NeuroMaker Hand 2.0

Quick Start Guide

Step1: Control

Step2: Program

Step3: Expand

NeuroMaker Core

NEUROMAKER

BioSensor Ports A-C

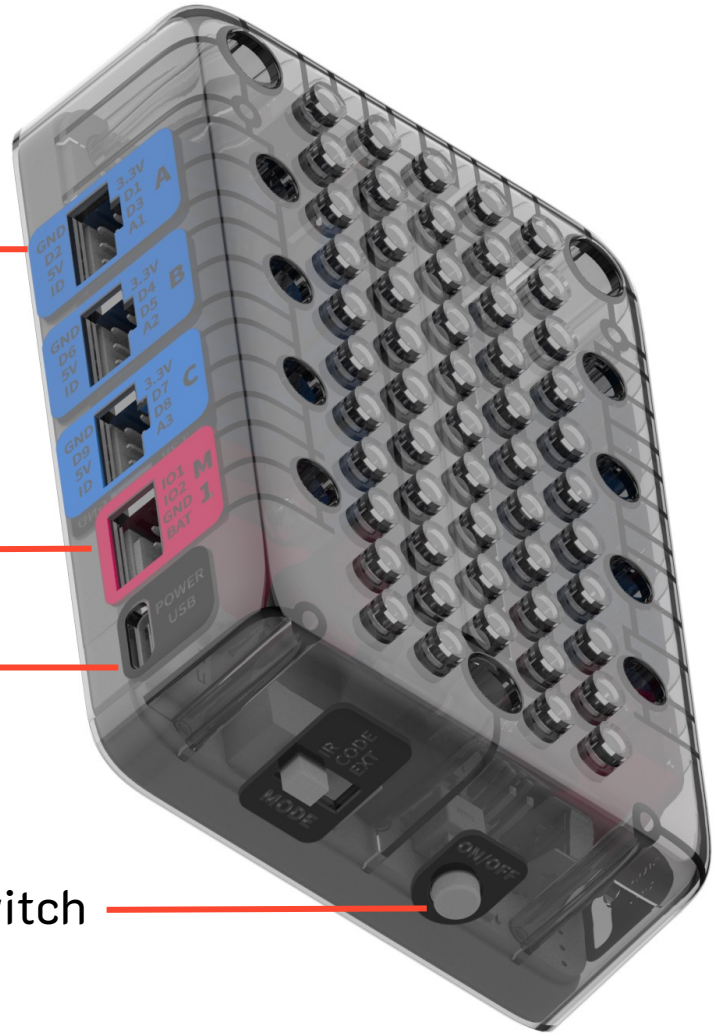
Requires NeuroMaker BioSensor Kit
Or 3rd party sensors using jumper cables

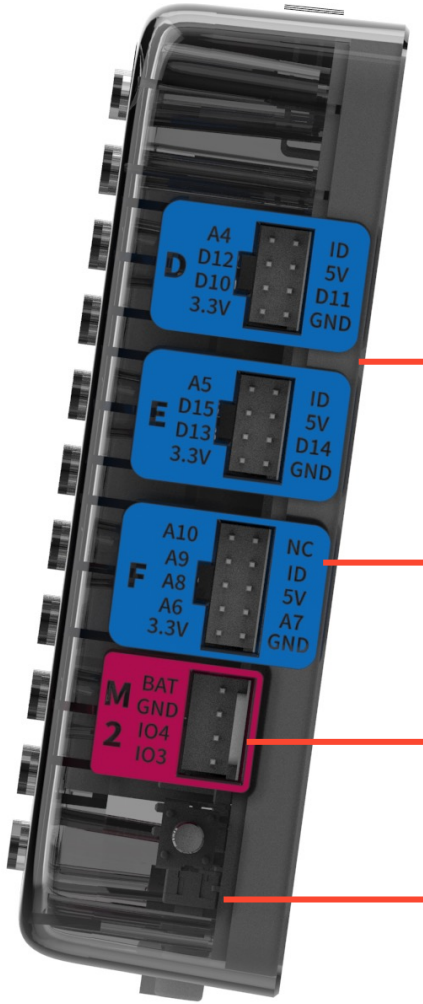
DC Motor Port

Charging/ Coding

Takes ~2 hours to charge

On/ Off Switch





BioSensor Ports D- E

Port F

For the gesture glove

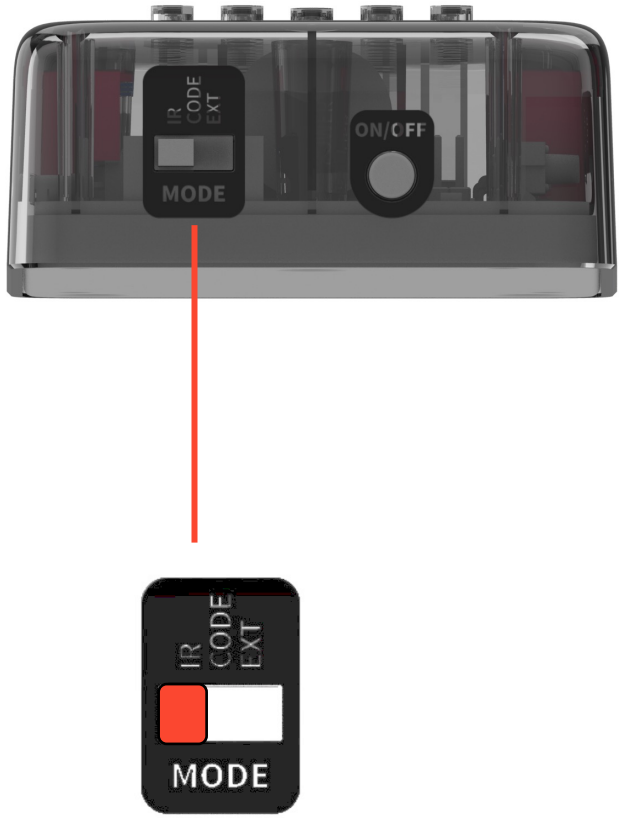
DC Motor Port

IR Receiver

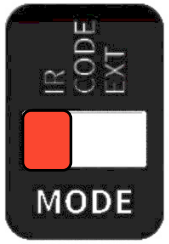
Step1: Control

Use IR Remote to control finger movements, customize, and save gestures.

Switch to IR Mode by moving the switch under “IR”.



Use the remote to control



IR Mode | Programming Mode | Extension Mode

NEUROMAKER

Basic Finger Movements

Press number 0-5 to move an individual finger. Press again to release the finger.

1- Thumb

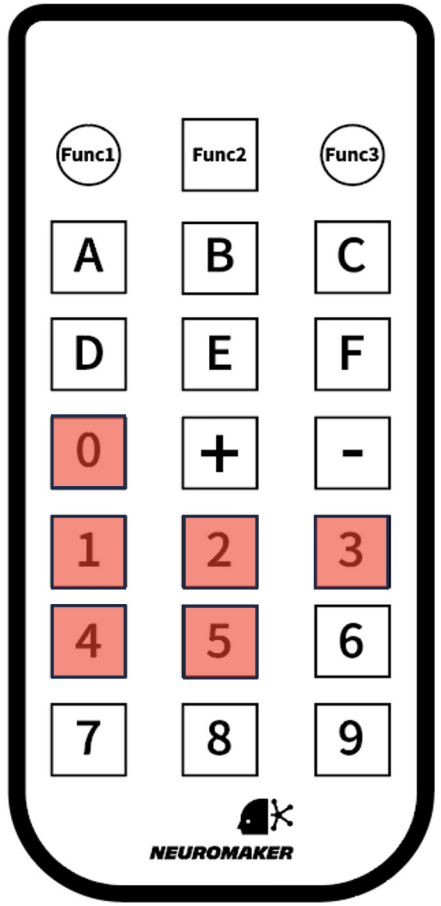
2- Index finger

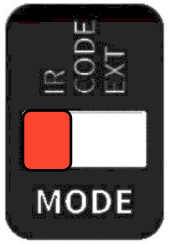
3- Middle finger

4- Ring finger

5- Little finger

0- Reset all finger positions





IR Mode | Programming Mode | Extension Mode

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Preset Functional Grips

These are some of the most commonly used grips from the real prosthesis.

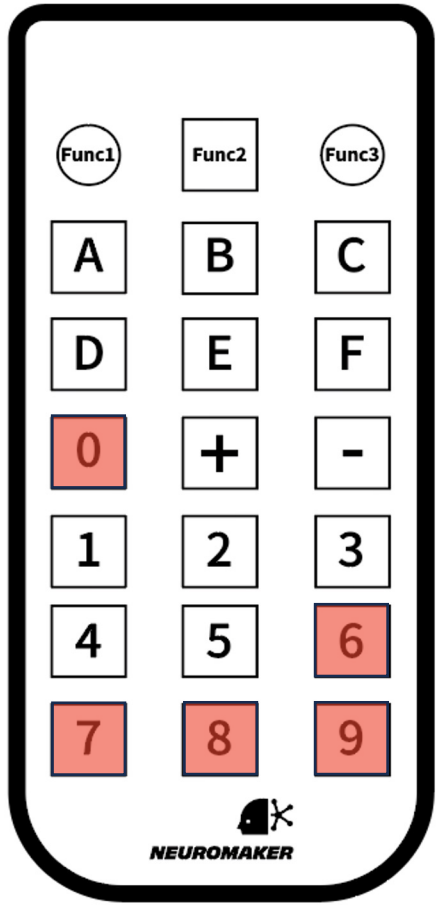
6- **Precision pinch**: Used to grab thin or small objects.

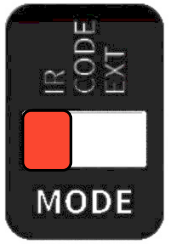
7- **Tripod**: Used to grab pens, cups, or medium sized objects.

8- **Power grip**: All fingers close, using all gripping power from the hand.

9- **Lateral grip**: Used to grab cylindrical shaped objects, like screwdrivers, frying pan, or a door handle.

0- Reset all finger positions





IR Mode | Programming Mode | Extension Mode

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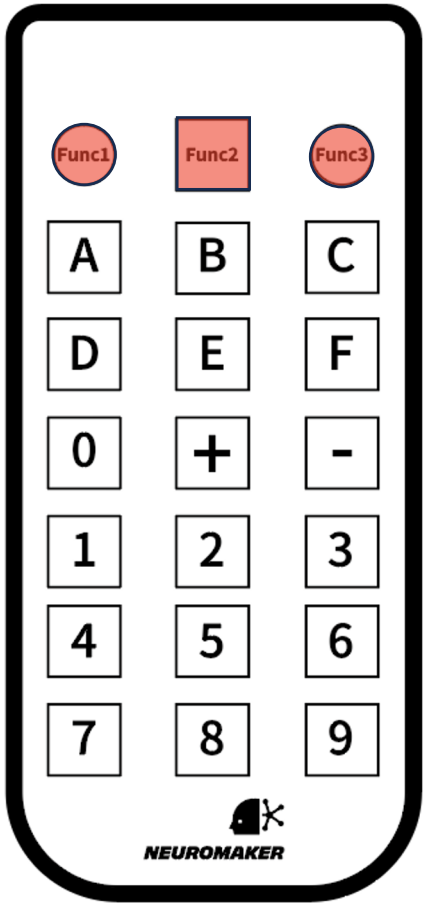
Save Current Gesture

The ‘func1’, ‘func2’ and ‘func3’ buttons are used to save the current gesture.

Step1: Move fingers to desired positions.

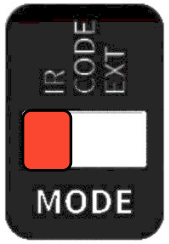
Step2: Long press one of the ‘func’ buttons for 5 seconds, until all LEDs start blinking rapidly.

Now this gesture is saved to that ‘func’ button. You can perform the gesture using a short press of that button.



Long press: Save
Short press: Perform gesture

Once the NeuroMaker Core powers off, all saved gestures will be lost.



IR Mode | Programming Mode | Extension Mode

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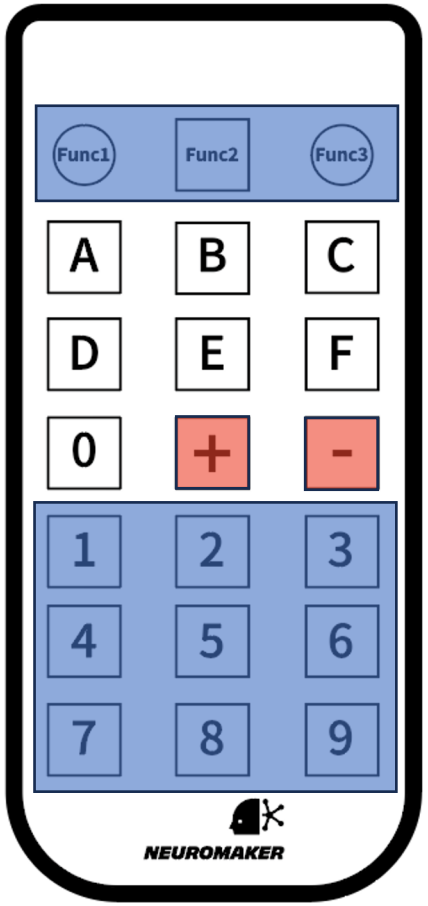
Finger Fine Adjustments

The '+' and '-' buttons are used to adjust finger positions in small increments.

Step1: Select a finger or a grip by pressing a button from 1-9, and func1- func3.

Step2: Repeatedly press '+' or '-' to slightly move the selected finger to the desired position.

This self-defined gesture can also be saved to 'func' buttons.



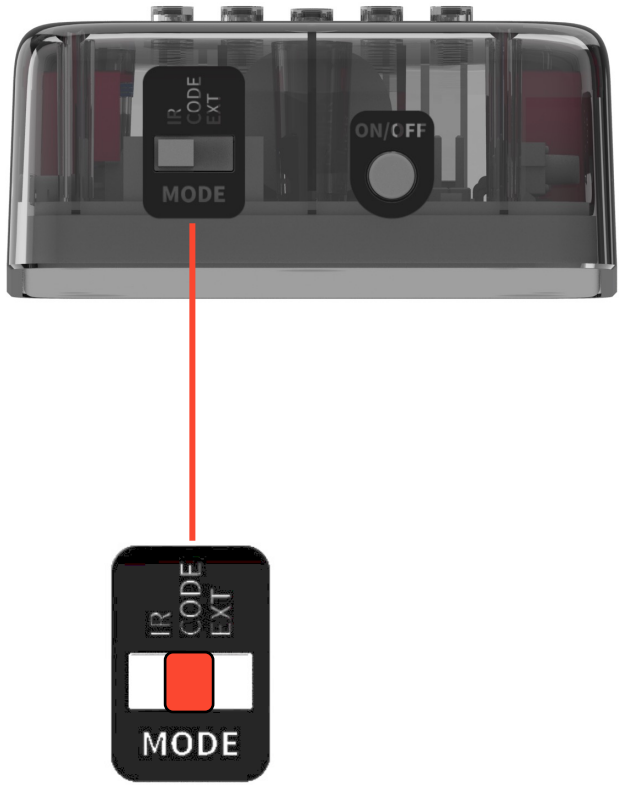
Step1: Select any finger/ grip

Step2: Press + or -

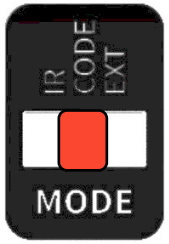
Step2: Program

Use block-based coding/ Arduino C to program the hand and the IR remote.

Switch to Programming Mode by moving the switch under “CODE”.



Plug in to a Chromebook/ Laptop with Chrome browser using the USB-C cable provided

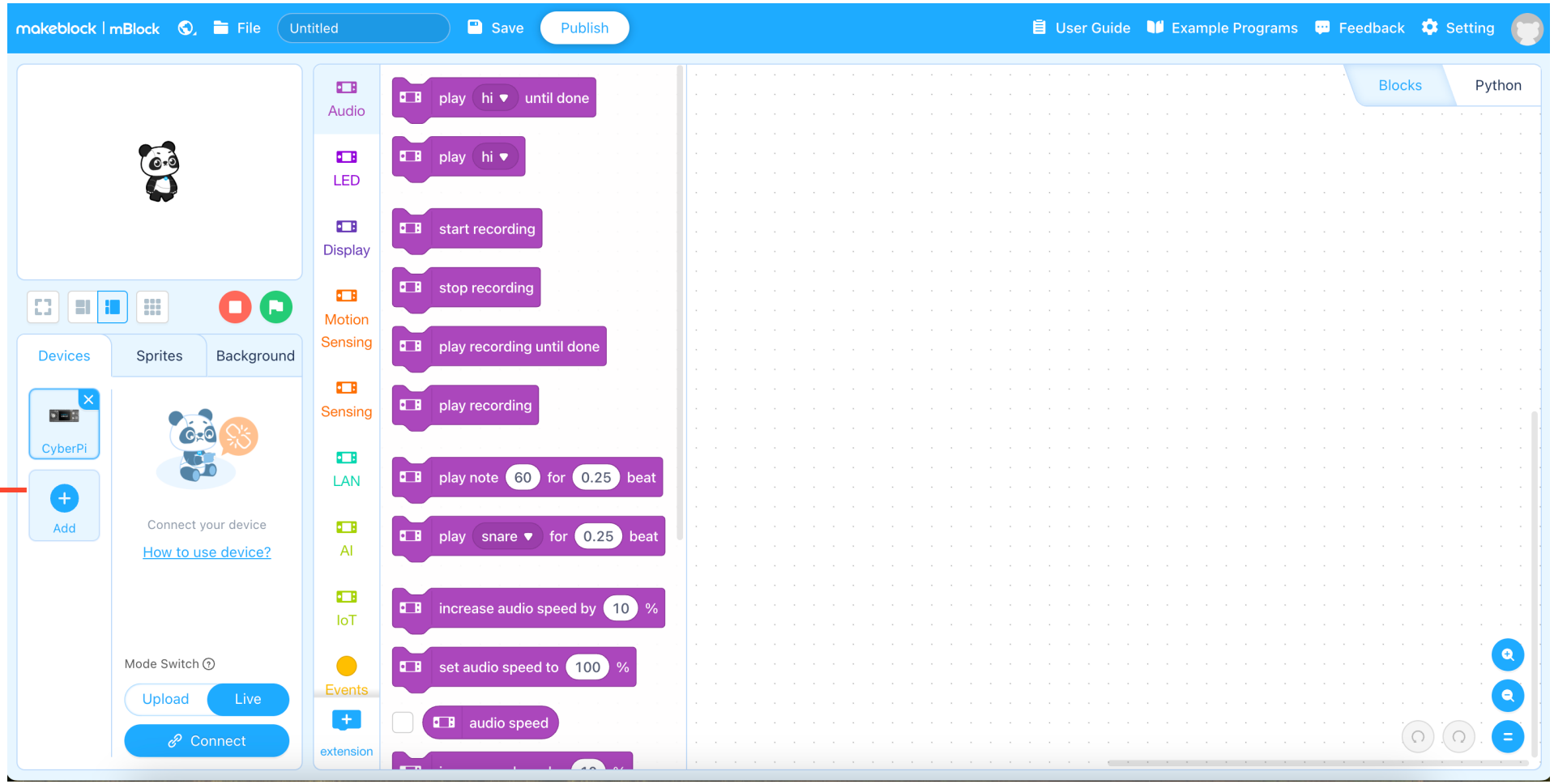


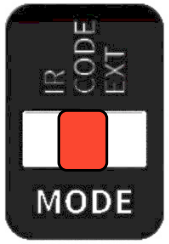
IR Mode | **Programming Mode** | Extension Mode

NEUROMAKER

In a Chrome browser, go to ide.mblock.cc

Then Click “Add”



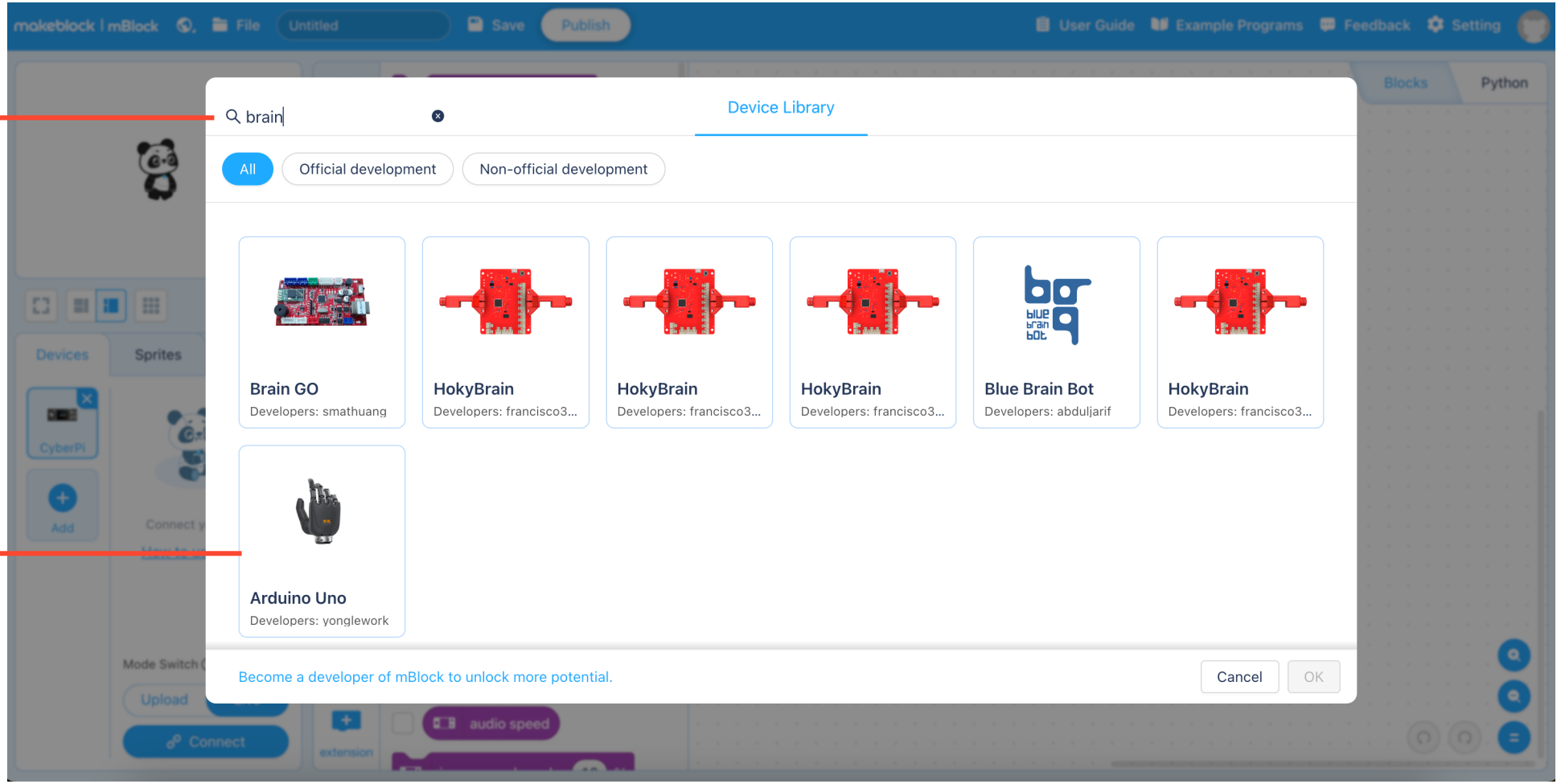


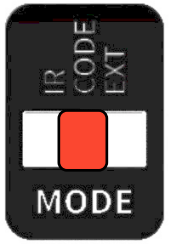
IR Mode | **Programming Mode** | Extension Mode

NEUROMAKER

Search “brain”

Then click and add this device extension





IR Mode | **Programming Mode** | Extension Mode

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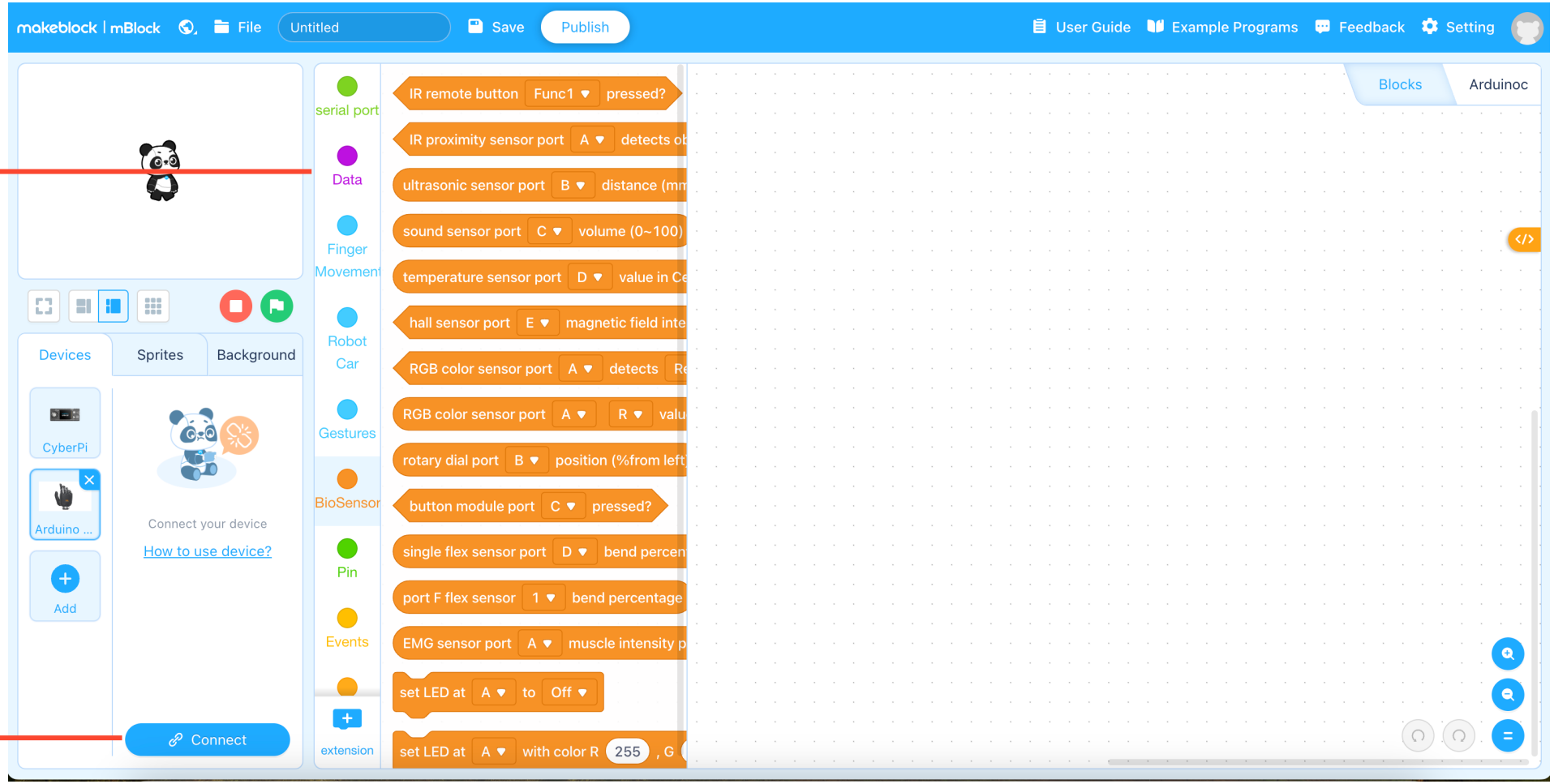
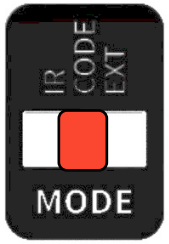
Now you should see the NeuroMaker Hand coding blocks.

Click “Connect”





IR Mode | Programming Mode | Extension Mode

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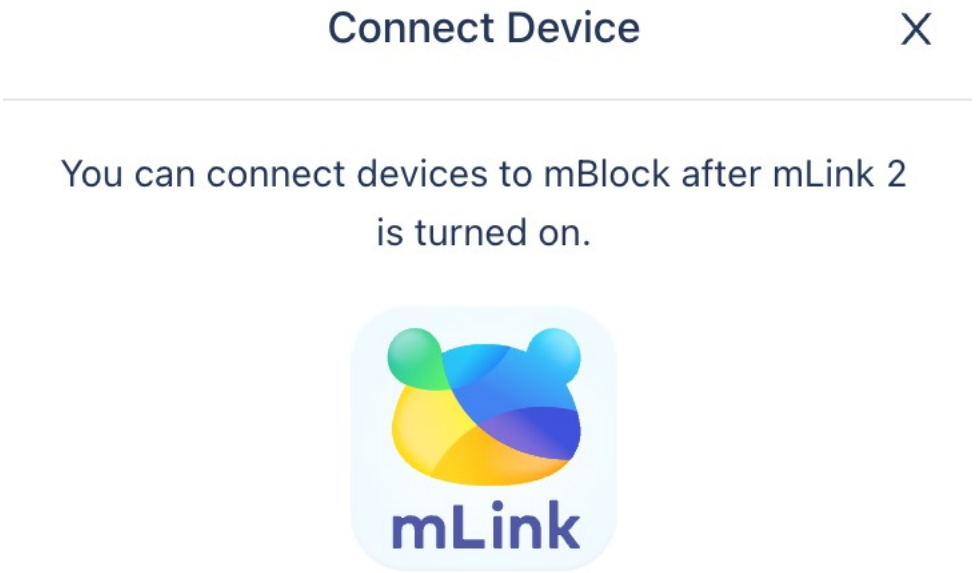
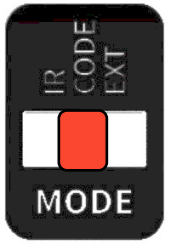
Follow the prompt and redirect to install mLink2.



To manually install:

For Chromebook, go to the Chrome Extension Store and install mLink 2.

For other laptops,go to mblock.cc/en/download/mlink to download and install.



IR Mode | Programming Mode | Extension Mode

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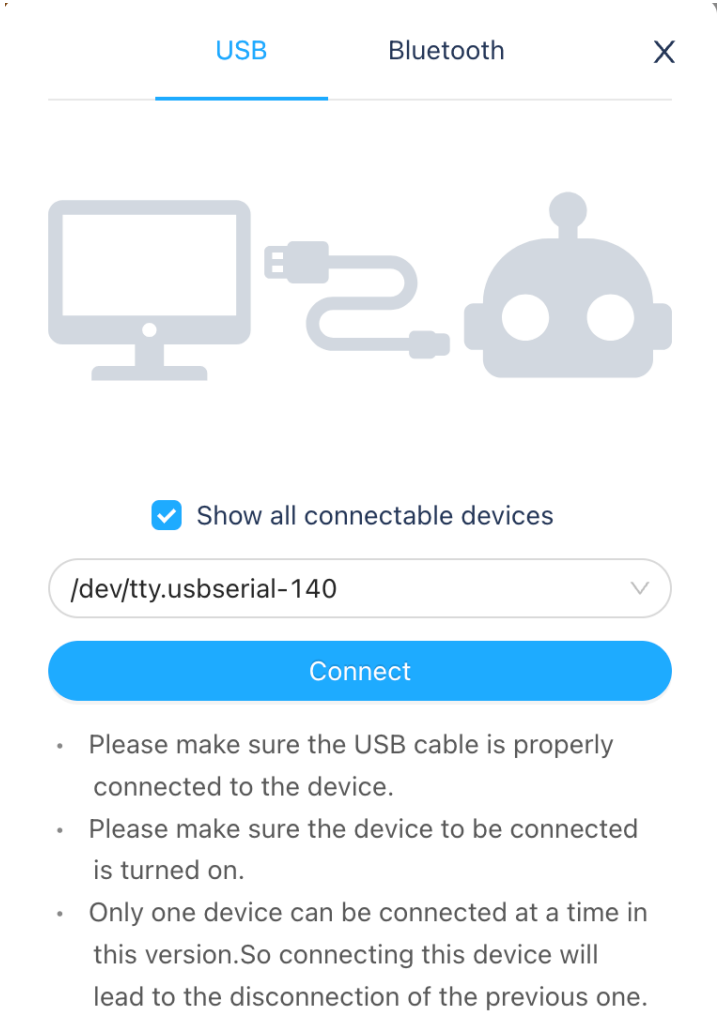
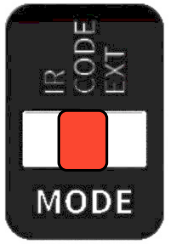
Once mLink 2 is installed and launched, return to the previous page and click the “Connect” button once more. This action should prompt a new window to appear, similar to the one displayed on the right.



Check “Show all connectable devices”.

In the droop down menu, select the one similar to “usbserial”. The exact name varies for each device. If you have trouble locating the Hand, disconnect other accessories including mouse, speakers, or Bluetooth devices.

Then click “Connect”.



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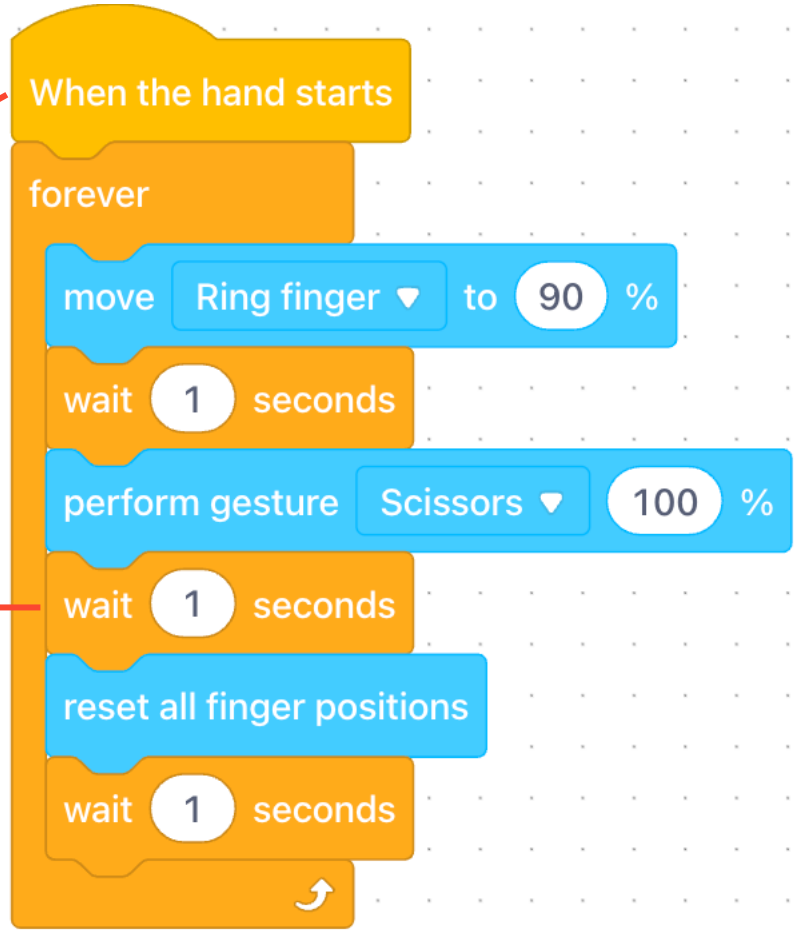
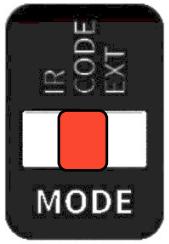
Code Example 1

Always start your program with “When the hand starts”.

Add a “forever” to loop through the commands.

Include a ”Wait” block following each finger movement command to allow adequate time for the fingers to complete their motion.





IR Mode | Programming Mode | Extension Mode

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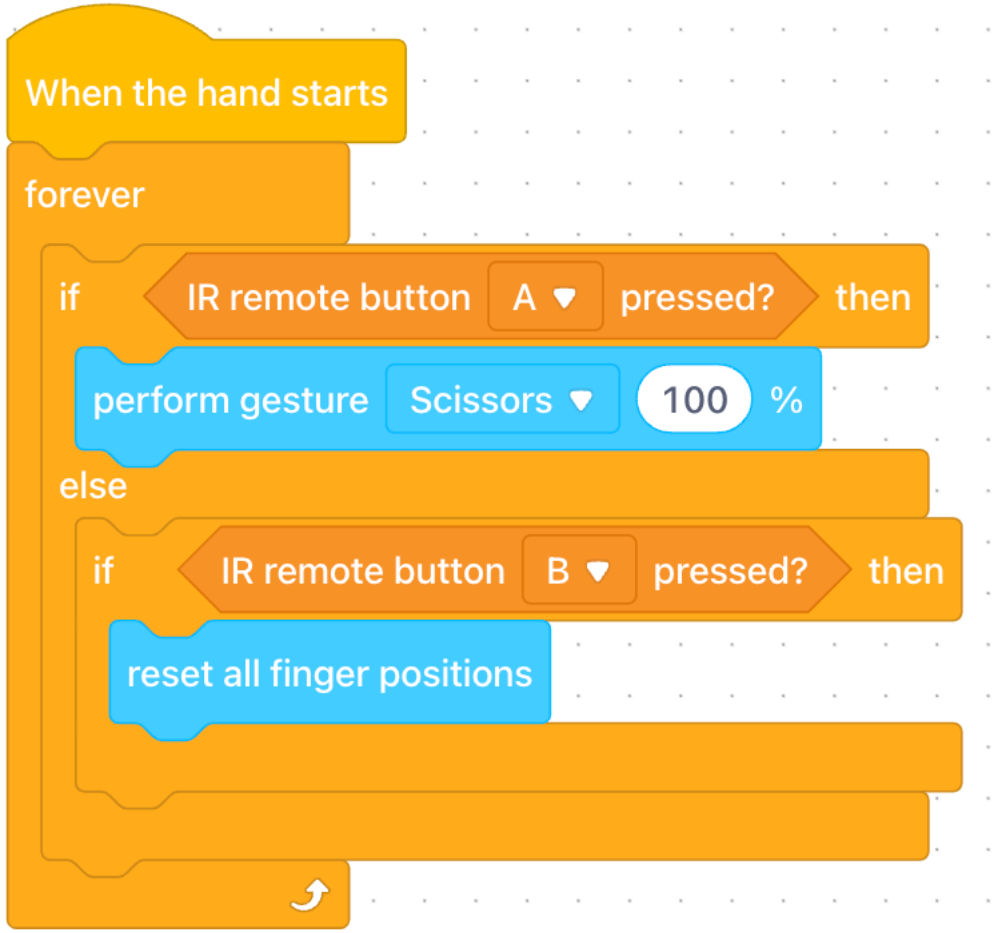
Code Example 2

Except for the basic finger movements, all buttons on the IR remote are programmable.

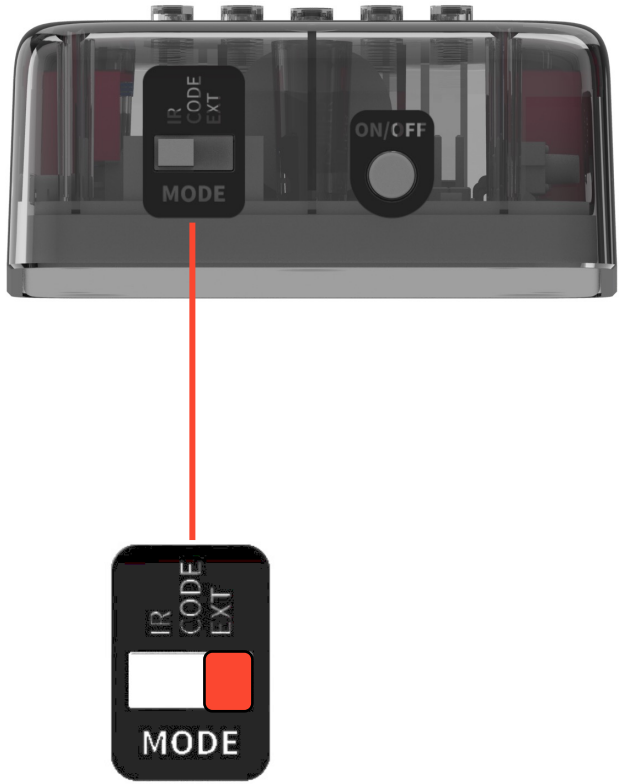
Use an “if- else” statement to perform a gesture when A is pressed, and reset all fingers when B is pressed.



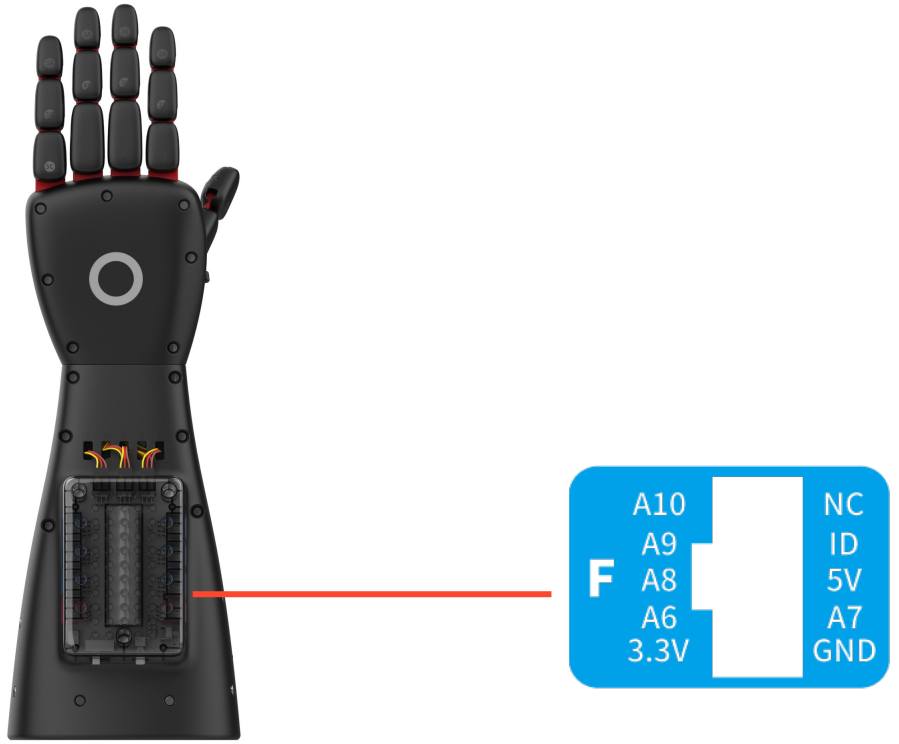
Step3: Expand (Advanced)

Use other microcontrollers to control the NeuroMaker Hand.
Connect 3rd party sensors to the Hand and program them.

Switch to Extension Mode by moving the switch under “EXT”.



On the right side of the NeuroMaker Core, locate the sensor port F.



Use other Microcontrollers to control the Hand

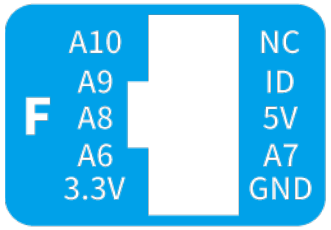
Once in Extension mode, Port F starts to automatically receive analog signal from its A pins, which directly controls finger positions. The percentage of the finger bending is corresponding to the input voltage. It adjusts the maximum bending dynamically according to the maximum input voltage.

Step1: Use the provided extension cable (under the double sided tape at the top tray) and plug one side to Port F.

Step2: Connect A6-A10, and GND to the corresponding pins on your microcontroller.

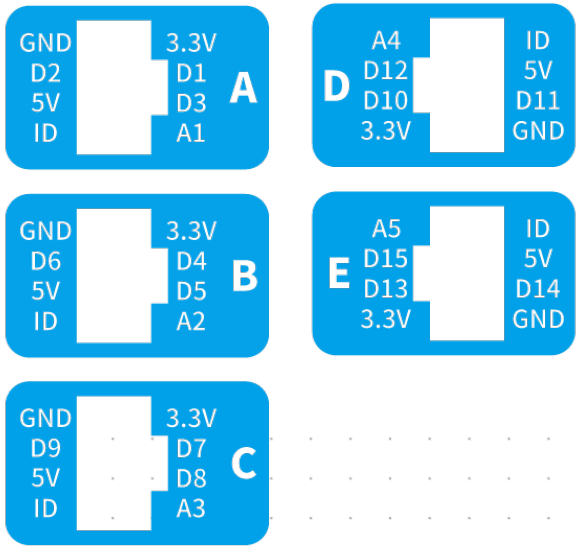
Step3: Make sure the ID pin is disconnected or remains LOW.

Step4: Program the external microcontroller to output analog voltage to A6-A10 to control the fingers.



Pin in Port F	Function	Description
3.3V	3.3V Output	Provides power
GND	GND	GND
A6	Analog Input, 0-3.3V	Controls thumb
A7	Analog Input, 0-3.3V	Controls index finger
A8	Analog Input, 0-3.3V	Controls middle finger
A9	Analog Input, 0-3.3V	Controls ring finger
A10	Analog Input, 0-3.3V	Controls little finger
ID	Module Identification	Not used in this mode

Connect 3rd Party Sensors to the Hand and Program Them



All digital and analog pins inside each sensor ports can be individually accessed and programed.

In this example code:

- A 3rd party sensor that outputs an analog signal is connected to pin A1 inside Port A.
- Another sensor is connected to pin D5 inside Port B.
- A actuator is connected to D6.
- An additional servo motors is connected to S6 on top of the NeuroMaker Core.