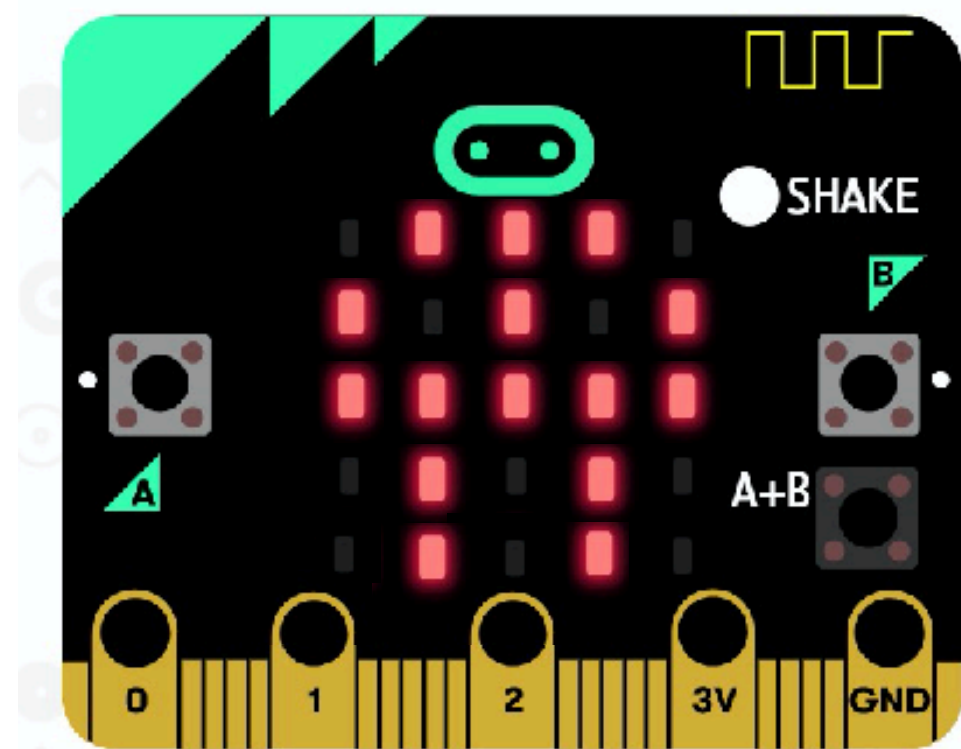
1. Turn on transmitter and hover:craft (on the transmitter you need to plug the battery connector into micro:bit)
2. Verify the number shown briefly on screen, the radio channel need to be the same.
3. Tilt the remote sideways to verify that the hover:bits rudder is moving
4. Press A+B to start engines
5. Increase speed with B button
6. Decrease speed with A button
7. Stop with A+B again or shake to stop quickly.
8. Have fun drifting your hover:bit! It can be used indoor and outdoor on dry clean surfaces like asphalt.





# Remember:

Always turn off transmitter and receiver after use. There is no auto power off.  
The skull icon means low battery on hovercraft. Please recharge the battery.



# Contact:



[www.makekit.no](http://www.makekit.no)



[henning@makekit.no](mailto:henning@makekit.no)



[makekit](https://www.facebook.com/makekit)



[gomakekit \(also twitter\)](https://www.instagram.com/gomakekit)

Get fast response at our facebook group:  
**[www.facebook.com/groups/gohoverbit/](https://www.facebook.com/groups/gohoverbit/)**