Creative Lab Kit 2.0

1. Parts list
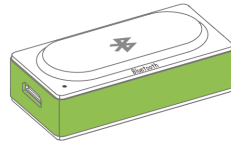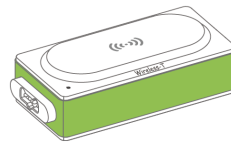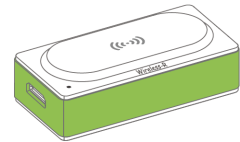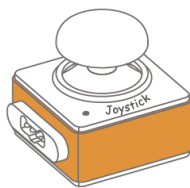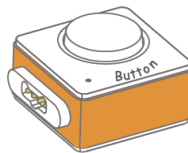
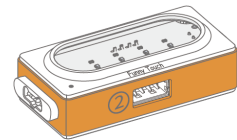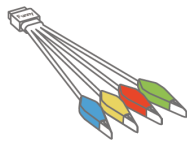|			
Power × 2	Bluetooth × 2	Wireless transmitter	Wireless receiver
Joystick	Button × 2	Knob × 2	Funny touch
Funny switches	GND wire	Light sensor	Dual IR detector
Ultrasonic sensor	Ranging sensor	Sound sensor	PIR sensor
Color sensor	Gyro sensor	Temperature sensor	Temperature srobe
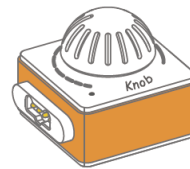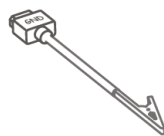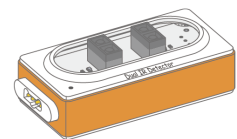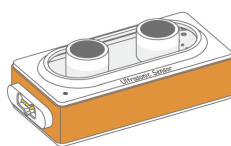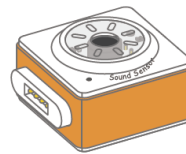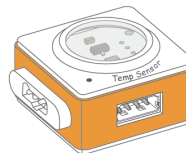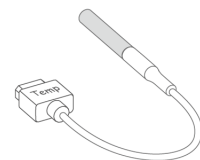
Humiture sensor

Soil moisture sensor
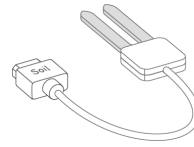
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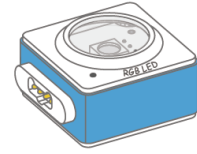
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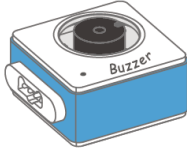
Buzzer
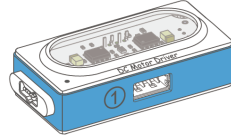
Dual DC motor driver

× 2
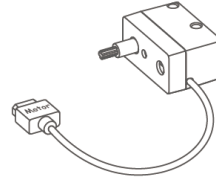
Motor pack

× 4
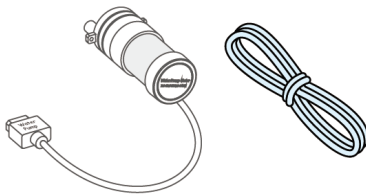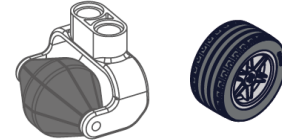
Water pump pack
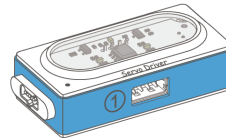
Dual servo driver × 2
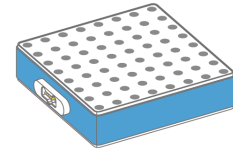
LED panel × 2
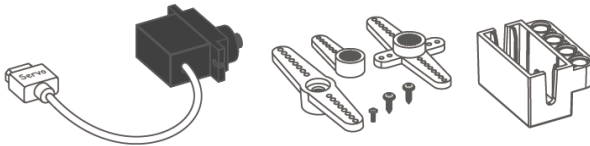
Servo pack × 4
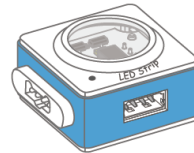
LED strip driver × 2
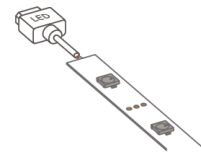
LED strip pack × 2
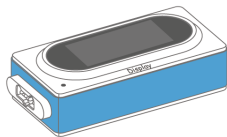
Display
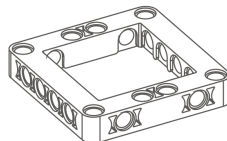
Neuron board

× 12
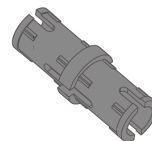
Friction pin connector

× 72
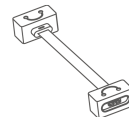
Magnet wire (10cm) ×

3
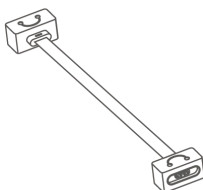
Magnet wire (20cm) ×

3
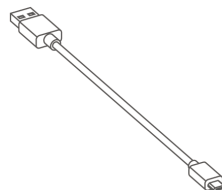
USB cable (100cm) ×

2
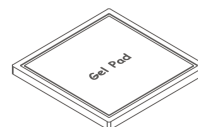
Gel pad

× 6

Color cards

2. Meet your Neuron

Colorful Blocks with Diverse Functions

Neuron blocks are classified into three categories according to color.

- Energy & Communication blocks (Green): Provide power to other blocks. The communication block contains a Micro USB interface, and you can connect the block to power bank or power adapter via USB cable to power the other blocks. The communication blocks also supply diverse wireless communication modes.
- Input blocks (Orange): The input blocks collect information (such as sound and light) from the environment and send signals to change the output.
- Output blocks (Blue): The output blocks receive signals from input blocks, and then do something, such as lighting up, moving or making a sound.

Easy Connection

- Magnetically snap together
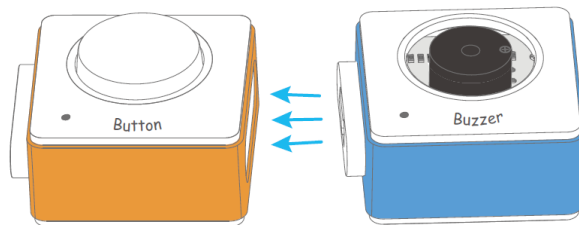
- Magnetically snap with a Neuron board or magnetic board
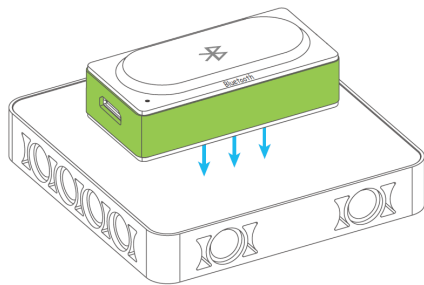
Offline Creating

When you use the Neuron without any software, you can create rich effects with the preset program. In this mode, the Neuron block will behave according to the data it received from the previous block.

Connection rules in this mode:

- The input block (orange) must be connected on the left side of the output block (blue).

✅ Working properly
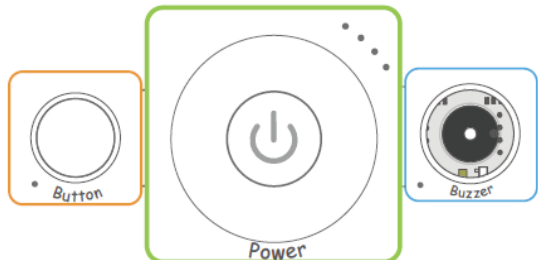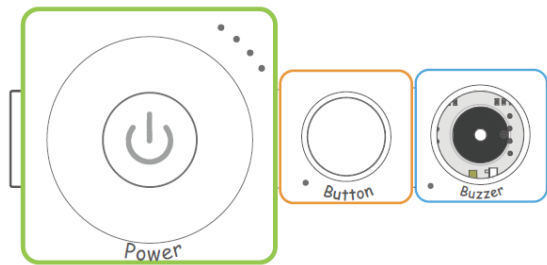
⚠ Only working when you program the blocks through Makeblock Neuron app or mBlock 5.
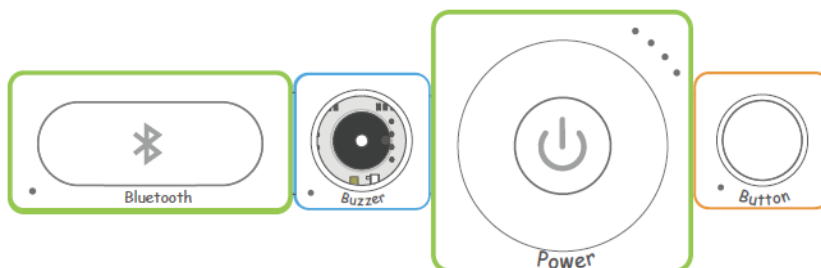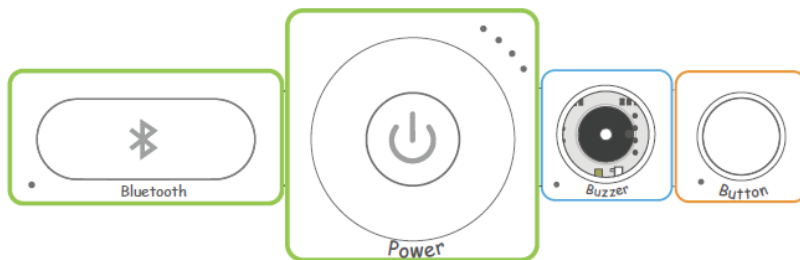
• An input block can affect multiple output blocks, while an output block can only receive signals from its nearest input block.
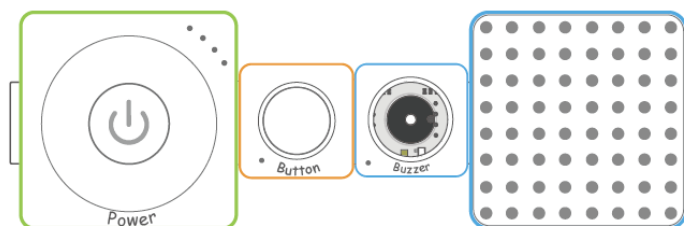
Both the buzzer and LED panel can receive signal from the button.

The buzzer can only receive signal from the button.
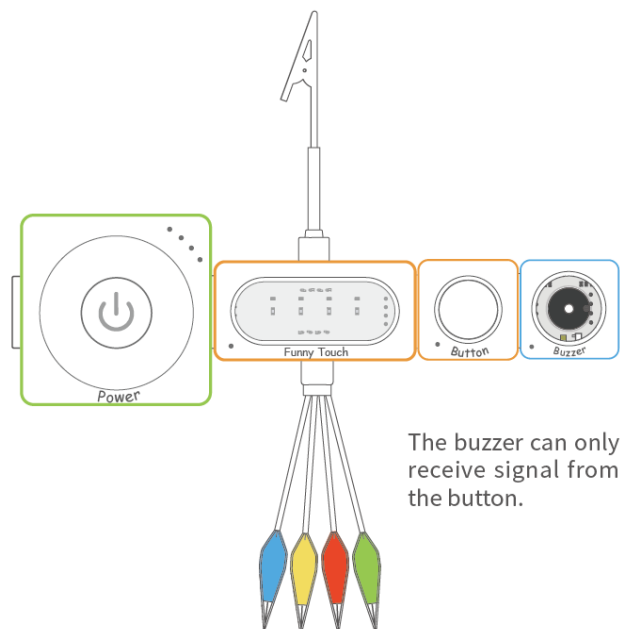
Online Programming

Connect the Neuron blocks to a tablet, smart phone or computer, either with Bluetooth or Wi-Fi block, then you can design how Neuron blocks interact with each other by using Makeblock Neuron app or mBlock 5. Reboot the power block to switch online programming to offline creating.

Makeblock Neuron App

With Makeblock Neuron app, you can invent with electronic blocks without programming knowledge. You only need to draw lines between electronic blocks in an intuitive interface. This process also develops logical thinking and intuition about electronics.

Furthermore, Makeblock Neuron app may control your invention remotely via its IoT (Internet of Things) functions, making it a perfect tool for education and creation.

How to begin?

1. Download the Makeblock Neuron app from 🍎 App Store or ▶ Google play.
2. Ensure the Bluetooth or Wi-Fi block is connected to your chain.
3. Launch the app and follow the instruction on screen to connect your blocks to your mobile device.

Find more instruction at http://neuron.makeblock.com/en/ <http://neuron.makeblock.com/en/>

mBlock 5 (PC)

mBlock 5, based on Scratch 3.0, is a block- and text-based programming software designed for STEAM education. You can write programs for Neuron. You can also create fun games, stories, and animations. By combining the functionalities of AI and IoT, mBlock 5 makes code learning simple and fun.

Download mBlock and find more information from:

3. Block Introduction

Energy & Communication Blocks

Power

Provide power for other blocks.

Appearance

Power Indicator
Press the Power button to
display the current battery level.

Power Button
Press to turn on. Press and hold
for about 3 seconds until all
LEDs go out to turn off.

Micro USB interface
To charge the power block.
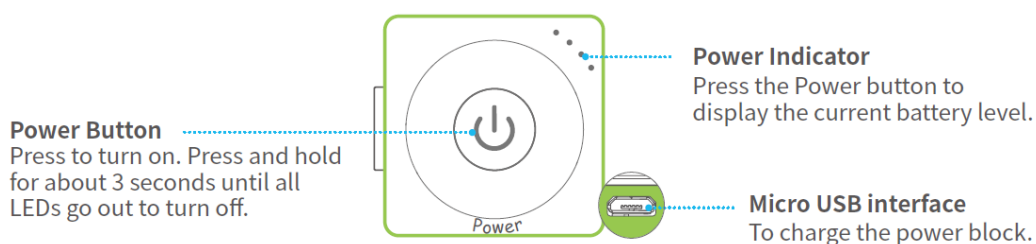
Power

Charge your power block

We recommend you to charge your power block when the last indicator is blinking.

Use a power adapter   Use a computer
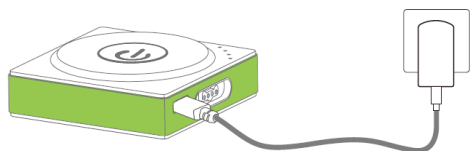
or

Specifications

Battery capacity	900 mAh		Input current	< 1A
Output voltage	DC 5V		Operating temperature	0° C – 45° C
Input voltage	DC 5V		Storage temperature	-10° C – 55° C

Tips:

1. Please charge the block once every three months when not in use.

2. The power block cannot power the other blocks while it is charging.

Bluetooth

The Bluetooth block has two functions:

- Establish a wireless connection between the blocks and your mobile device within 10 meters, then you can program the blocks via Makeblock Neuron app.
- Provide power to other blocks. It contains a Micro USB interface, you can connect the block to power bank or power adapter via USB cable to power the other blocks.

Micro USB interface

Power Adapter (5V / 2A)

Power Bank

USB Cable

Bluetooth

Gyro Sensor

Buzzer

Tablet   Smart Phone
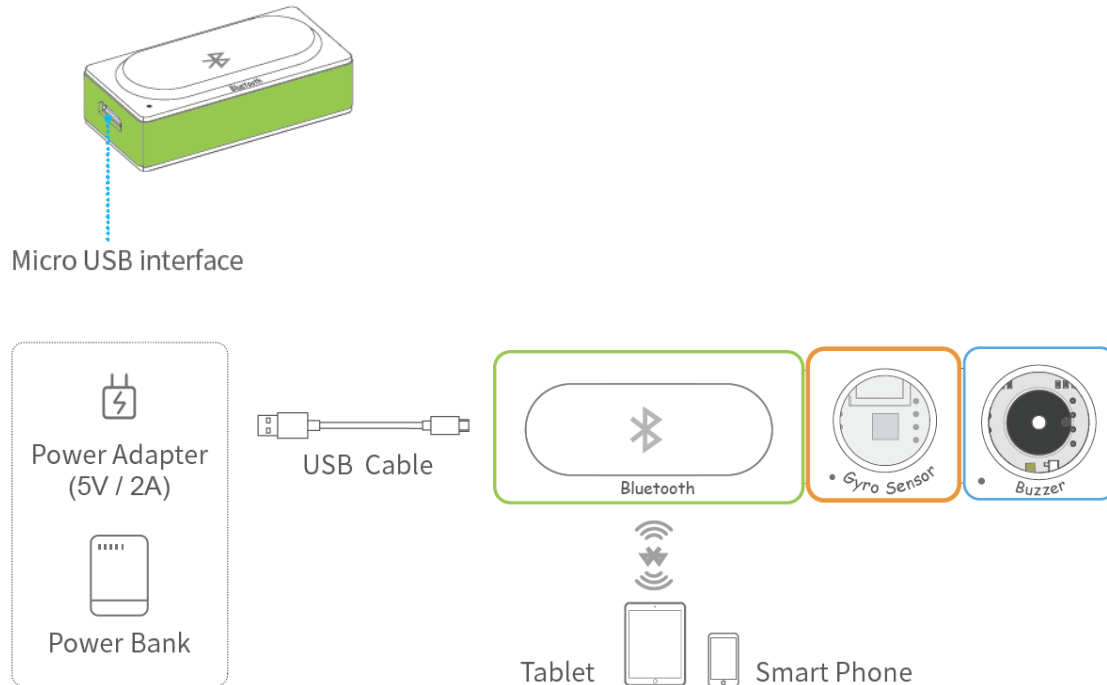
Specifications

Bluetooth Specification	BT 4.0
Frequency Band	2402 – 2480MHz
Output Power Class	≤ 4dBm

Wireless Transmitter + Wireless Receiver
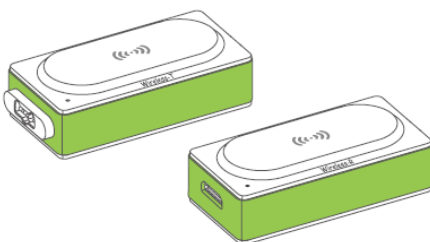
Wireless receiver (Wireless-R) receives signals from wireless transmitter (Wireless-T) within 10 meters.

With these two blocks, you can establish a wireless connection between two chains.

You may need to pair the two blocks before using: connect the two blocks to the power block as shown in the following figure.

Press

Watch the two indicators change from blinking to solid on, indicating that the pairing is successful.

Try it now!

Press the button.

Transmitting chain

Press

Watch the RGB LED turn on.

Receiving chain
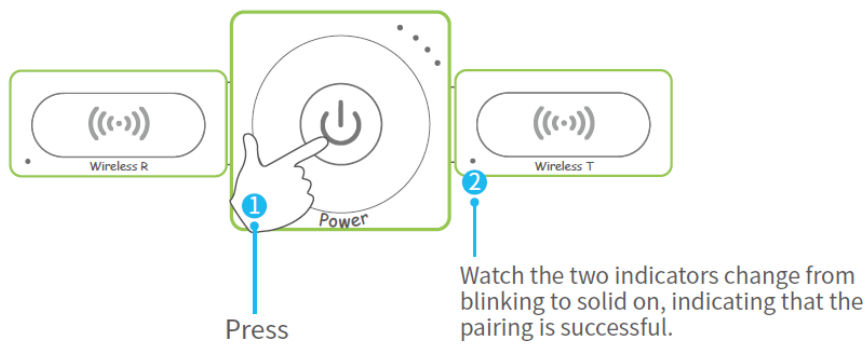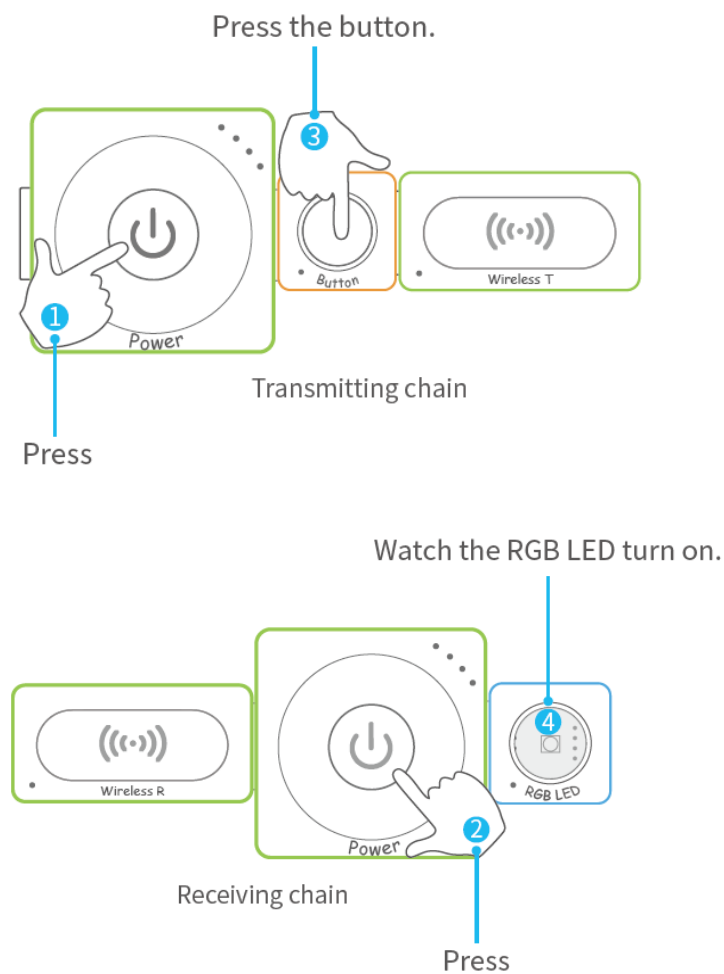
Press

Input blocks
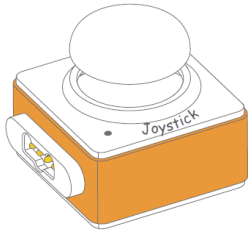
Joystick

Push the joystick to control your creation (such as a remote control car) moving in the X-axis (left-right) or Y-axis (up-down) direction.

Try it now!

Push the joystick.

Read the X and Y values on the display block.
X stands for the displacement of the joystick on the X-axis, Y stands for the displacement on the Y-axis.
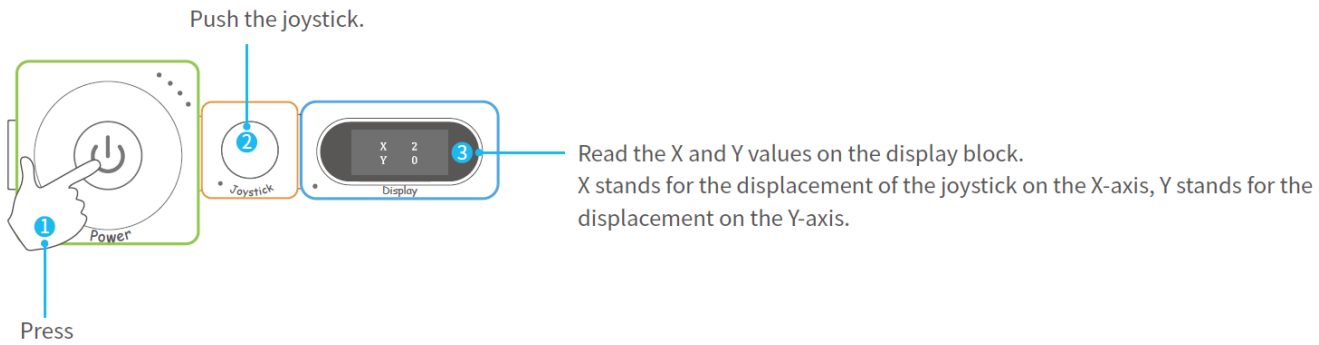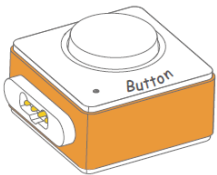
Button

Short press to turn something on and release to turn it off.
Press and hold for 5 seconds to stay in an active state.

Try it now!

Press and immediately release the button.

Watch the LED panel light up once.
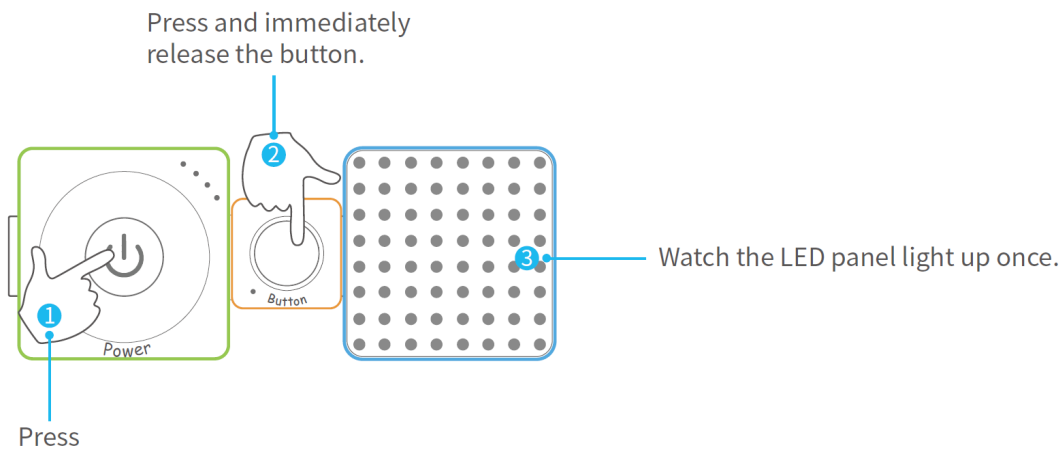
Press and hold the button block for 5 seconds, see what happens.

Knob
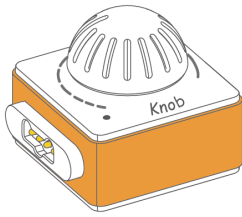
The knob is an input block that can adjust the numerical value. After connecting it to the output block, you can turn the knob to adjust the output effect.

Try it now!

Turn the knob clockwise.

Watch the RGB LED light up and get brighter gradually.

Press
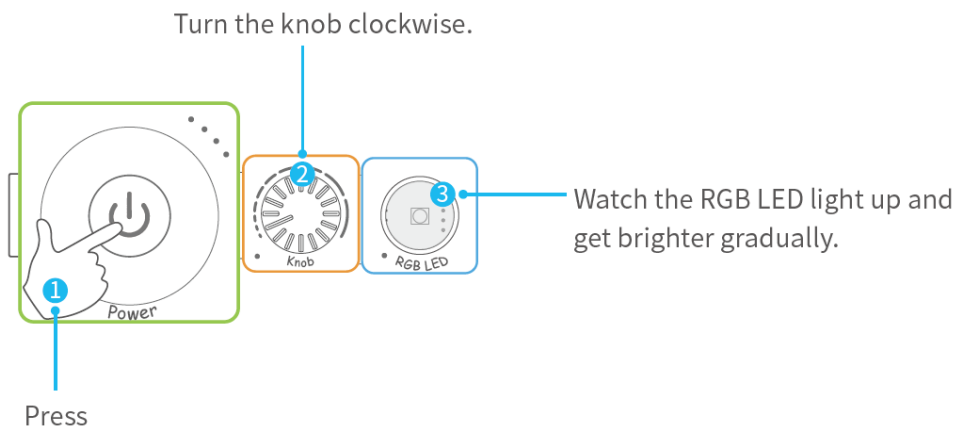
Funny Touch

Funny touch can be connected to any conductive object (such as bananas and water) and turn it into a touch switch. A simple and interesting interactive effect can be achieved by detecting the conducting state between funny switches and GND wire.

GND wire

Indicators

Slot number

Four funny switches
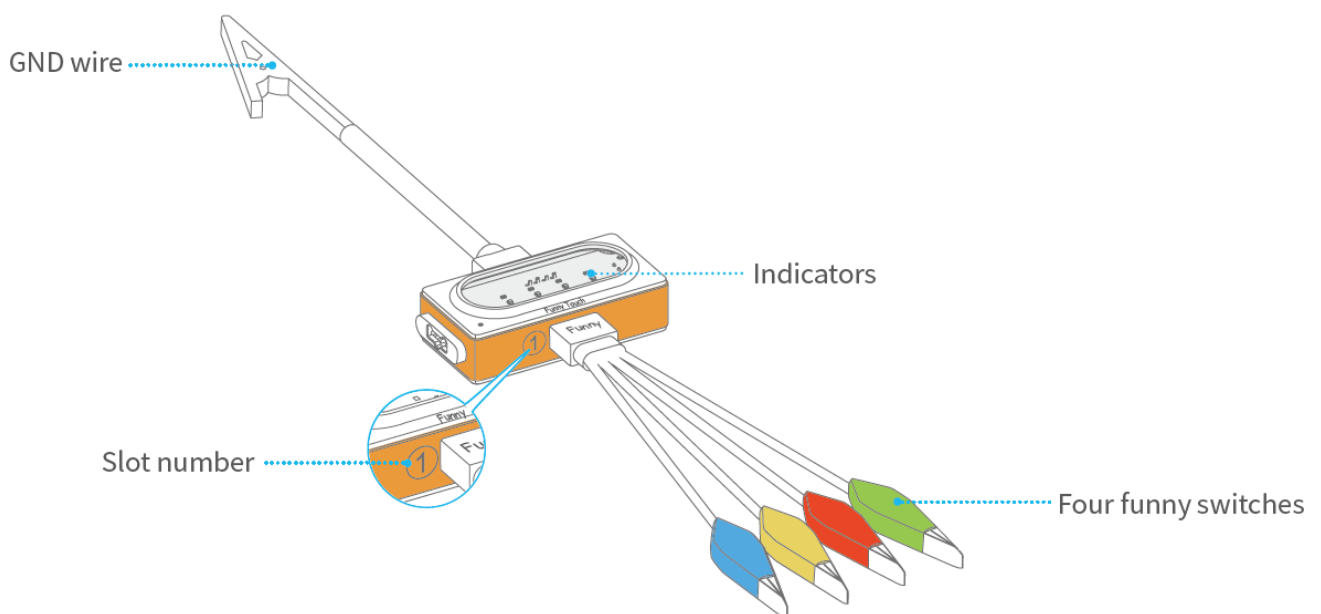
How to use?

1. Plug the funny switch to slot 1 and the GND wire to slot 2.

2. Clip a funny switch to a conductive object.

3. Hold the metal clip of the GND wire and touch the conductive object with the other hand, the relevant indicator will light up and the block will send out an on signal.

> **Tips:** Alligator clip is sharp. Do not clip yourself with the funny switch or the clip of GND wire, you may get hurt.

Try it now!

Press

Watch the LED panel light up.

Clip a funny switch to a banana. You can try other objects at your home to see if they are conductive.

Touch both the metal part of the GND wire and the banana with your hands.
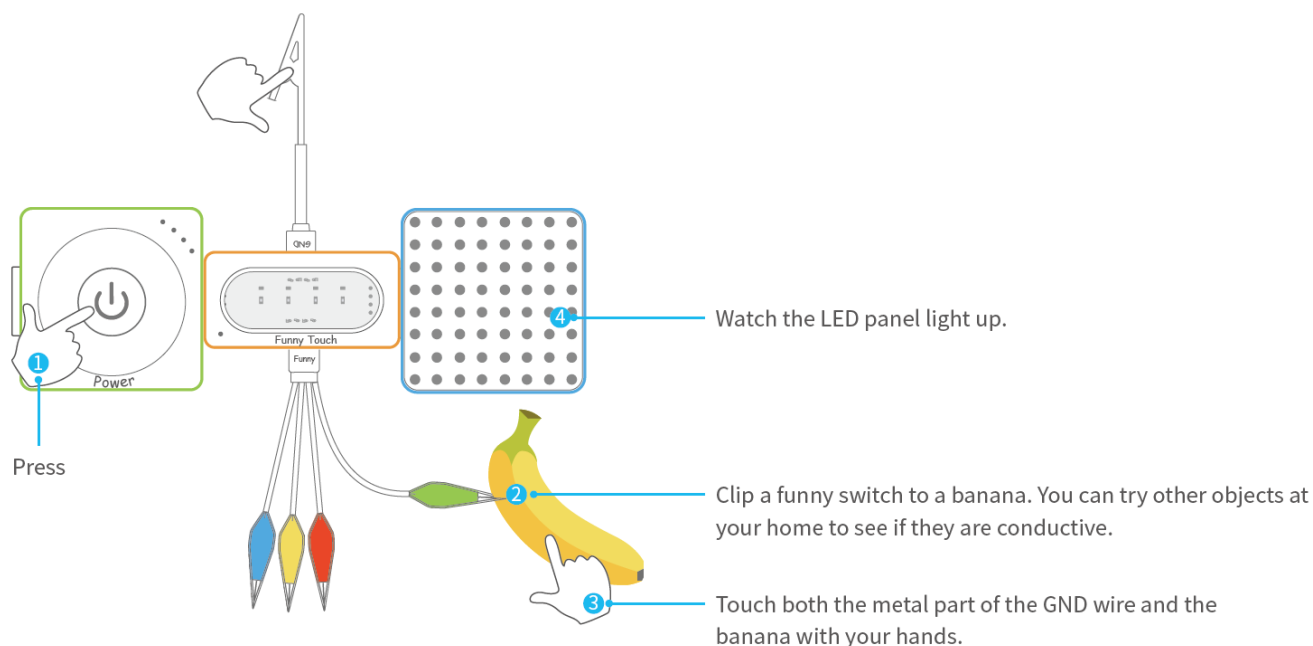
Try touching another funny switch or touching two funny switches simultaneously, see what happens.

Light sensor
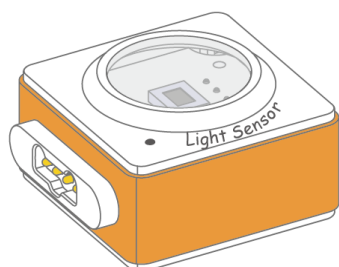
The light sensor can detect the light intensity of the surrounding area.
The more light it receives, the stronger signal it sends out.

Try it now!

Cover the light sensor.

The value ranges from 0 to 100.
The larger the value, the stronger the light intensity.

Watch the RGB LED darken and the light intensity
value on the display block become smaller.

Press
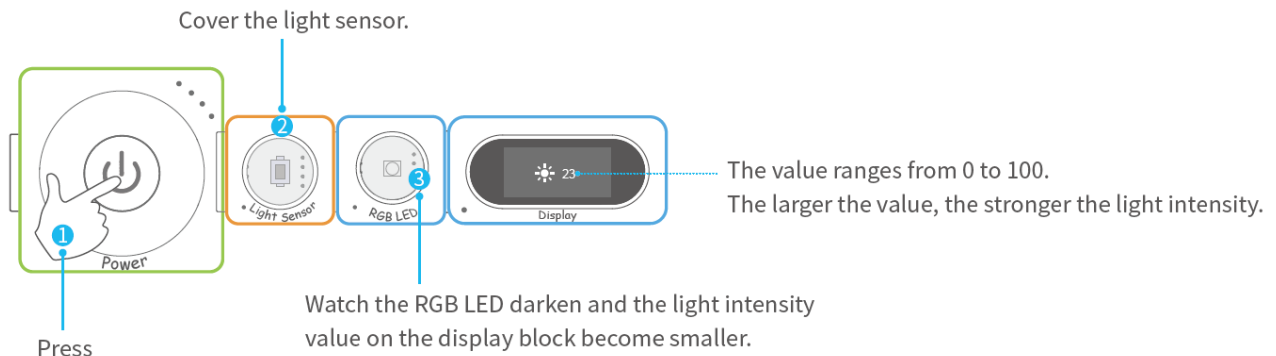
Dual IR Detector

Dual IR detector block can be used to make your creation follow a black line on a white background or a white line on a black background. It contains two IR detectors which can be used to control the output.

Detecting Range： 0 – 2cm

Try it now!

Cover the IR detector with your finger.

Watch the LEDs on the left half of the LED panel light up.

Press

Ultrasonic Sensor

Ultrasonic sensor can be used to measure distance between the block and the obstacle, from 3cm to 300cm.

Try it now!

Put your hand right above the ultrasonic sensor.

②

③ → Read the distance value on the display block.

200.2cm

Ultrasonic Sensor

Display

①

Power

Press
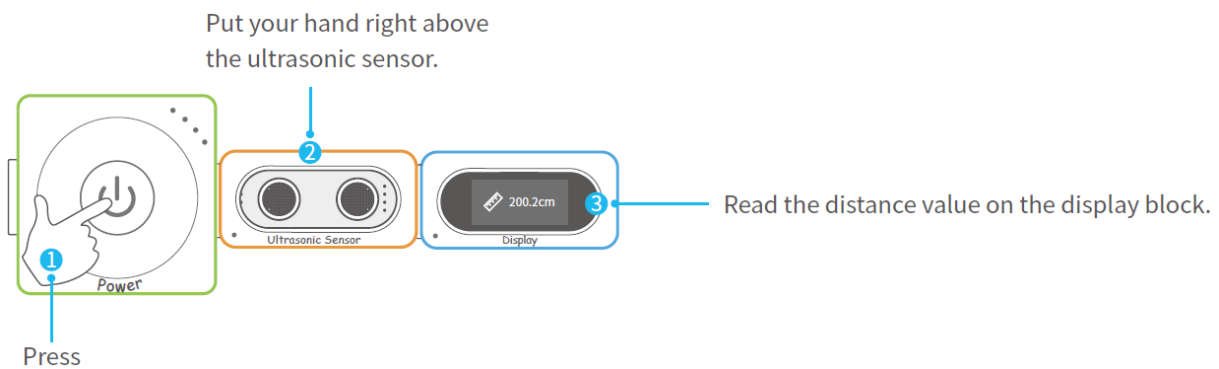
Ranging sensor

The ranging sensor is used to measure the distance between the sensor and an obstacle.

Measurement range: 2cm – 200cm

How does the ranging sensor measure distance?

IR receiver

The ranging sensor includes an IR transmitter and an IR receiver.

Ranging Sensor
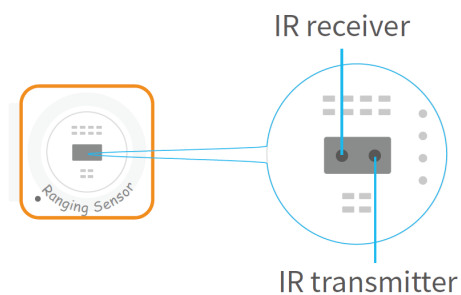
IR transmitter

The IR transmitter emits infrared light which is reflected when it hits an obstacle. The reflected infrared light is detected by the IR receiver. The distance between the obstacle and the block can be calculated by the time lag between transmission and reception.

IR transmitter

IR receiver

Try it now!

Press the power button.

More lights will light up on the LED panel.
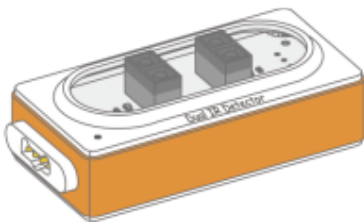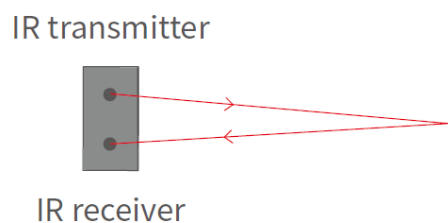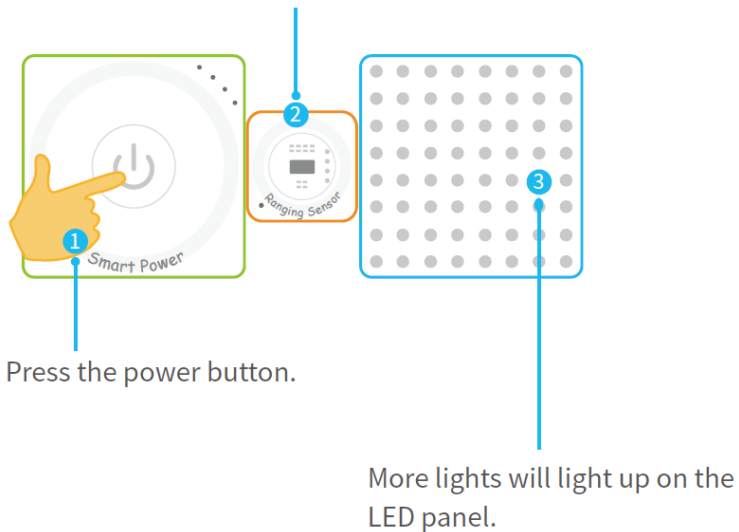
Sound sensor

The sound sensor can detect the sound intensity of the surrounding area.

The louder sound it receives, the stronger signal it sends out.
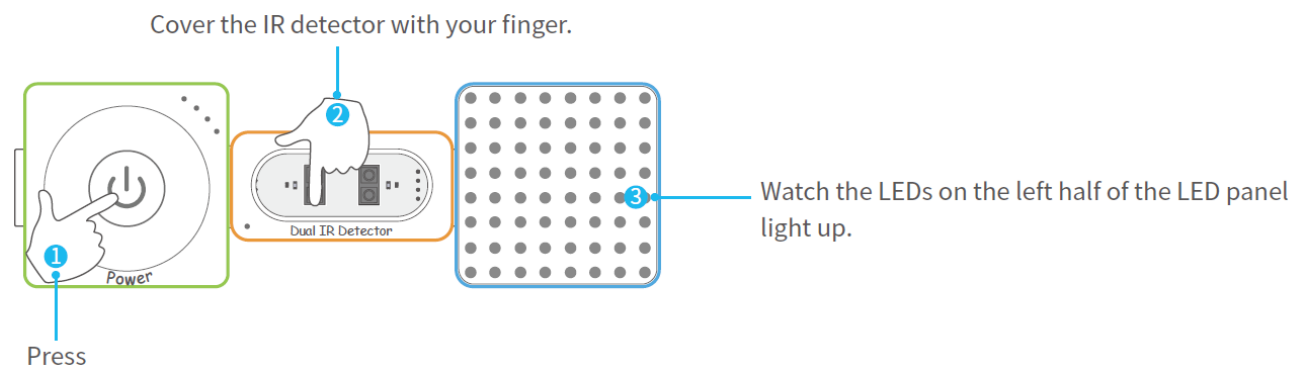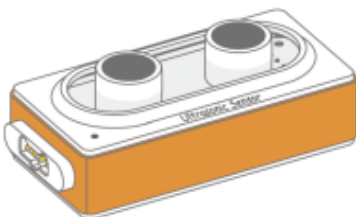
Try it now!

Watch the RGB LED light up and read the sound intensity value on the display block.

The value ranges from 0 to 100. The larger the value, the stronger the sound intensity.

Press

Make a sound near the sensor.

PIR sensor

PIR sensor (Passive Infrared sensor) can detect motion from humans within 3 meters. If anyone moves in that range, the sensor will send out an on signal to the following block.

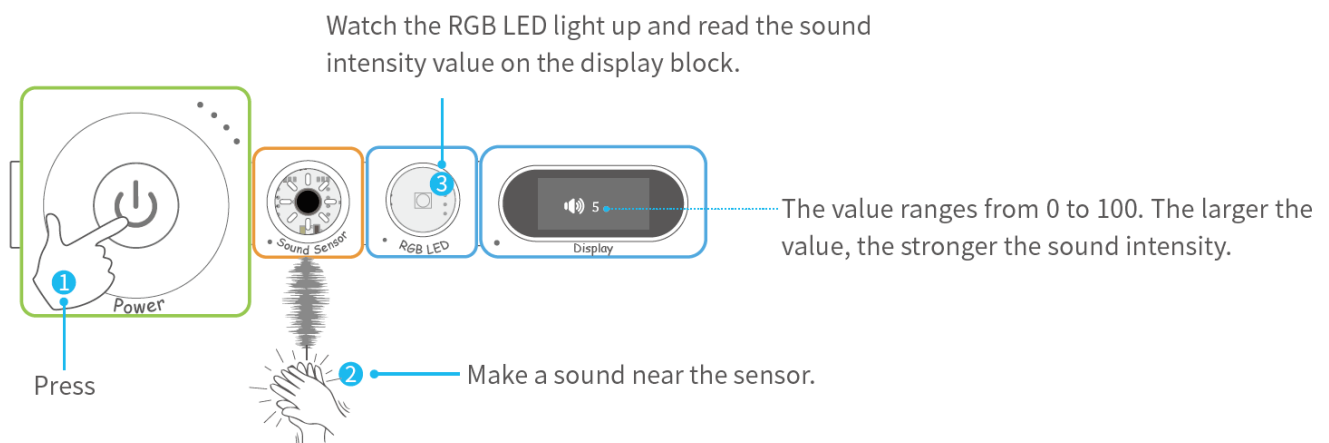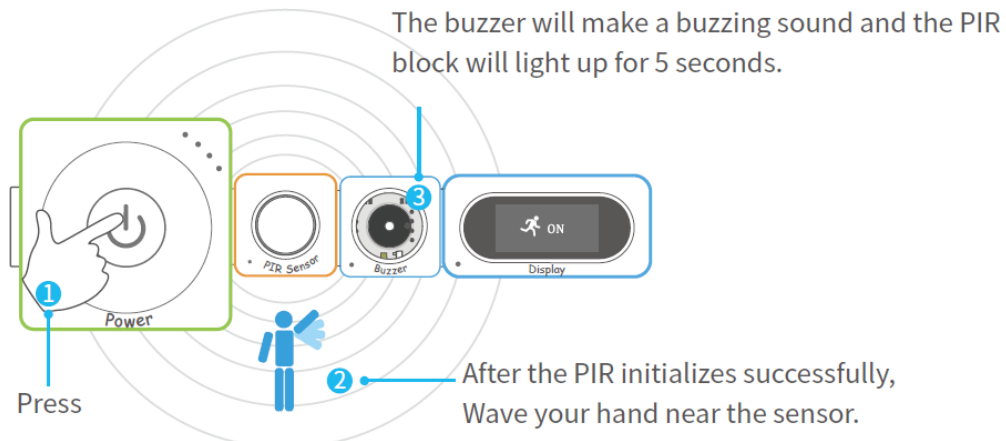When powered on, the indicator will light up and it will take about 5 seconds for the block to initialize. Once successfully initialized, the indicator will go out.

Try it now!

The buzzer will make a buzzing sound and the PIR block will light up for 5 seconds.

PIR Sensor

Buzzer

ON

Display

Power

① Press

② After the PIR initializes successfully, Wave your hand near the sensor.

③

Color sensor

The color sensor can detect different colors.

Try it now!

Cover the color sensor with different colored objects.

Power

① Press
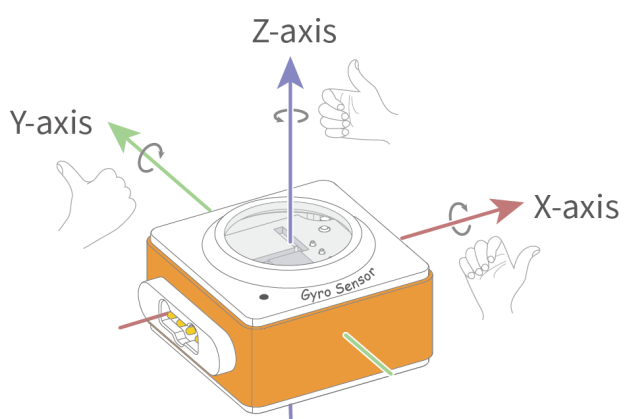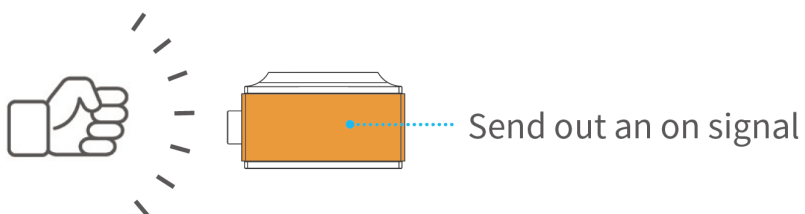
② Color Sensor

③ See what happens.
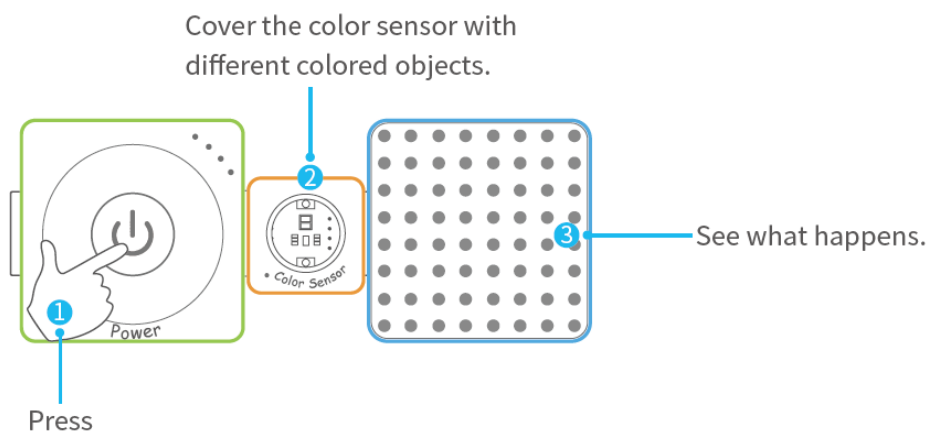
Gyro Sensor

The gyro sensor is an ideal block for motion and posture detection of your creation. It can be used to measure the angular value and the acceleration information of your creation. When it detects a vibration, the sensor will send out an on signal.
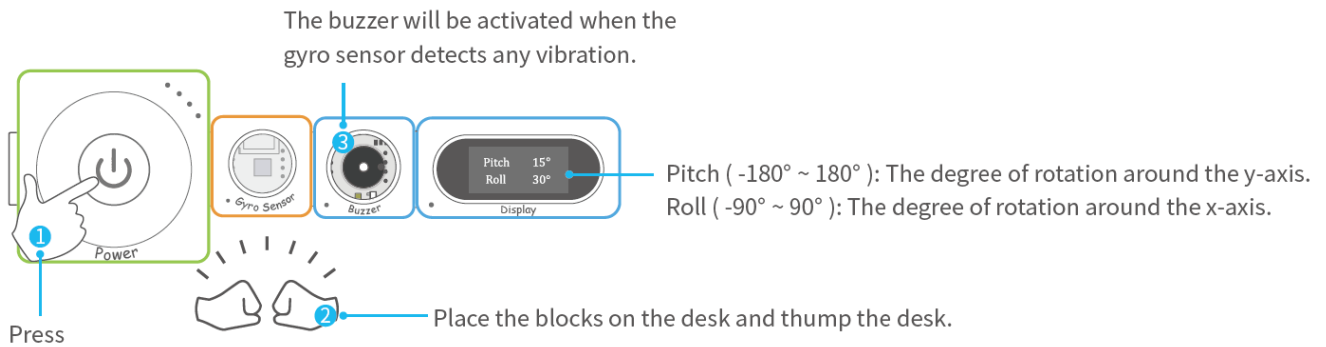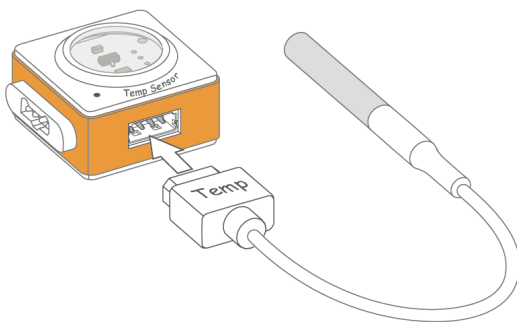
Reference coordinates:

Detect a vibration:

Send out an on signal

Try it now!

The buzzer will be activated when the
gyro sensor detects any vibration.

Pitch (-180° ~ 180°): The degree of rotation around the y-axis.
Roll (-90° ~ 90°): The degree of rotation around the x-axis.

Press

Place the blocks on the desk and thump the desk.

Pick up the blocks and rotate it, see what happens.

Temperature sensor

Get the temperature probe and plug it into the slot. The temperature sensor can detect temperatures from -55℃ to 125℃ .

Accuracy: ±0.5° C (-10° C ~ 85° C)

Tips:

The cable of temperature probe may be damaged when the temperature is over 100℃. Please be careful to protect the cable from damage.
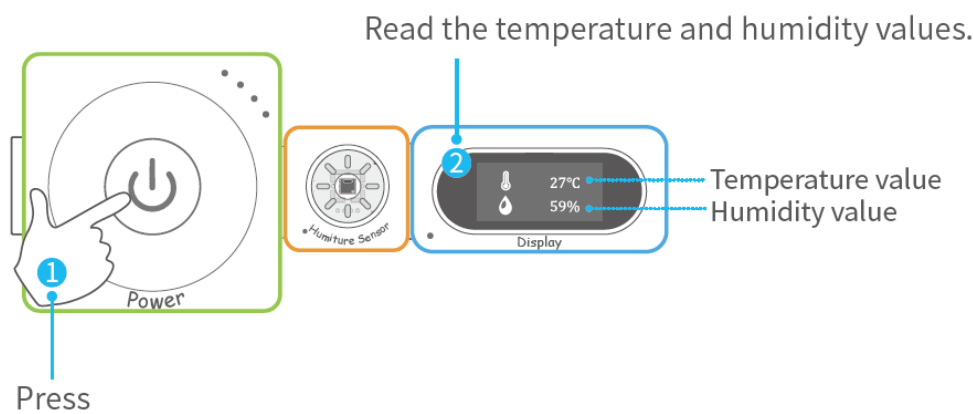
Try it now!

Press

Read the temperature value on
the display block.

Put the temperature probe into the water.
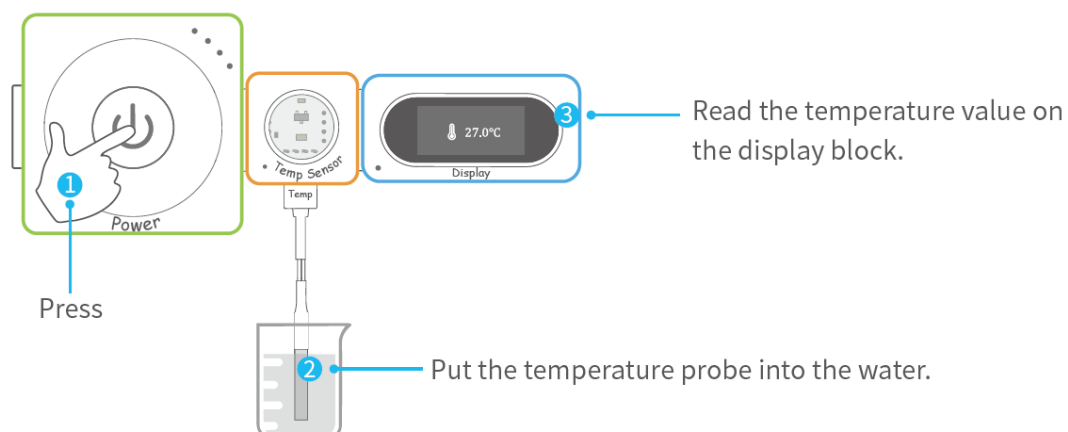
Humiture Sensor

Humiture sensor can detect temperature and humidity of the surrounding area.

Specifications

Temperature range	−40℃ − +125℃
Temperature accuracy	± 1℃
Humidity range	0% − 100%
Humidity accuracy	± 3%

Try it now!

Read the temperature and humidity values.
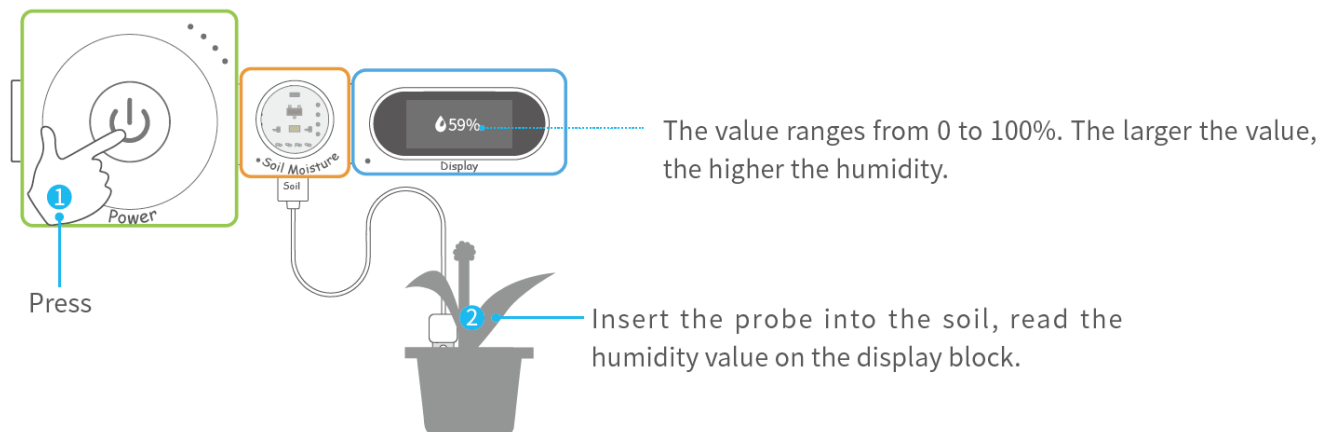

Temperature value
Humidity value

Press

Soil Moisture Sensor
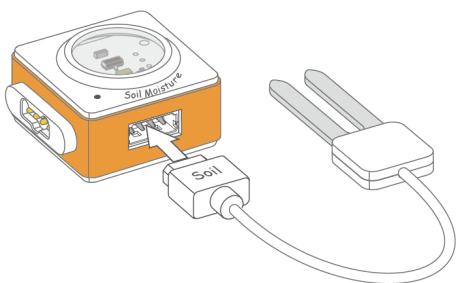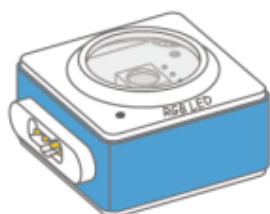

Get the soil moisture probe and plug it into the slot.

The soil moisture sensor can detect soil humidity.

Try it now!

The value ranges from 0 to 100%. The larger the value, the higher the humidity.

Press

Insert the probe into the soil, read the humidity value on the display block.
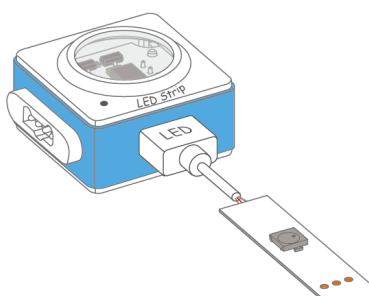
Output blocks

RGB LED

The RGB LED can emit various colors of light. Change the color or brightness of the RGB LED through Makeblock Neuron app or mBlock 5.

> **Tips:**
> RGB is an additive color model in which red, green, and blue light are combined in various ways to reproduce a broad array of colors.
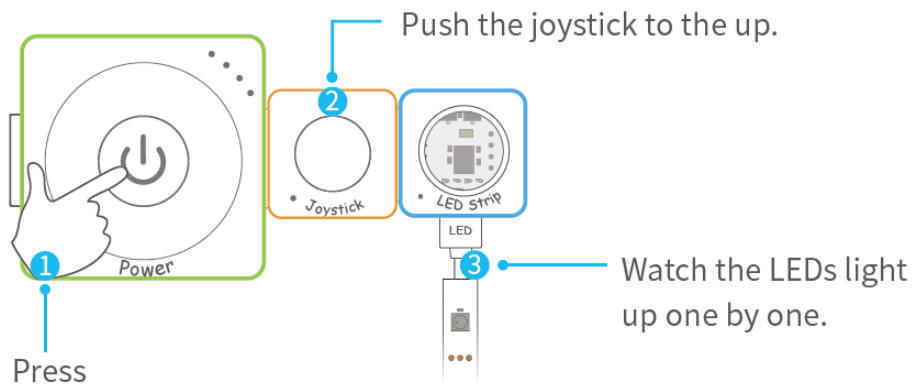
LED Strip Driver + LED Strip

Get the LED strip and plug it into the slot. The LED strip contains 15 RGB LEDs. Change the color of each LED and do more interesting things through Makeblock Neuron app or mBlock 5.
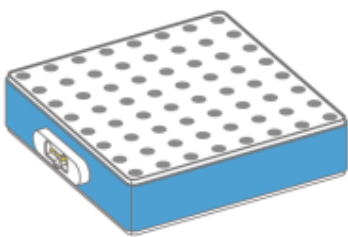
Try it now!

A special use case for LED strip

Push the joystick to the up.

① Press

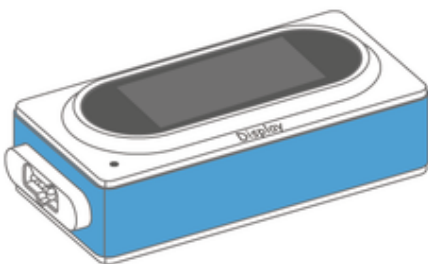③ Watch the LEDs light up one by one.

Push the joystick to the down, left or right, see what happens.
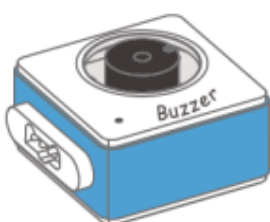
LED Panel

The LED panel contains 64 RGB LEDs. Change the color and do more interesting things through Makeblock Neuron app or mBlock 5.
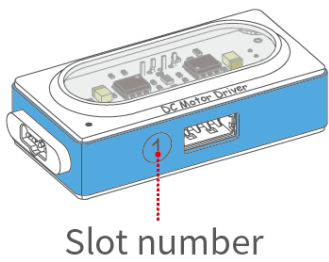
Display

Display the output parameters of the block in front of display block. Customize the display content via Makeblock Neuron app or mBlock 5.

Buzzer

The buzzer makes a buzzing sound when it receives an on signal. You can program the buzzer to get a different sound by using Makeblock Neuron app or mBlock 5.
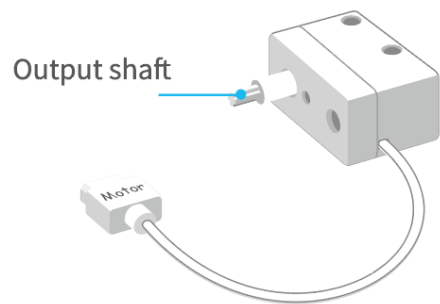
Dual DC motor driver

Slot number

The DC (Direct Current) motor driver can drive DC motor or water pump, two devices can be driven simultaneously.

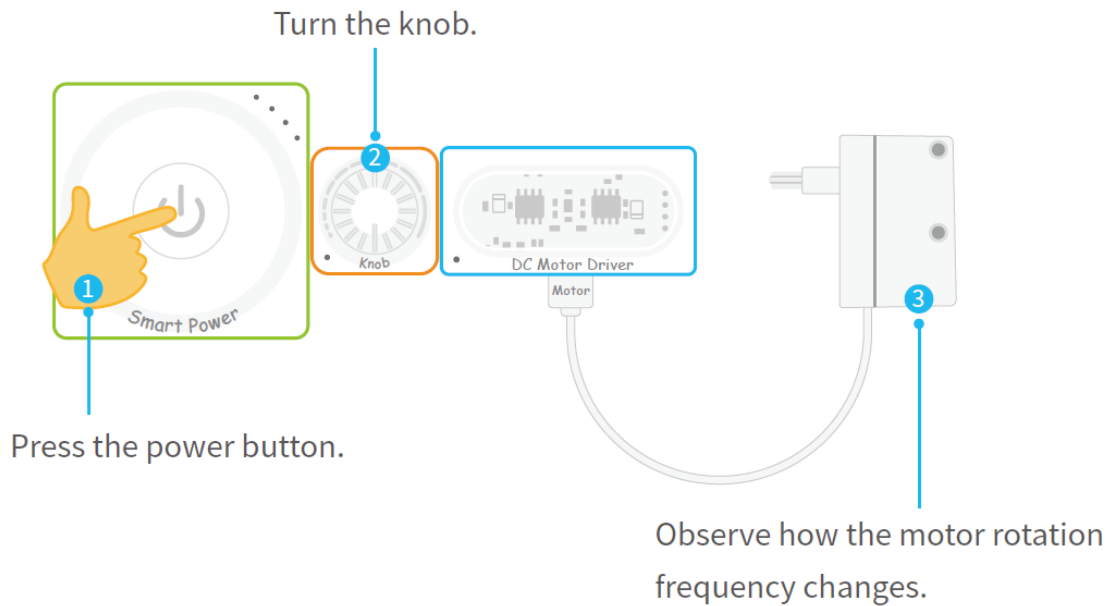**Dual DC motor driver + DC motor**

DC motor

Output shaft

Plug the motor into the dual DC motor driver's slot. The DC motor includes an output shaft. When the motor driver receives an on signal, the output shaft starts to rotate. The motor is compatible with LEGO parts.

Specifications

Rated speed	12000±10% RPM
Rated current	≤85 mA
Stall torque	≥ 28 gf.cm
Stall current	≤0.88 A
Gear ration	1:48

Try it now!

Turn the knob.

Press the power button.

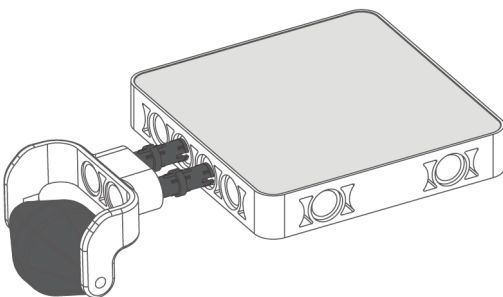Observe how the motor rotation frequency changes.

Mini Auxiliary Wheel

Mini auxiliary wheel is compatible with LEGO® blocks, and can be used in light-load car body, making 360 degree movement easily.
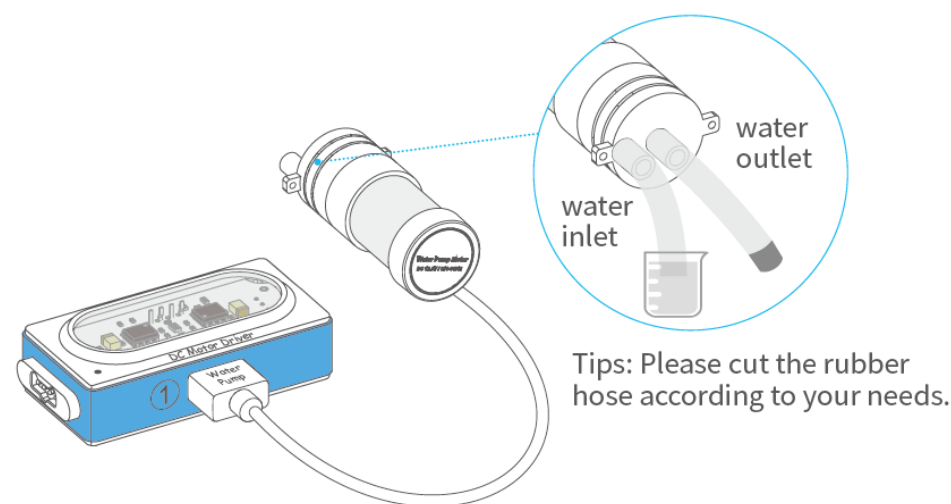
Connect mini auxiliary wheel to the Neuron board：

Dual DC motor driver + water pump

Water pump

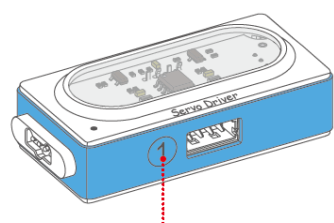The water pump can be used for water priming pump, automotive pump and so on.

Follow the following figure to install the water pump.

Tips: Please cut the rubber hose according to your needs.

Specifications

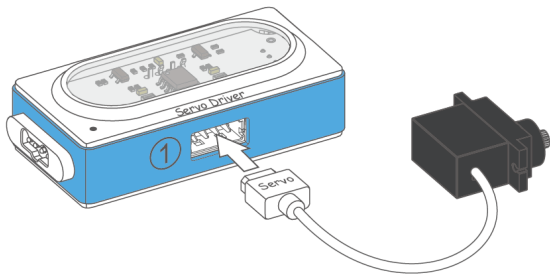|	
Rated voltage	DC 12V
Current (with load)	< 320mA
Operating temperature	−10℃ − +55℃
Operating humidity	< 95%
Water hole diameter	6.5mm
Noise	< 60dB

Dual Servo Driver

Slot number

The servo driver can drive two servos simultaneously.

Dual Servo Driver + servo

The servo can rotate from 0 to 180 degrees. Plug the servo into the servo driver.

Specifications

Storage temperature	−20℃ − +60℃
Operating temperature	−10℃ − +50℃
Operating voltage	4.5V − 6.0V
Excessive play	≤ 1°
Idle current (when stopped)	6±1mA
Stall torque (when locked)	1.5±0.05 kg·cm
Limit angle	180° ± 10°

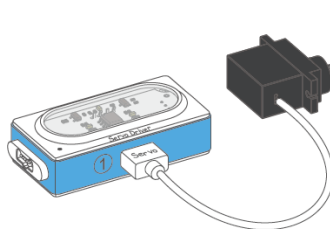# Servo pack

	The servo accessory pack contains three different servo hubs to meet your needs. The servo hub is designed to attach objects to the servo.
	The servo bracket can be used to connect servo to the Neuron board or LEGO® blocks.

How to use?

1. Connect the servo hub to the servo by pressing or using a screw (more permanent).
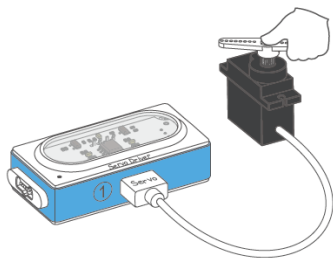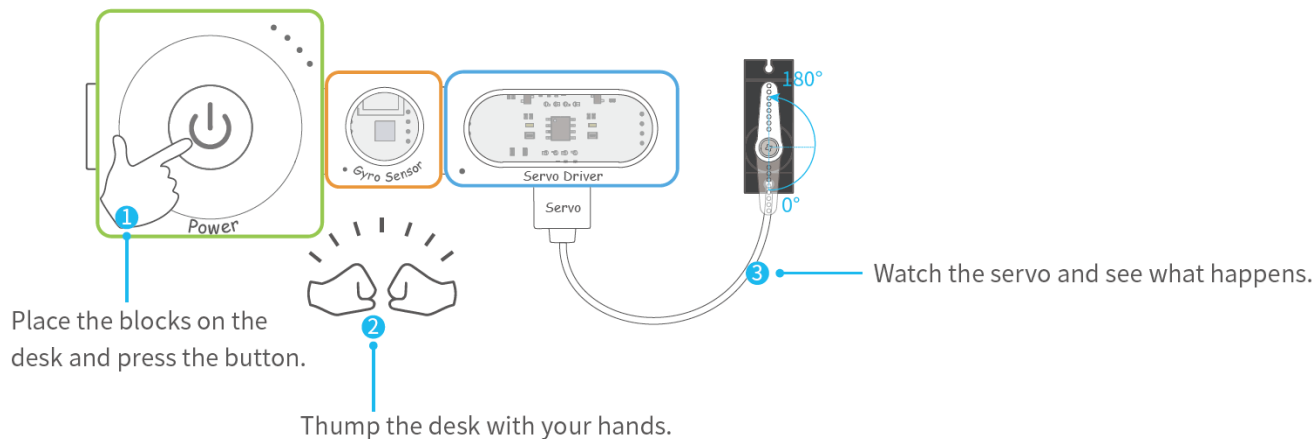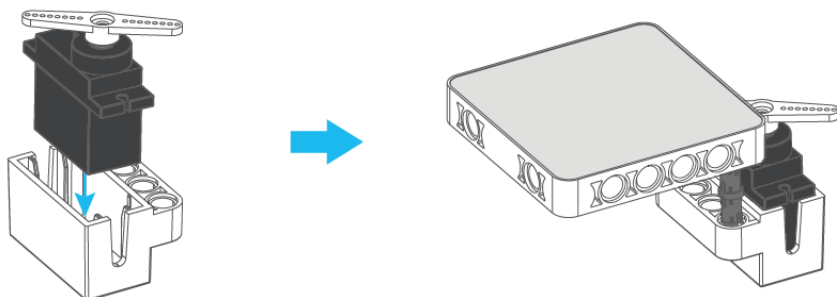
M2.2×6.5mm Self-drilling Screw

Tips: Please use a phillips screwdriver (not included in the package) to tighten the screw.
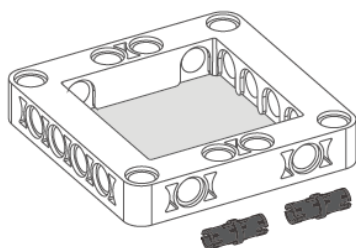
2. Attach objects to the hub.

Try it now!

① Place the blocks on the desk and press the button.

② Thump the desk with your hands.

③ Watch the servo and see what happens.

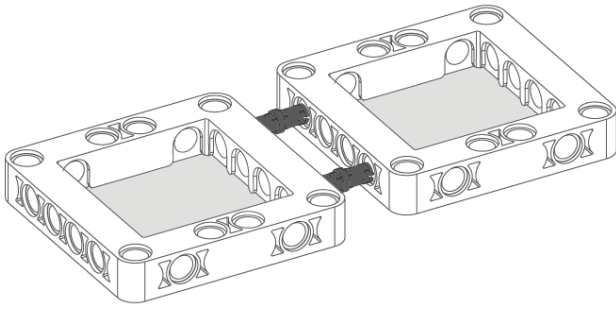**Connect servo to the Neuron board:**

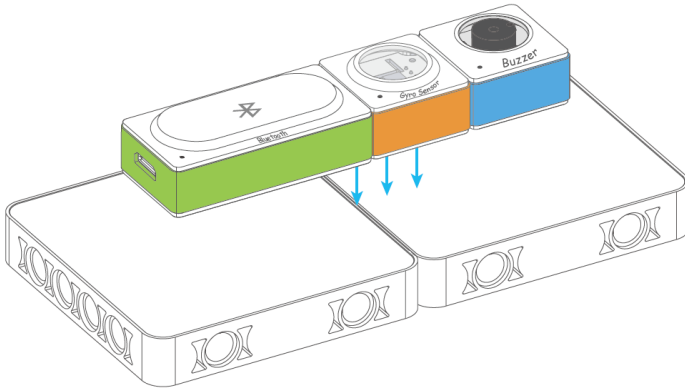# Accessories

Neuron board

1. Snap Neuron blocks to the mechanical parts of Makeblock.

2. Snap Neuron blocks to LEGO blocks.
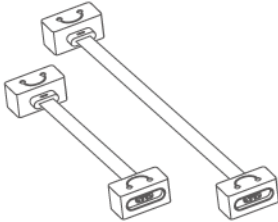
How to use?

Connect two Neuron boards:
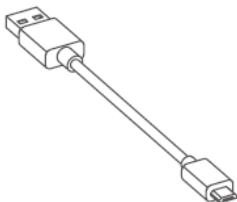
Snap the blocks to the Neuron boards:

Magnet wire

Provide a more flexible way to connect blocks, available with 10 cm and 20 cm.

USB Cable

1. Connect some specified blocks, such as camera, Mic & Speaker, Bluetooth, Wi-Fi.
2. Provide power and transmit the data.

Gel pad

Gel pad can firmly paste the blocks to any surface and can be reused.

FAQs

For the frequently asked questions on Neuron, visit Neuron FAQs
<http://docs.makeblock.com/neuron/en/faq/faq.html> .