

Quick Start Guide

Cytron
Technologies

reero
EDUteam

REKA:BIT RBT Project Kit for micro:bit



Written by Cheryl Ng & Abdulrahman Alhamed | Illustrated by Suhana Oazmi

Note from rero EDUteam

REKA in the Malay language means to design. REKA:BIT board is specially designed by engineers at Cytron to simplify digital making for beginners. Paired with the micro:bit and carefully curated components in this kit, you can kickstart your maker journey right away and start building projects!

We start with a simple **boom barrier gate project**, and progress to more advanced projects, namely **interactive robot, auto plant watering system, coin-eating robot** and finally **mobile robot car**. Connection diagrams and sample codes are provided for your reference.

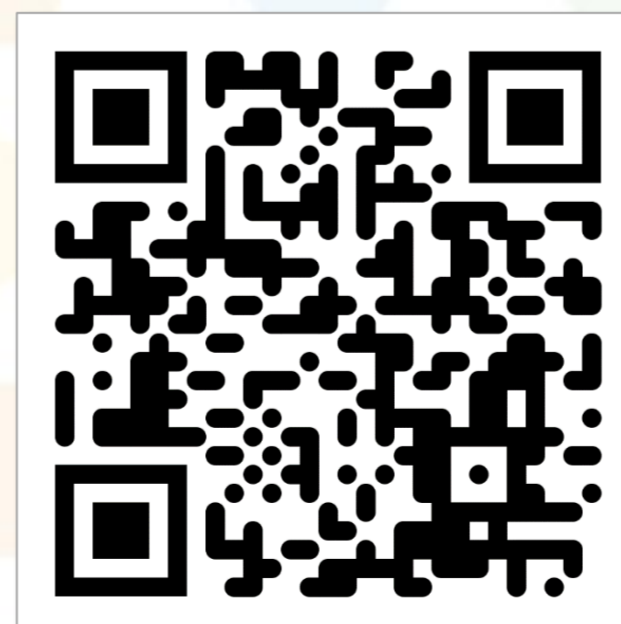
In this Quick Start Guide, we will also explore one by one the components included in this kit - **servo motor, RGB LED stick, LED module, ultrasonic sensor, soil moisture sensor, water pump** and **DC motor**. We will introduce each hardware component and explain its coding blocks so that you can use them in your future projects.

After experimenting with this kit, you will be equipped with the know-how to innovate and build your own smart projects!

Have fun exploring and making~

Cheers,

Adam & Anna



<https://link.cytron.io/rekabit-resource-hub>



QUICK START GUIDE TO REKA:BIT RBT PROJECT KIT

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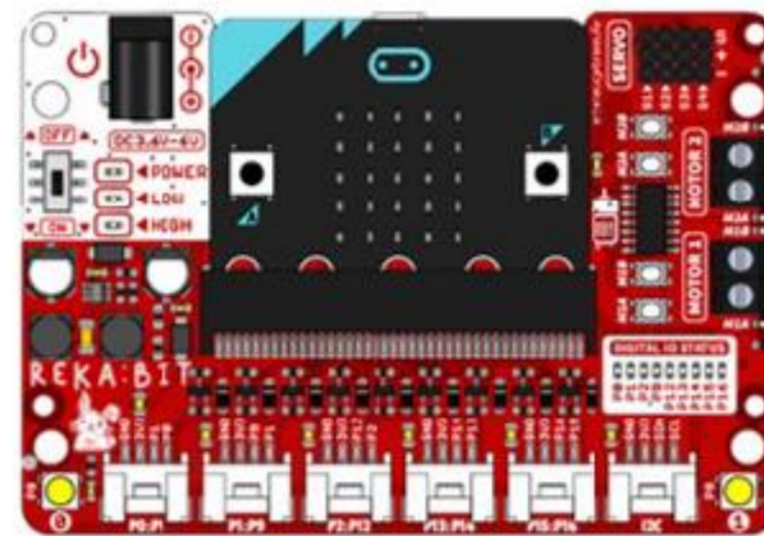
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WHAT'S IN THE KIT?



Quick Start Guide



REKA:BIT (with or without micro:bit)



Micro Servo Motor & Servo Extension Cable



RGB Stick



Big LED Module x2



Soil Moisture Sensor



Submersible Water Pump



Ultrasonic Sensor

WHAT'S IN THE KIT?



DC Motor with wheel x2



Castor



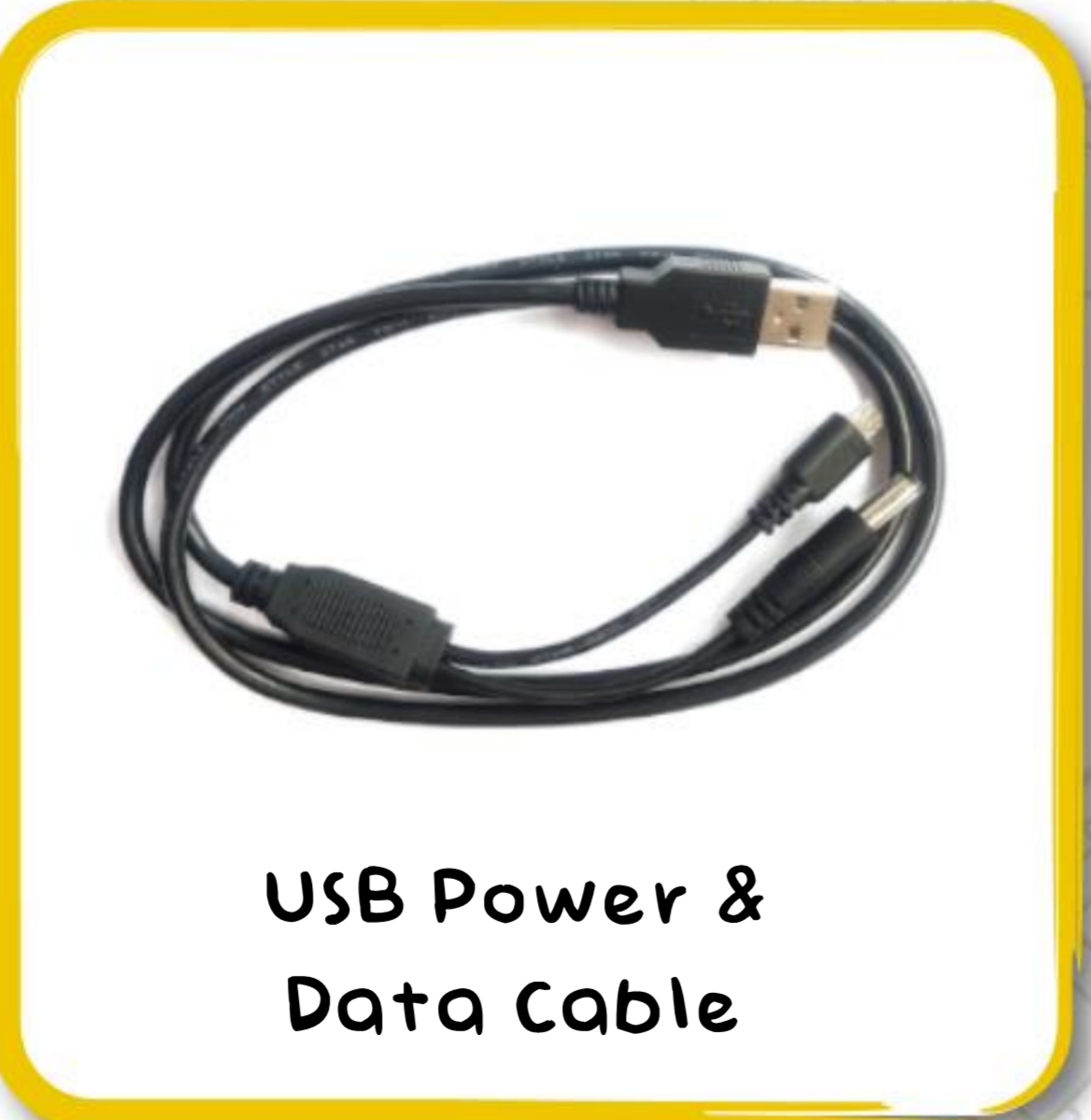
Mini Screwdriver



Double-sided Tape x5



Grove to Female Header Cable x4



USB Power & Data Cable



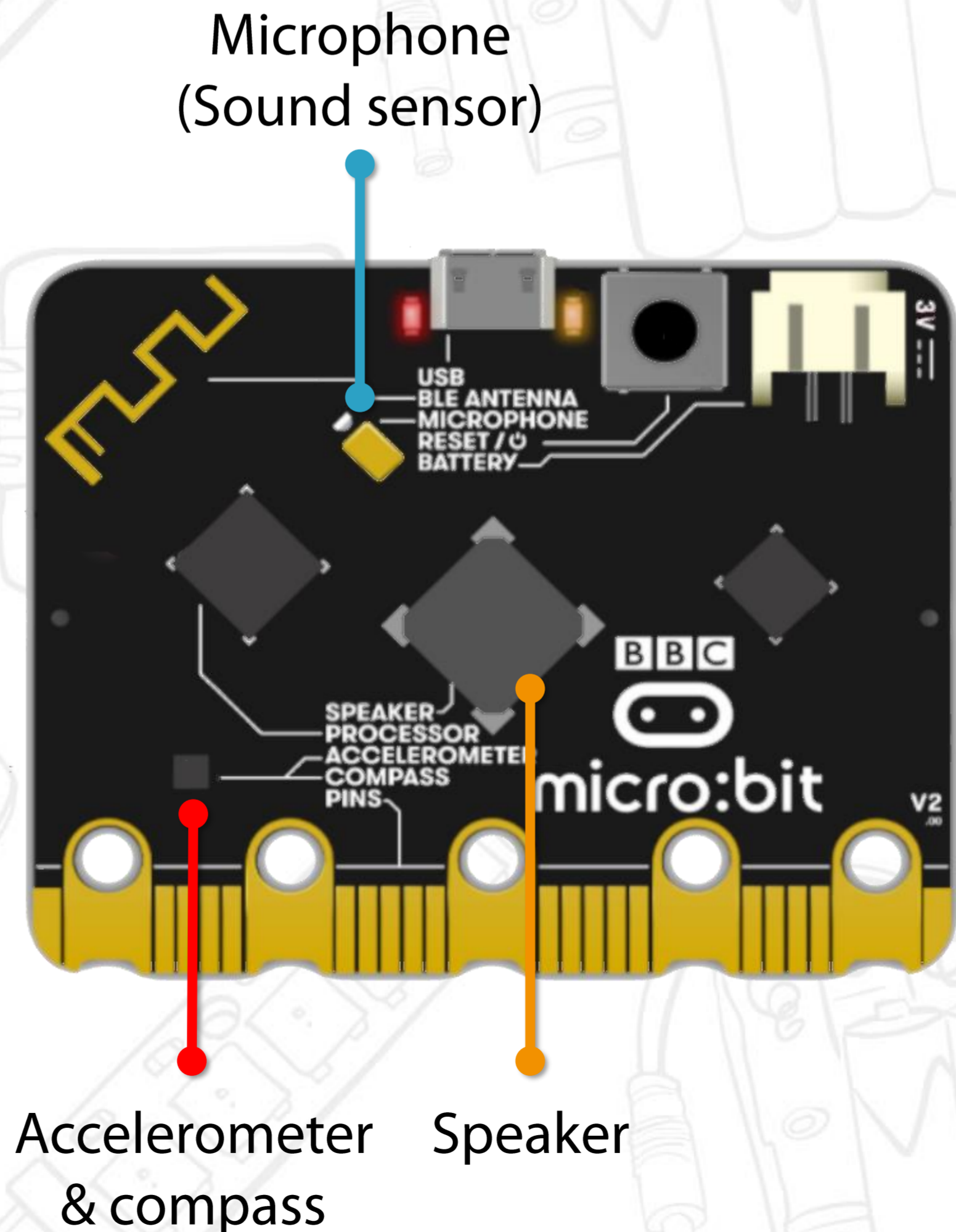
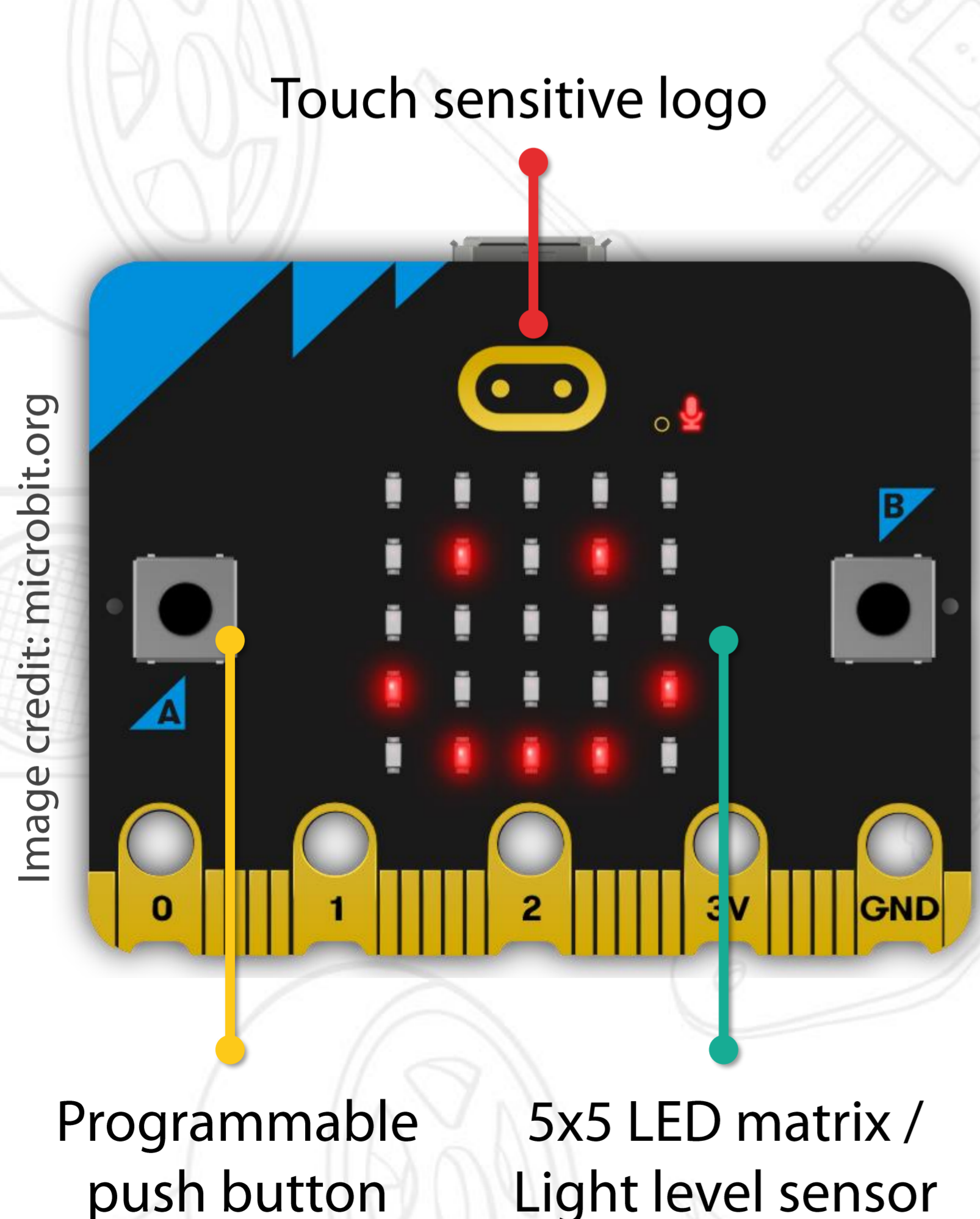
AA Battery x4



Battery Holder

Hello Hello (micro:bit V2)

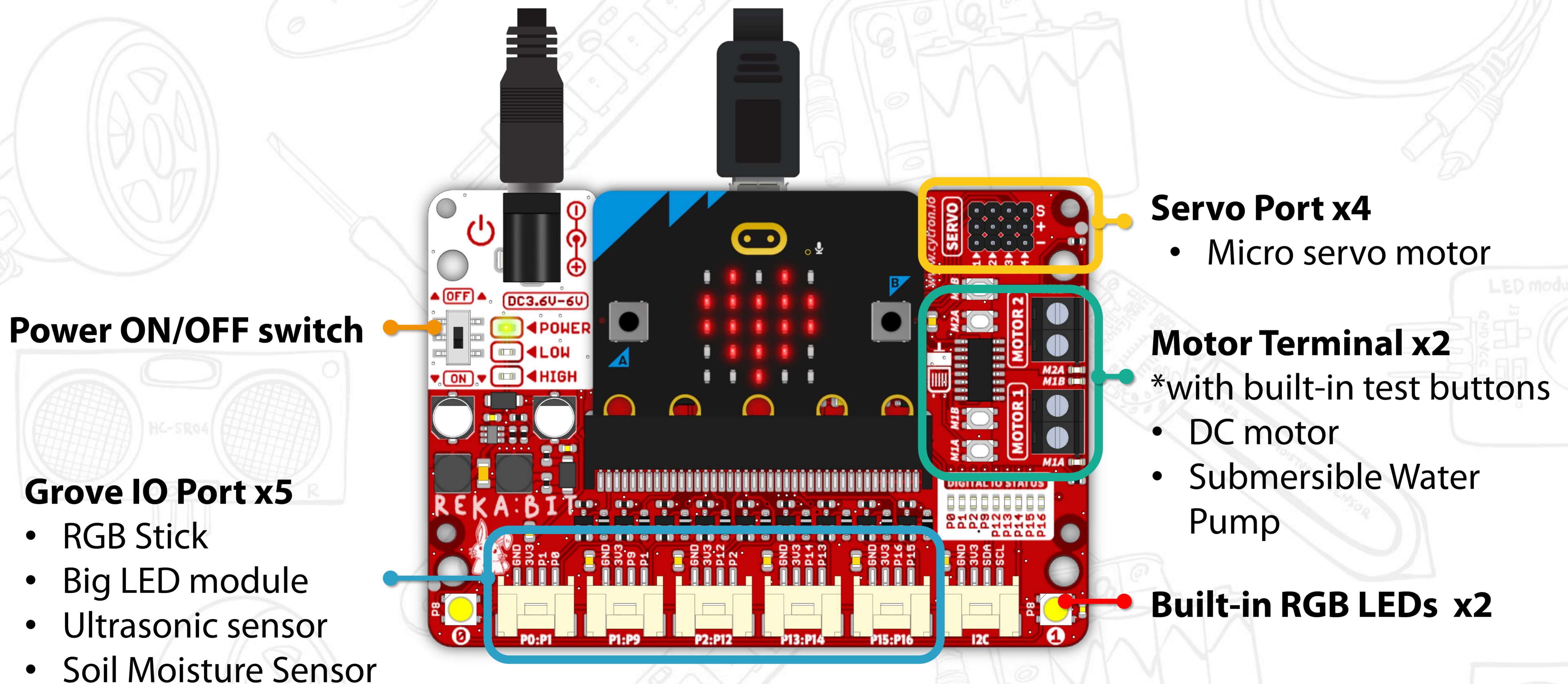
micro:bit is a “pocket-sized computer” that is specially designed to encourage kids to learn coding in a fun and easy manner. If this is your first time meeting micro:bit, scan the QR code and watch the intro video to learn more about its features.



Introduction to the BBC micro:bit
<https://youtu.be/u2u7UJSRuko>

REKA:BIT Expansion Board

Plug in your micro:bit to **REKA:BIT** expansion board and voila, you can now easily build smart projects with components included in this kit.

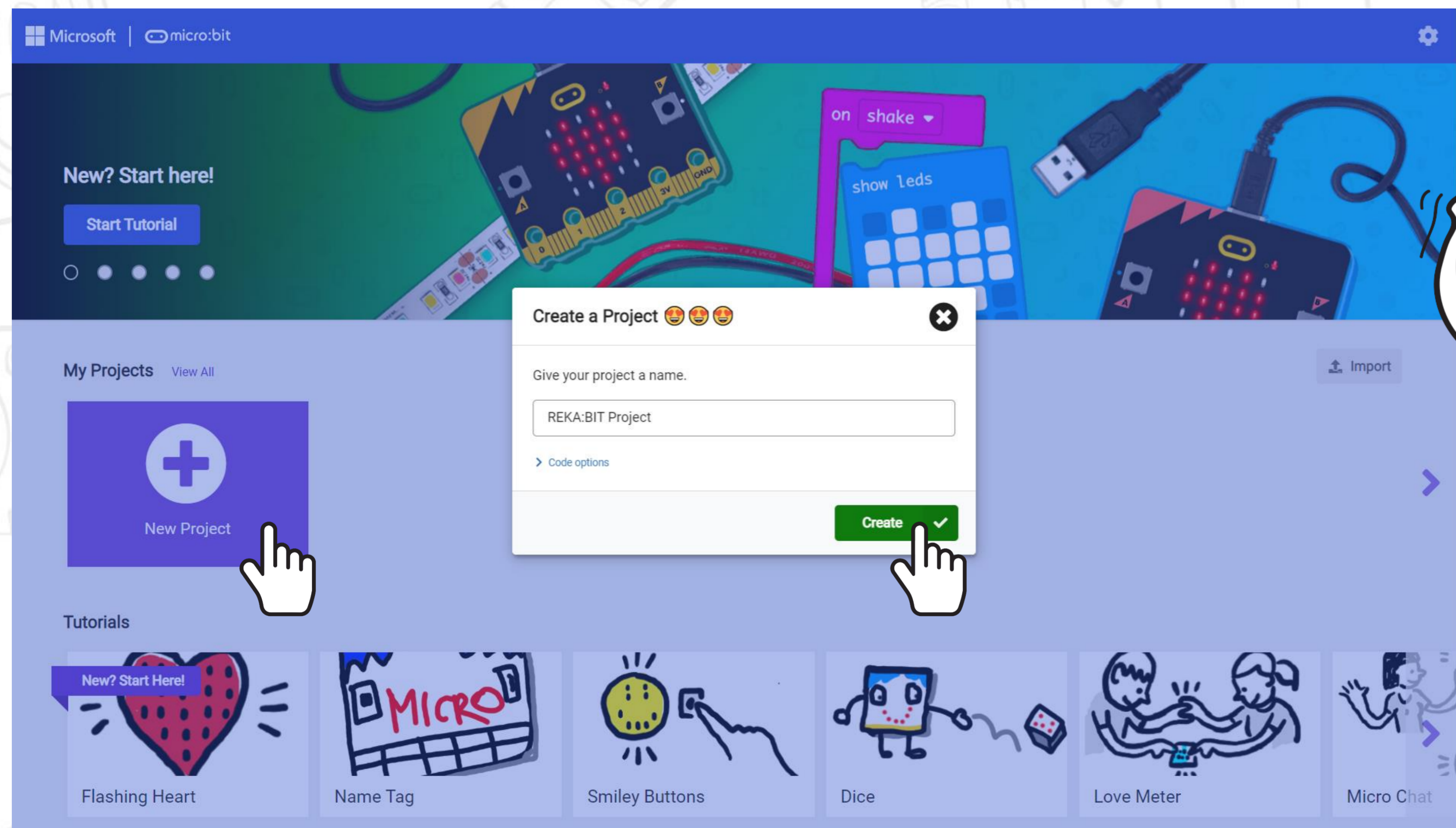


Let's Start!

We can use **MakeCode Editor + REKA:BIT RBT Project Kit Extension** to program our projects.

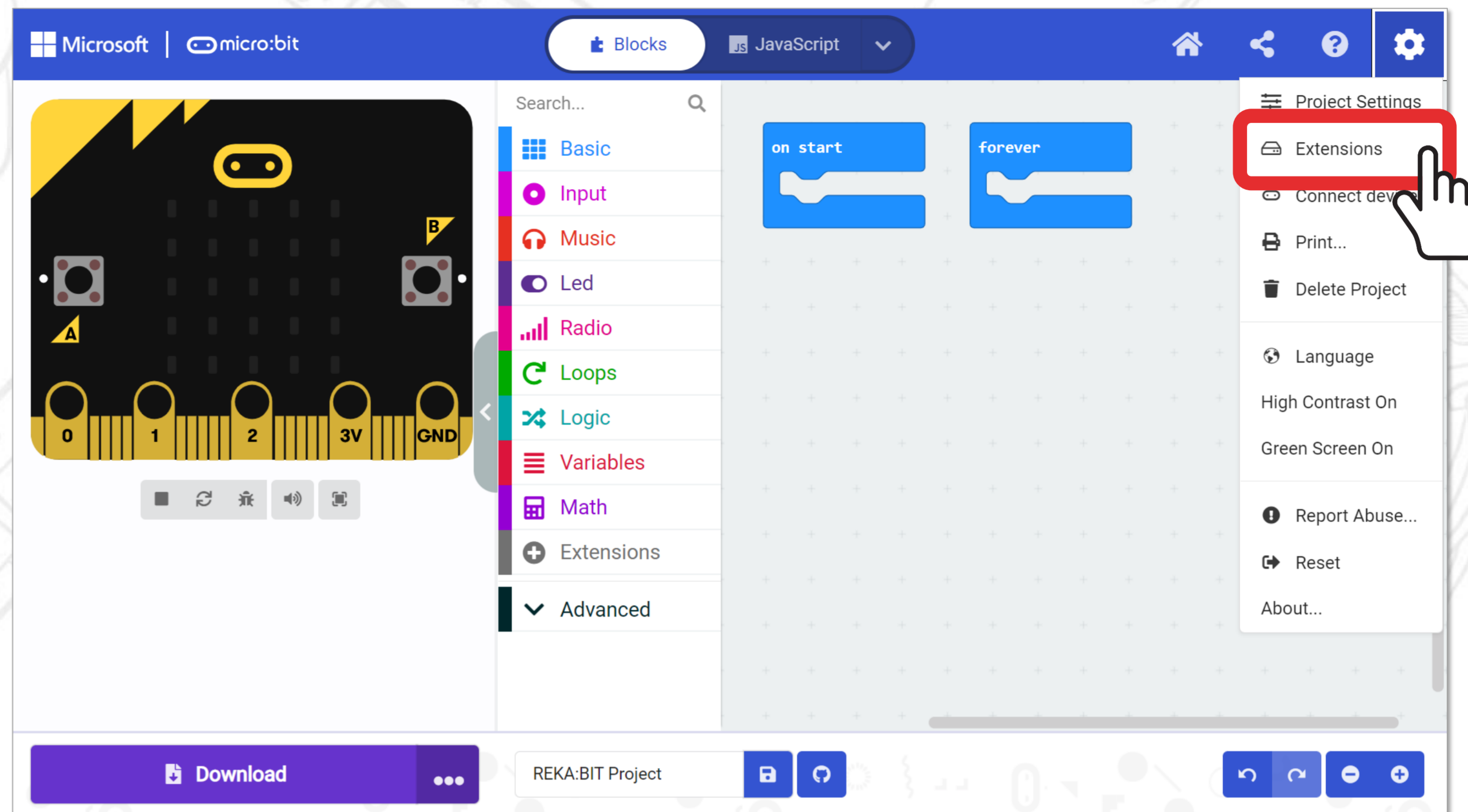
[1] In your browser, go to <https://makecode.microbit.org/>.

[2] Click [**New Project**]. Name your project and then click [**Create**].



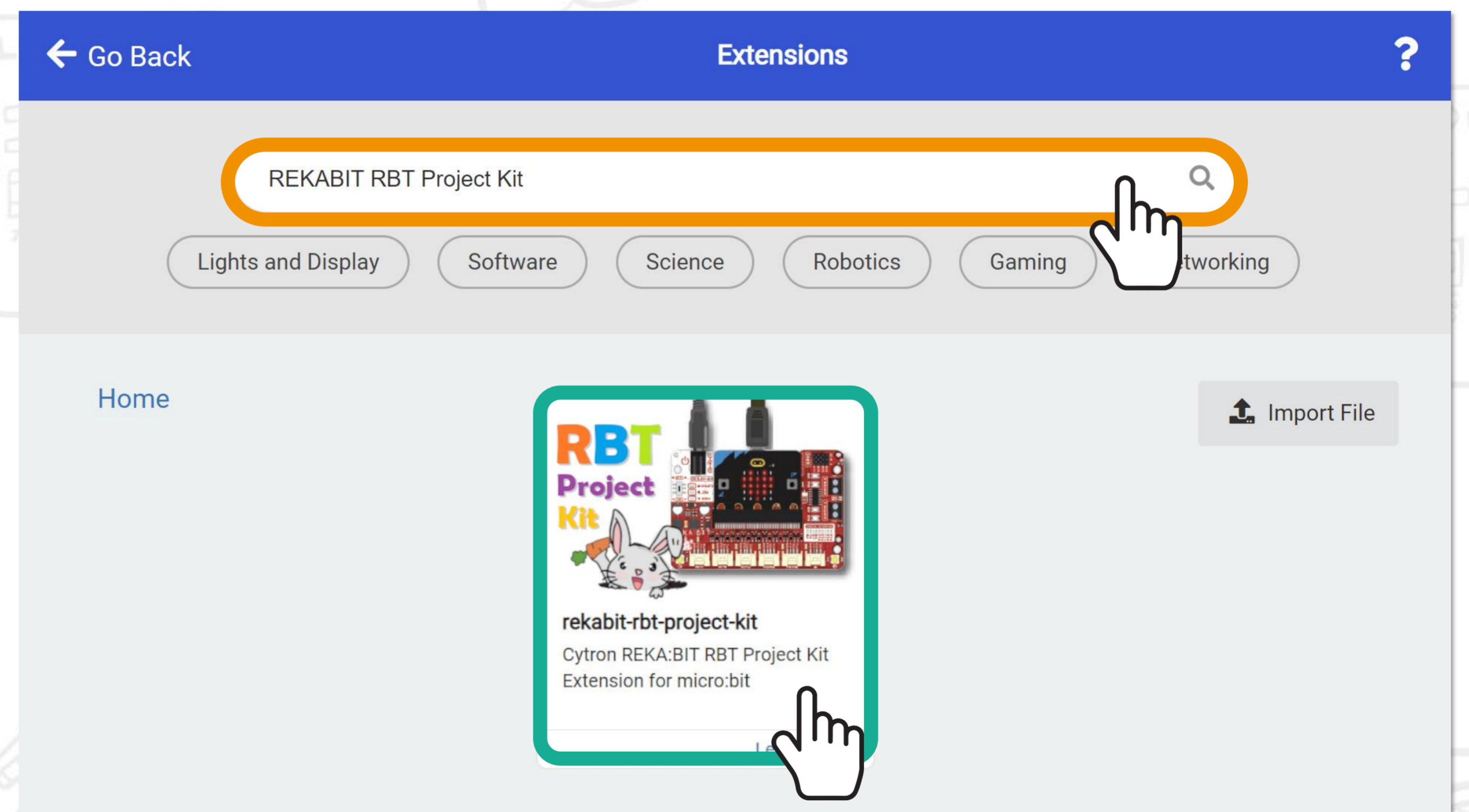
[3] Click the cogwheel icon  and then select '**Extensions**'.

*You need Internet connection in order to add extensions.

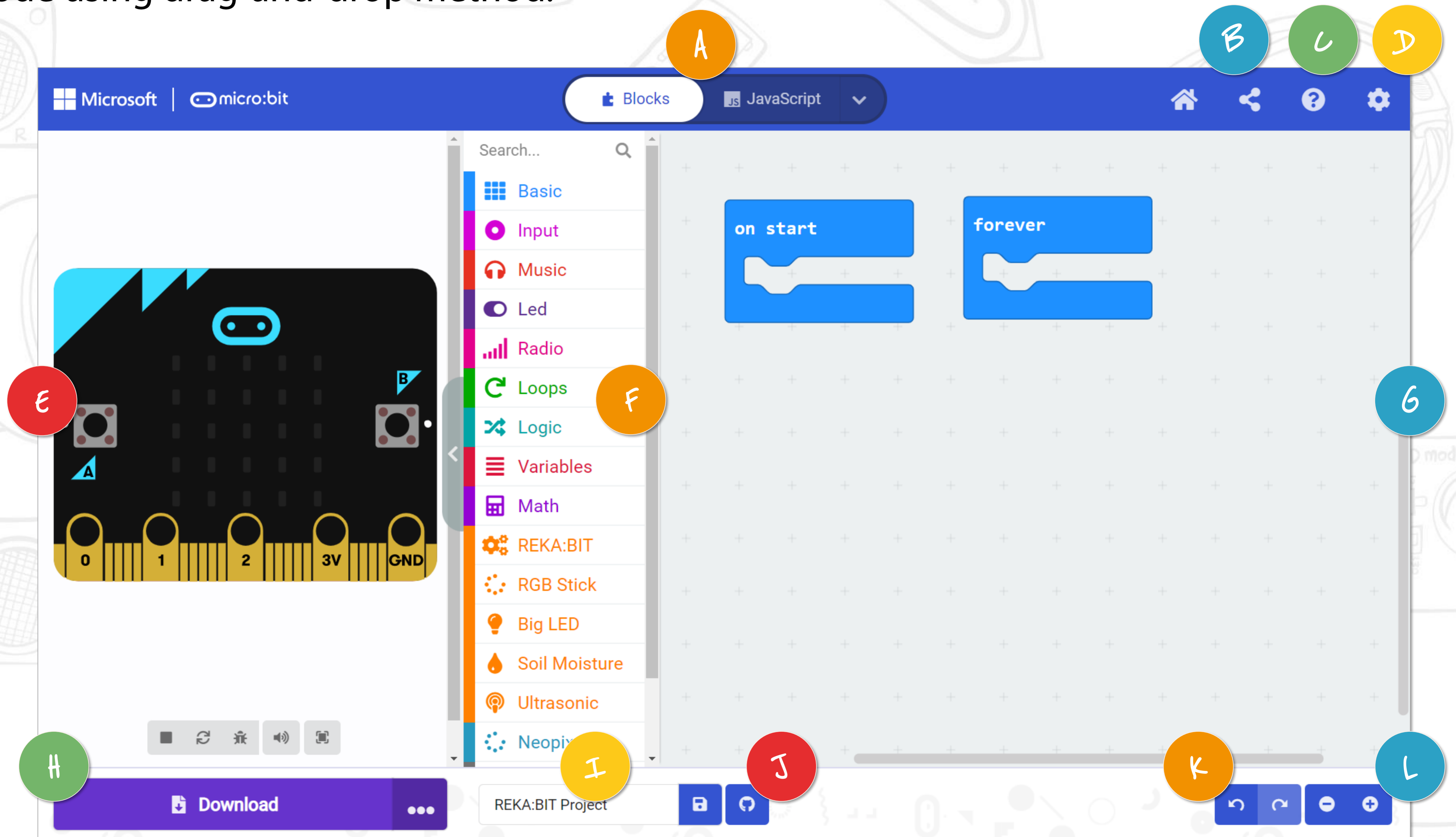


[4] Type '**REKA:BIT RBT Project Kit**' (or <https://github.com/CytronTechnologies/pxt-rekabit-rbt-project-kit>) into the search box and click Enter.

[5] Click to select '**rekabit rbt project kit**' extension and wait for it to load.



You will see this **Microsoft MakeCode Editor** page which allows you to easily build your code using drag-and-drop method.

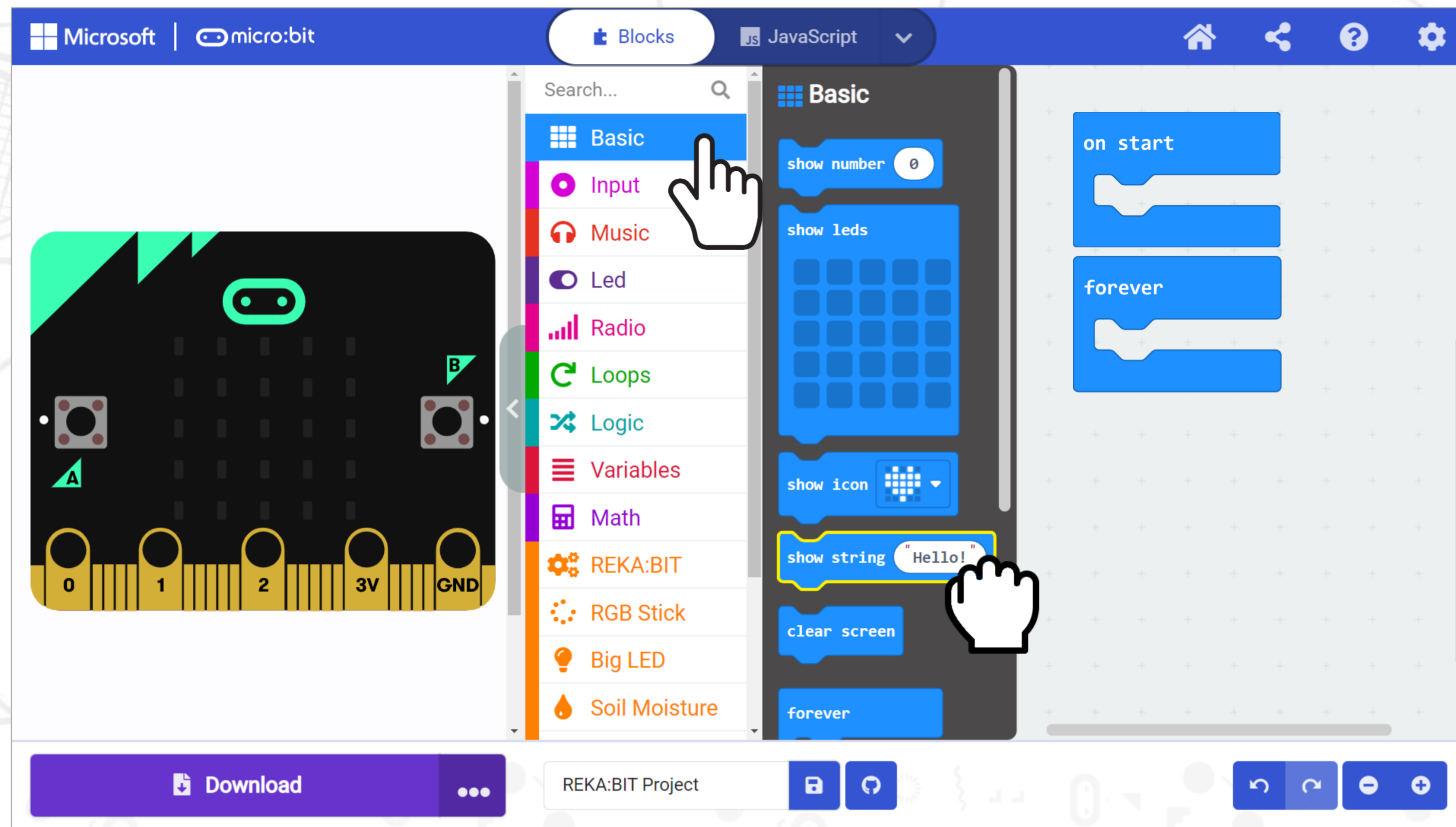


- A** Choose to program in Blocks, JavaScript or Python.
- B** Publish and share your project.
- C** Open Help menu.
- D** Change settings, add extensions, connect device, etc.
- E** **Simulator** - Show you a simulation of your code.
- F** **Toolbox / Category Drawers** - Get the coding blocks that you need here. Click to see available coding blocks for each category.

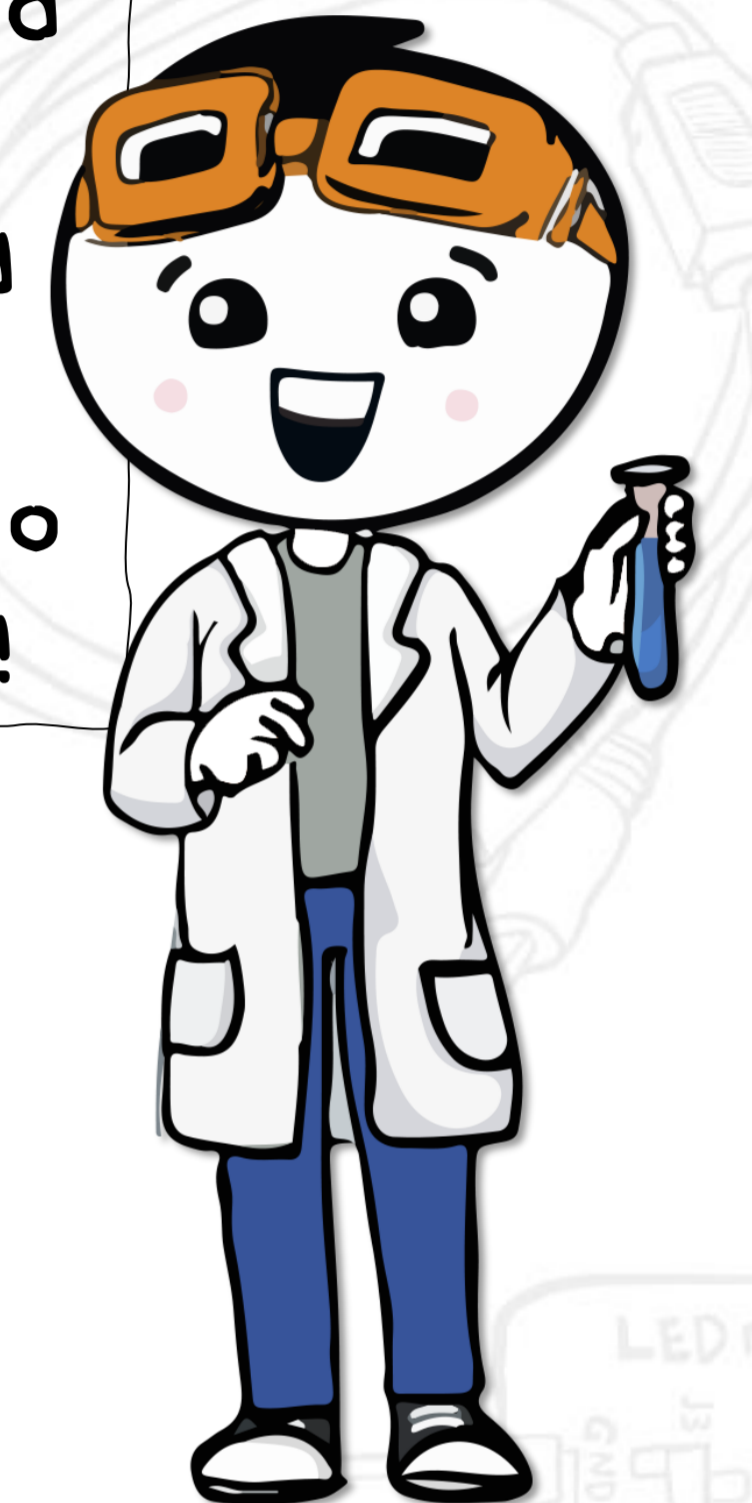
- G** **Programming Workspace** - Build your code here by snapping blocks together.
- H** Click to download your code to REKA:BIT-micro:bit.
- I** Name and save current project to your computer.
- J** Create GitHub repository.
- K** Undo / Redo
- L** Zoom in / out.



[6] Click **[Basic]** category and select **[show string ("Hello!")]** block.



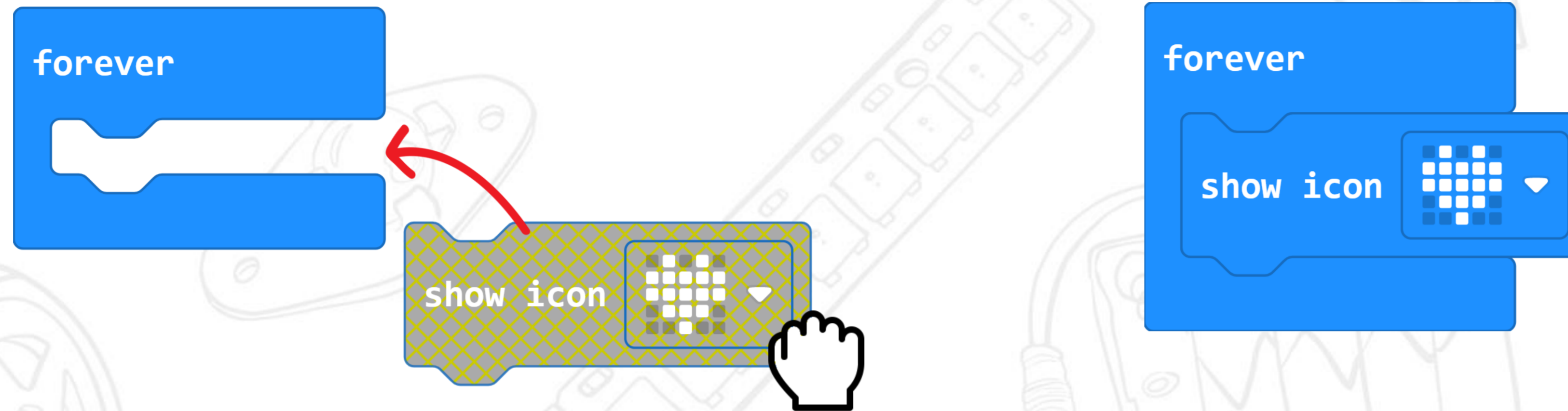
Let's build a simple code and try to flash it to REKA:BIT!



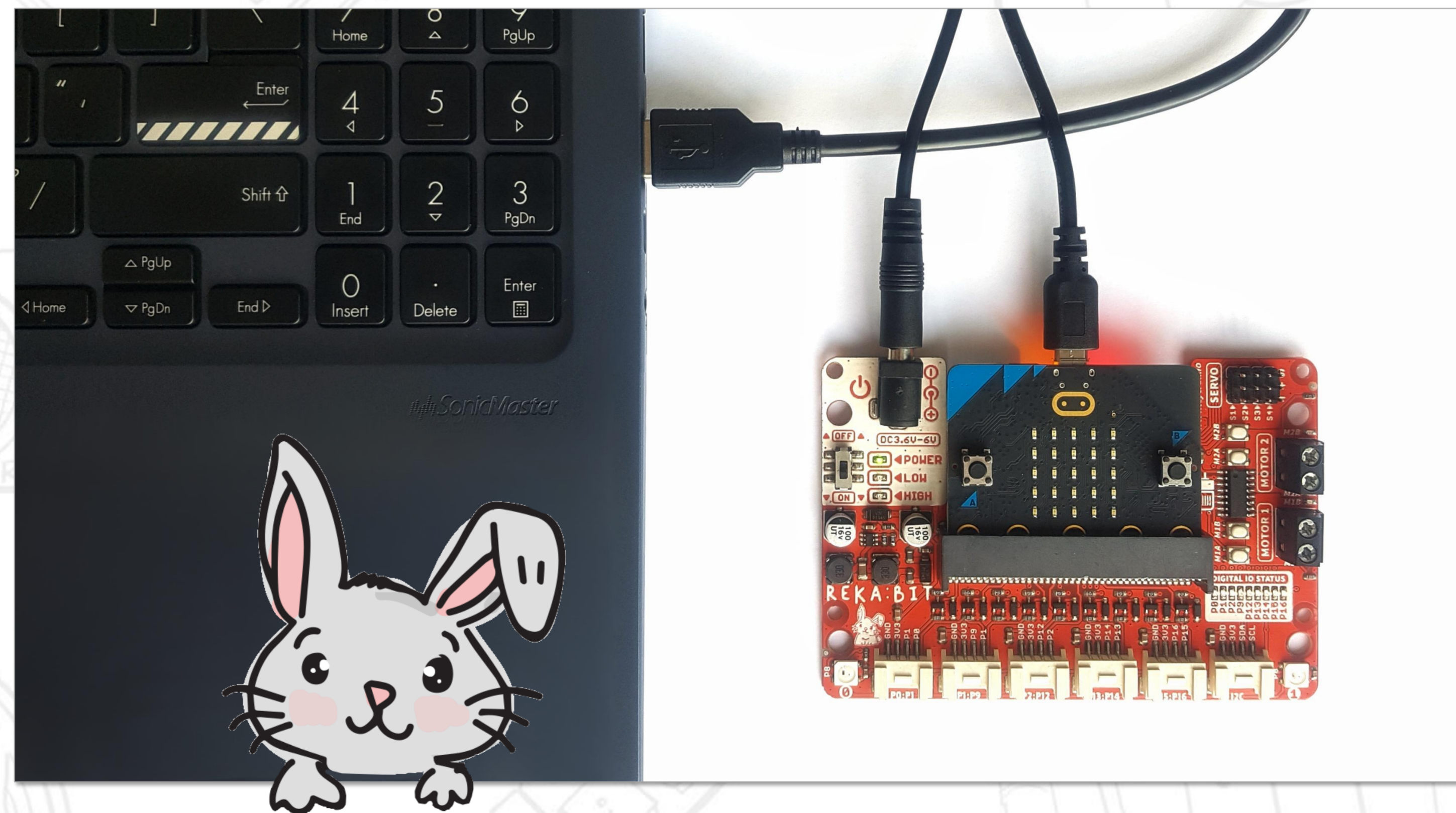
[7] Click and snap the **[show string ("Hello!")]** block to the **[on start]** block.



[8] Click **[Basic]** category again and select **[show icon]** block. Click and snap the block to the **[forever]** block.

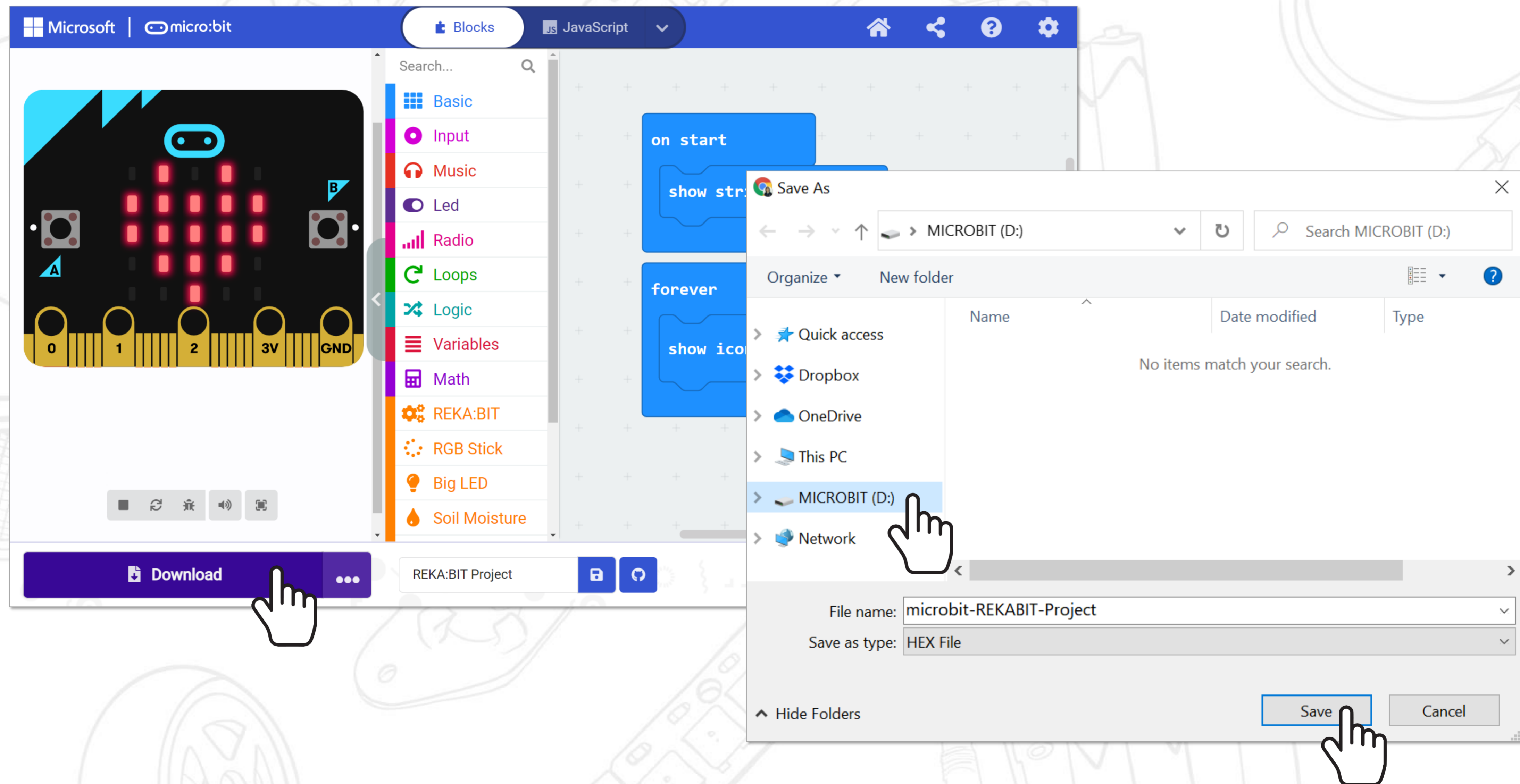


[9] Connect the USB cable to your computer and REKA:BIT as shown below.



[10] Click [**Download**] button. In the pop-up window, choose to download your project to the **MICROBIT drive** and then click [**Save**].

[11] Click [**Done**] to close the window when it shows '**Download completed**'.



NOTE:

If the pop-up window does not appear, it means that the file has been automatically downloaded to the location where your browser is set to save downloads. Right-click on the downloaded .hex file which will appear at the bottom of the window and select 'show in folder'. Click and drag the downloaded "microbit-xxx.hex" file to the MICROBIT drive, as if you were copying a file to a flash drive.

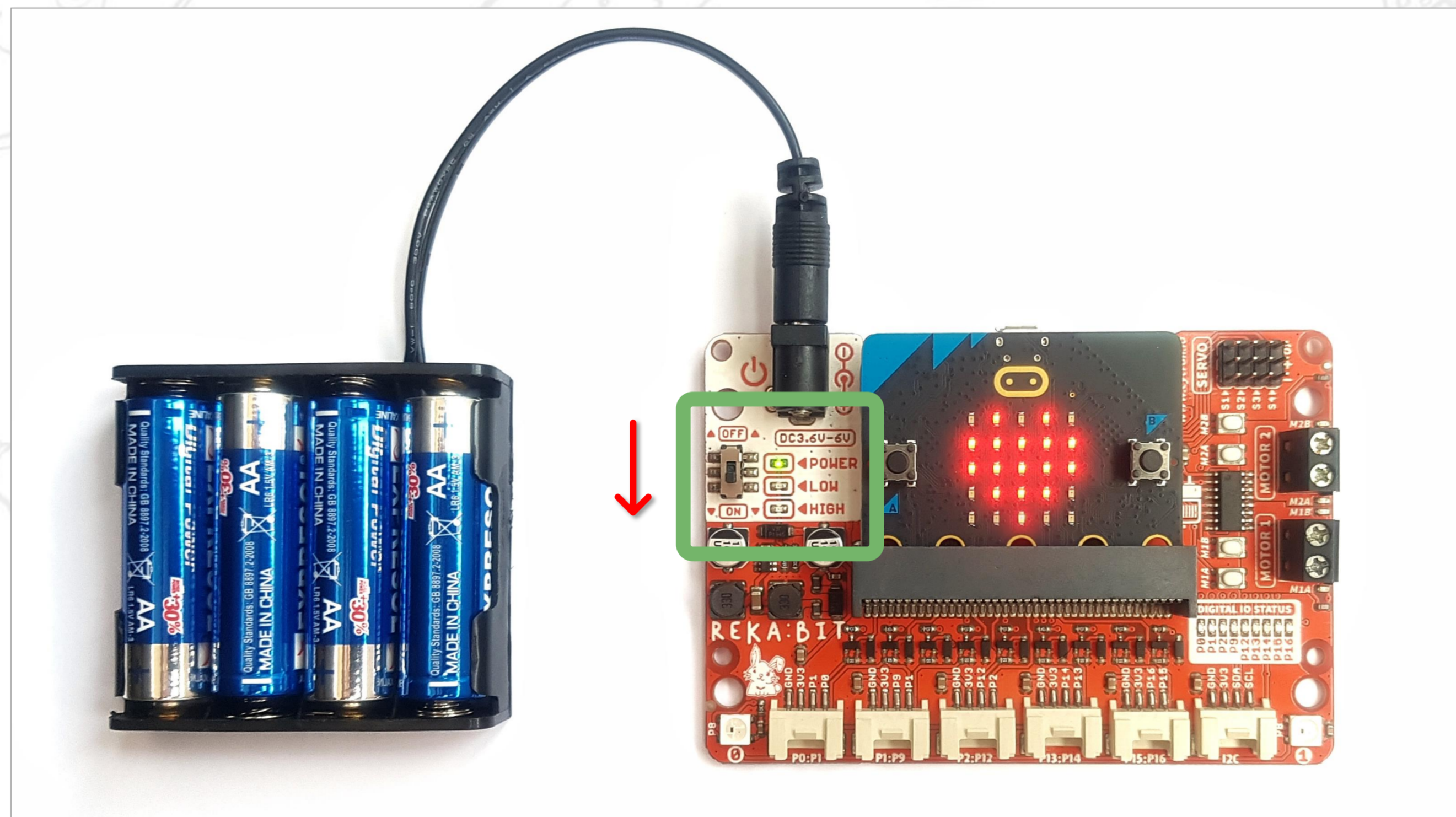


The image shows two overlapping screenshots. The left screenshot is from the REKA:BIT software interface, displaying a breadboard with pins labeled 0, 1, 2, 3V, and GND. A right-hand sidebar lists components like Logic, Variables, Math, REKA:BIT, RGB Stick, Big LED, and Soil Moisture. A 'REKA:BIT Project' window is open at the bottom. A context menu is shown over a downloaded file 'microbit-REKABIT-....hex', with 'Show in folder' highlighted by a hand cursor. The right screenshot is a Windows File Explorer window showing the 'Downloads' folder. A file named 'microbit-REKABIT-Project.hex' is selected. A red arrow points from this file to the 'MICROBIT (D:)' drive listed in the left-hand pane, which is also highlighted with a red box and a hand cursor.

*You need to plug in REKA:BIT to your PC.

[12] Insert 4 AA batteries into the battery holder and connect the cable to the power jack.

[13] Unplug the USB cable and power up REKA:BIT by sliding the power switch to ON.



NOTE:

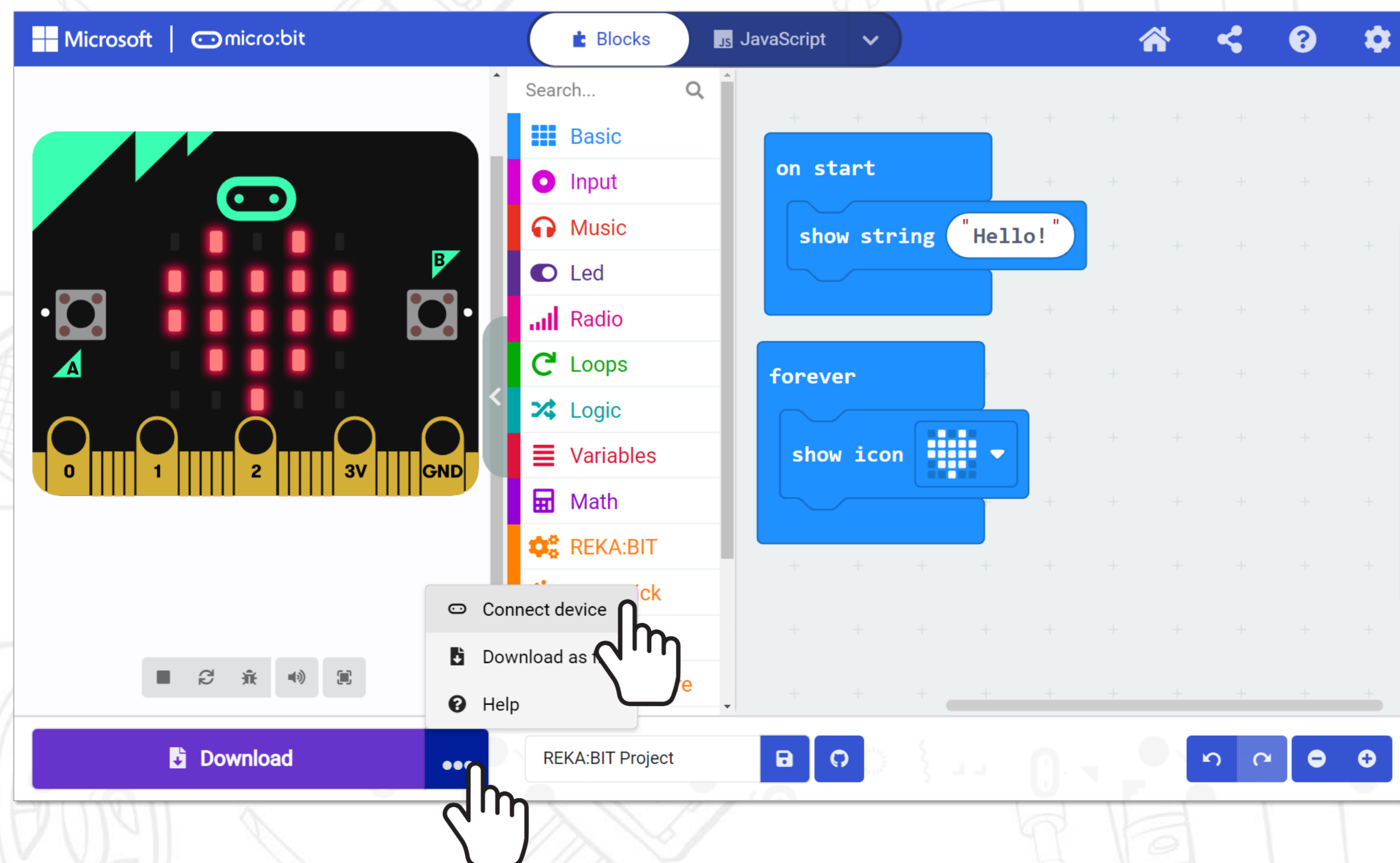
Do you see 'Hello' scroll across the LED matrix followed by a heart icon? If you missed it, simply press the reset button on the back of the micro:bit board, or you can slide the power switch to OFF, and then turn it ON again to reset.



QUICK TIP #1

You can “connect device” to make it easier to download your code. After you’ve connected your device, you can directly flash code to your REKA:BIT with just ONE single click.

[1] Plug in REKA:BIT to your PC. Click the **three dots** next to the **[Download]** button, and then select **[Connect device]**.



[2] Follow the on-screen instructions. Select '**BBC micro:bit CMSIS-DAP**' or '**DAPLink CMSIS-DAP**' from the list and then click [**Connect**].

The image displays two sequential screenshots from the MakeCode website's connection interface. The first screenshot, titled "Connect your micro:bit...", provides instructions: "Pair your micro:bit to the computer by selecting 'BBC micro:bit CMSIS-DAP' or 'DAPLink CMSIS-DAP' from the popup that appears after you press the 'Next' button below." It features an illustration of a micro:bit board connected to a laptop. A hand cursor is shown clicking the "Next" button. The second screenshot shows a system security dialog box titled "makecode.microbit.org wants to connect". It lists "BBC micro:bit CMSIS-DAP" as the selected device. A hand cursor is shown clicking the "Connect" button.

NOTE:

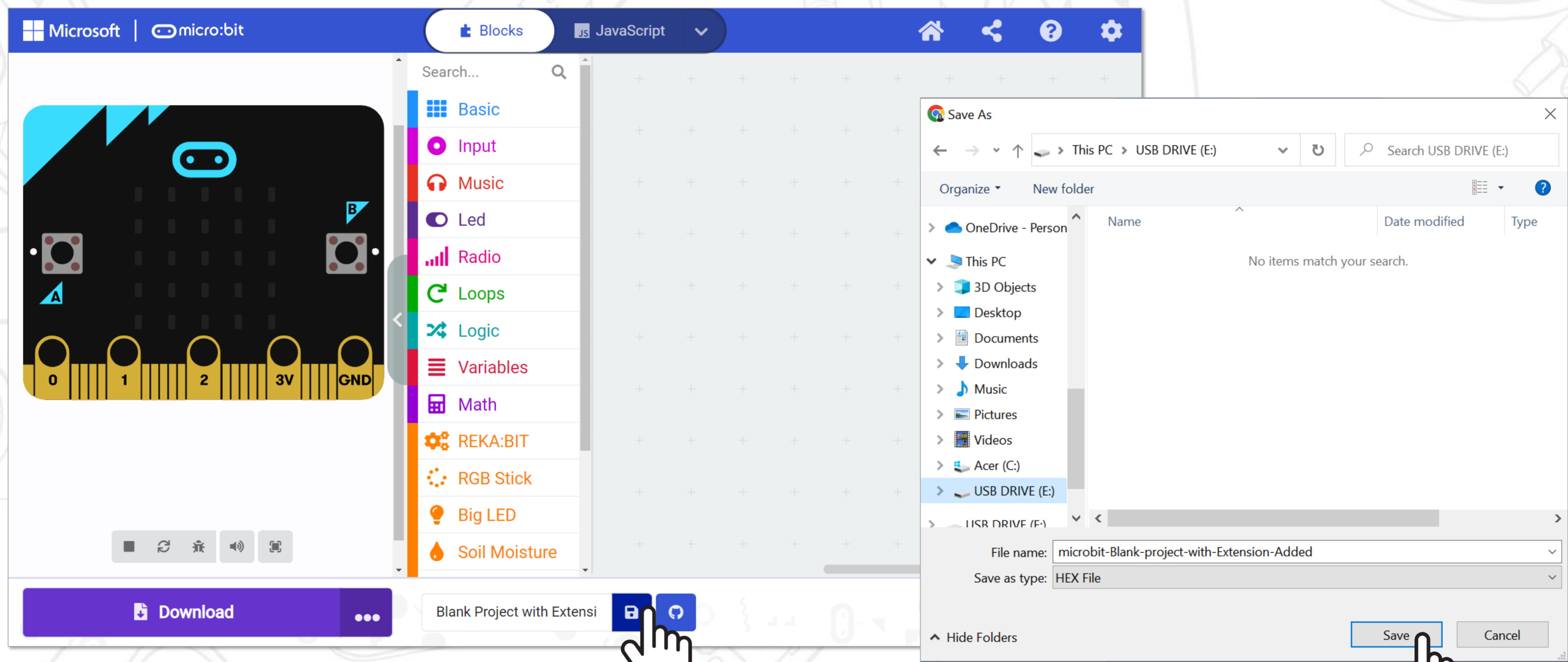
You need to use either the new Edge or Chrome browser and have the latest firmware on your micro:bit device. If you have problems connecting your device, you can refer to the following page for more info :

<https://makecode.microbit.org/device/usb/webusb/troubleshoot>

QUICK TIP #2

To avoid having to add extension every time you start a new project (or if you have unstable Internet connection), here's what you can do!

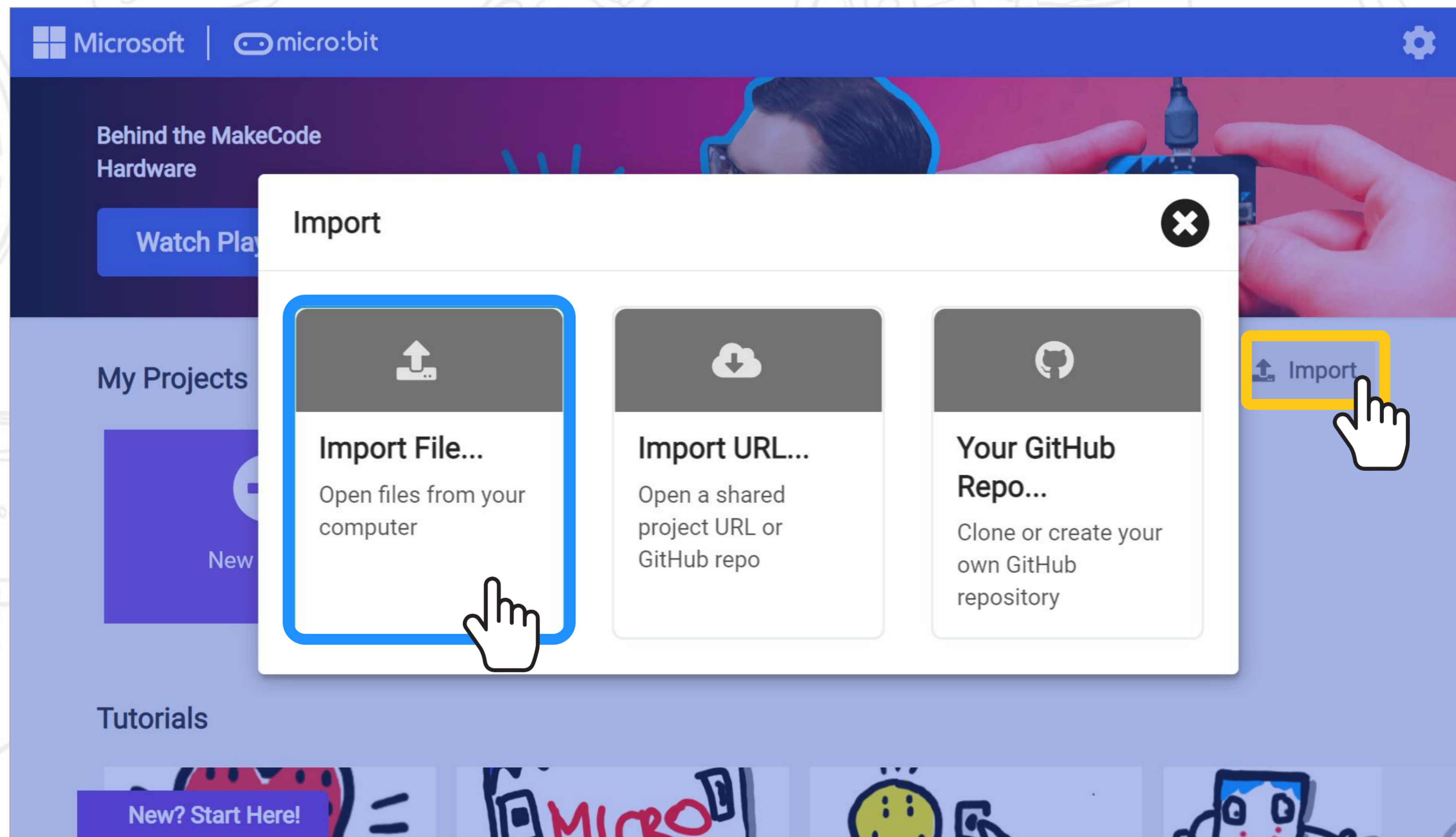
[1] Click  to save a blank project with extension added as a hex file.



*You can save the file to your Desktop or to an USB drive.

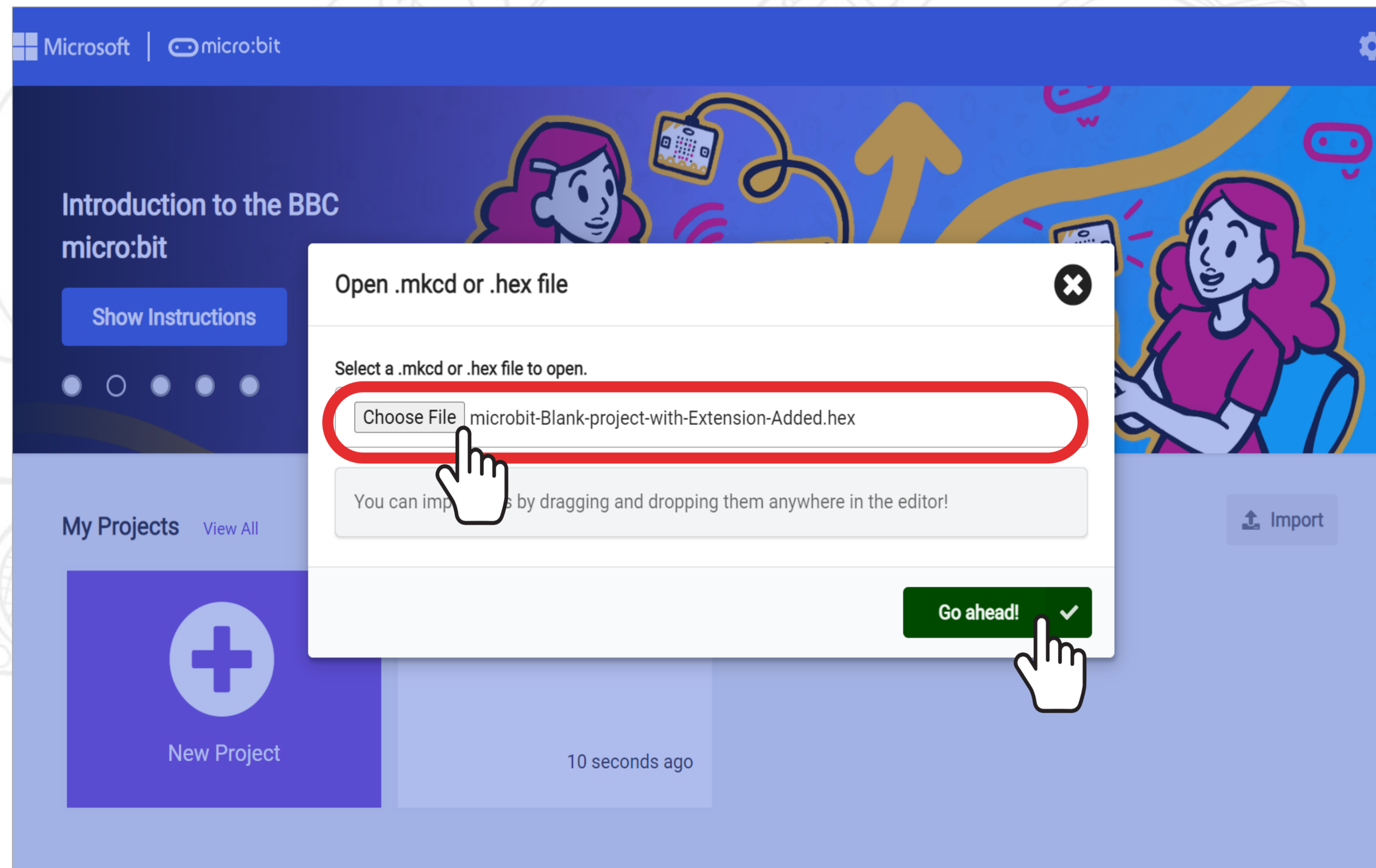
The next time you want to start a new REKA:BIT project,
[1] Go to MakeCode Editor <https://makecode.microbit.org/>.

[2] Click  **Import** button. Select **[Import File... Open files from your computer]**.



[4] Click on **[Choose File]** button and select the **blank-project-with-extension-added** .hex file that you've saved earlier.

[5] Click **[Go ahead!]** button.

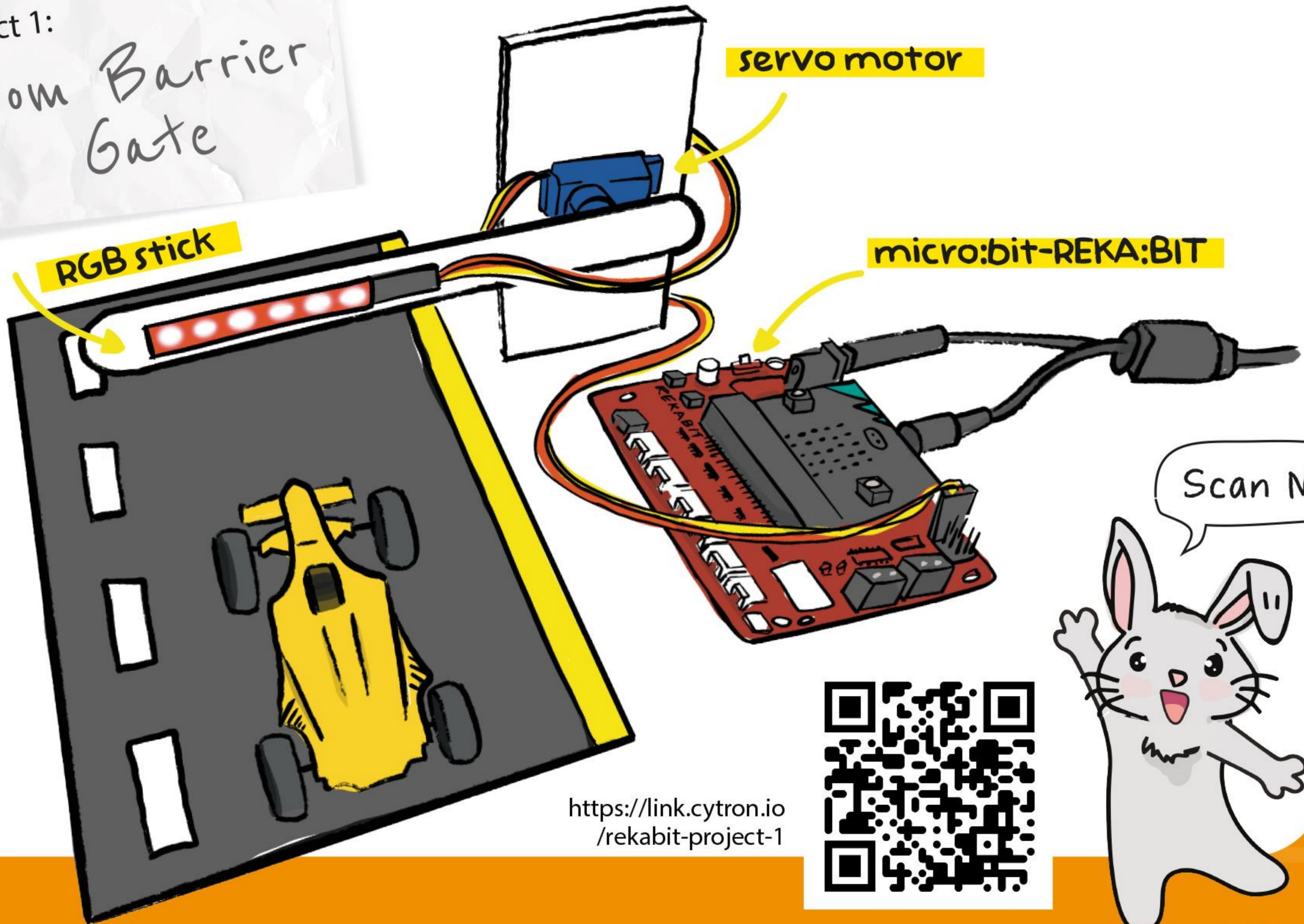


And voila,
you're ready
to start
building code
for your new
REKA:BIT
project!



Project 1:

Boom Barrier Gate



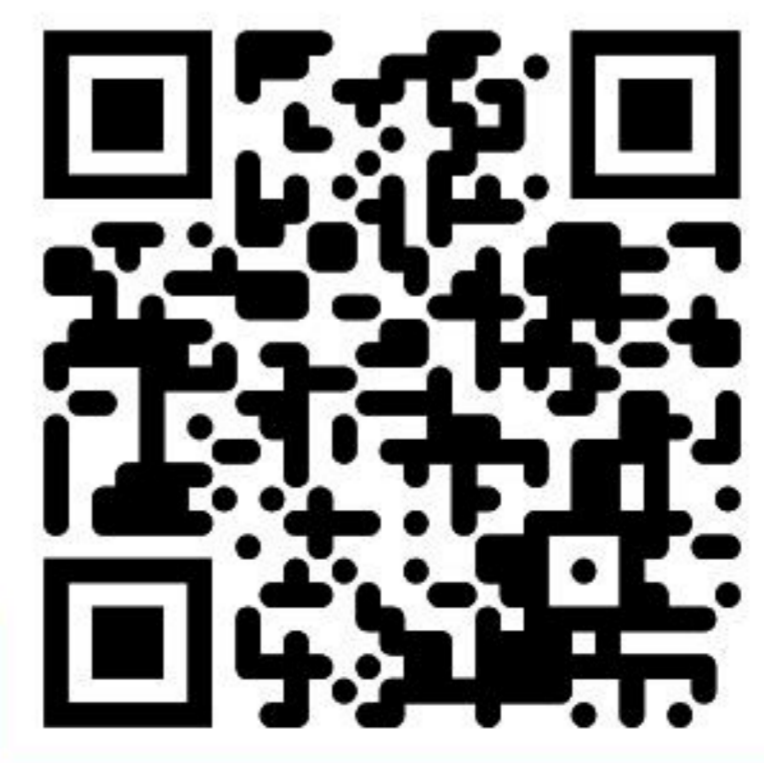
RGB stick

servo motor

micro:bit-REKA:BIT

Scan Me!

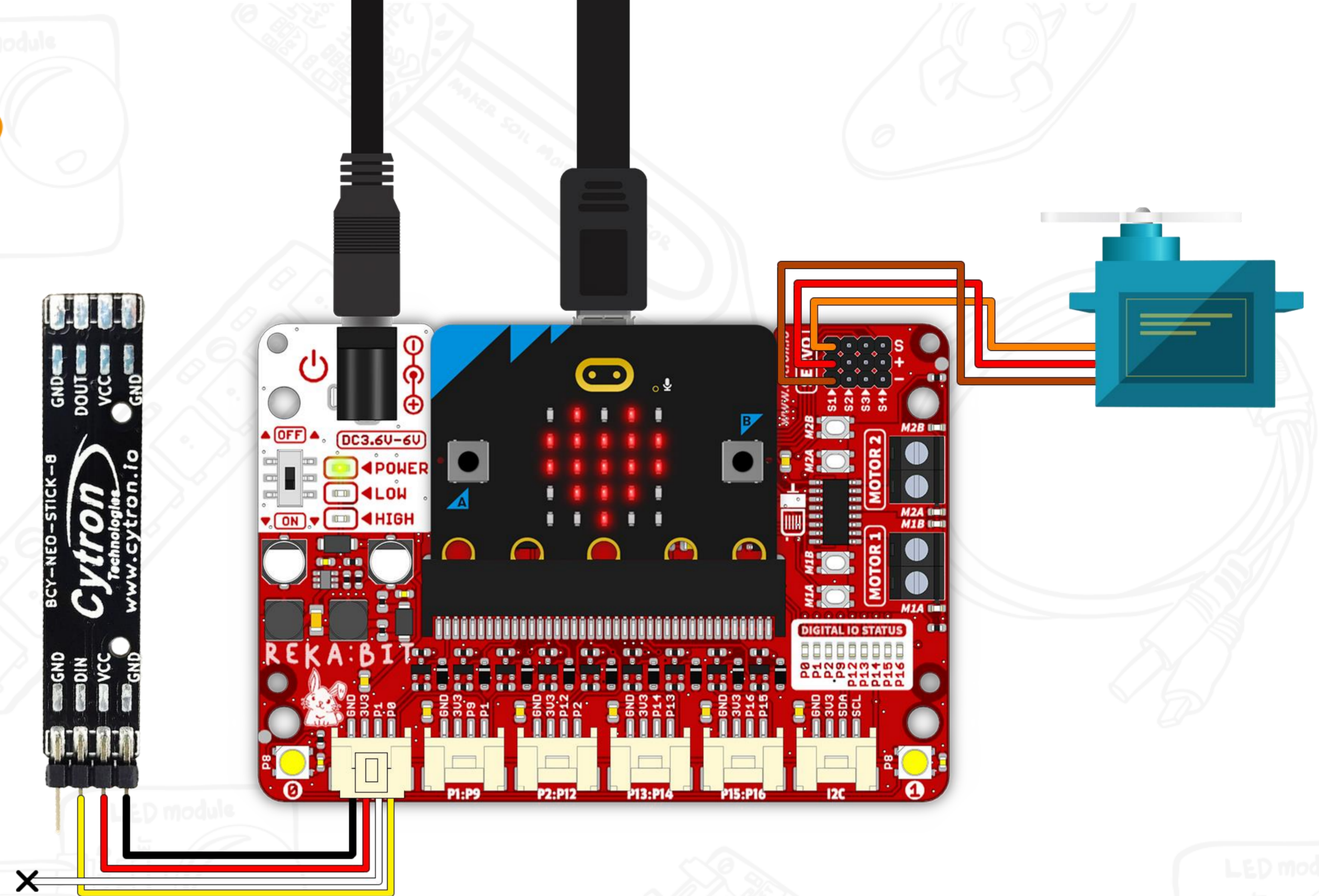
<https://link.cytron.io/rekabit-project-1>



Project 1 : Boom Barrier Gate

Boom barrier gates are a common sight at the entrance of car parks and restricted areas. They control the flow of traffic and prevent unwarranted access to private properties.

In this project, we'll build a barrier gate that opens and closes when we press the buttons on micro:bit.



Components:

- REKA:BIT with micro:bit
- Servo motor
- RGB stick

Tools/Materials:

- Cardboard
- Cutter knife
- Popsicle stick
- Blu tack / double-sided tape
- Hot glue gun

 Adult supervision required when using sharp tools.

Project 1 : Boom Barrier Gate

On start, set the RGB stick at pin P0 and light it up in RED.

CLOSE the barrier gate (90°).

- When Button A is pressed,
- i. play a warning tone,
 - ii. light up RGB stick in GREEN,
 - iii. OPEN the barrier gate (20°),
 - iv. scroll text "WELCOME"
 - and wait for 5 seconds.
 - v. Light up RGB stick in RED, and
 - vi. CLOSE the barrier gate (90°).

```
on start
  set RGB Stick at pin P0
  set RGB Stick to RED
  set servo S1 position to 90 degrees
```

```
on button A pressed
  play tone Middle C for 2 beat
  set RGB Stick to GREEN
  set servo S1 position to 20 degrees
  show string "WELCOME"
  pause (ms) 5000
  set RGB Stick to RED
  set servo S1 position to 90 degrees
```

Project 2:

Interactive Robot

servo motor

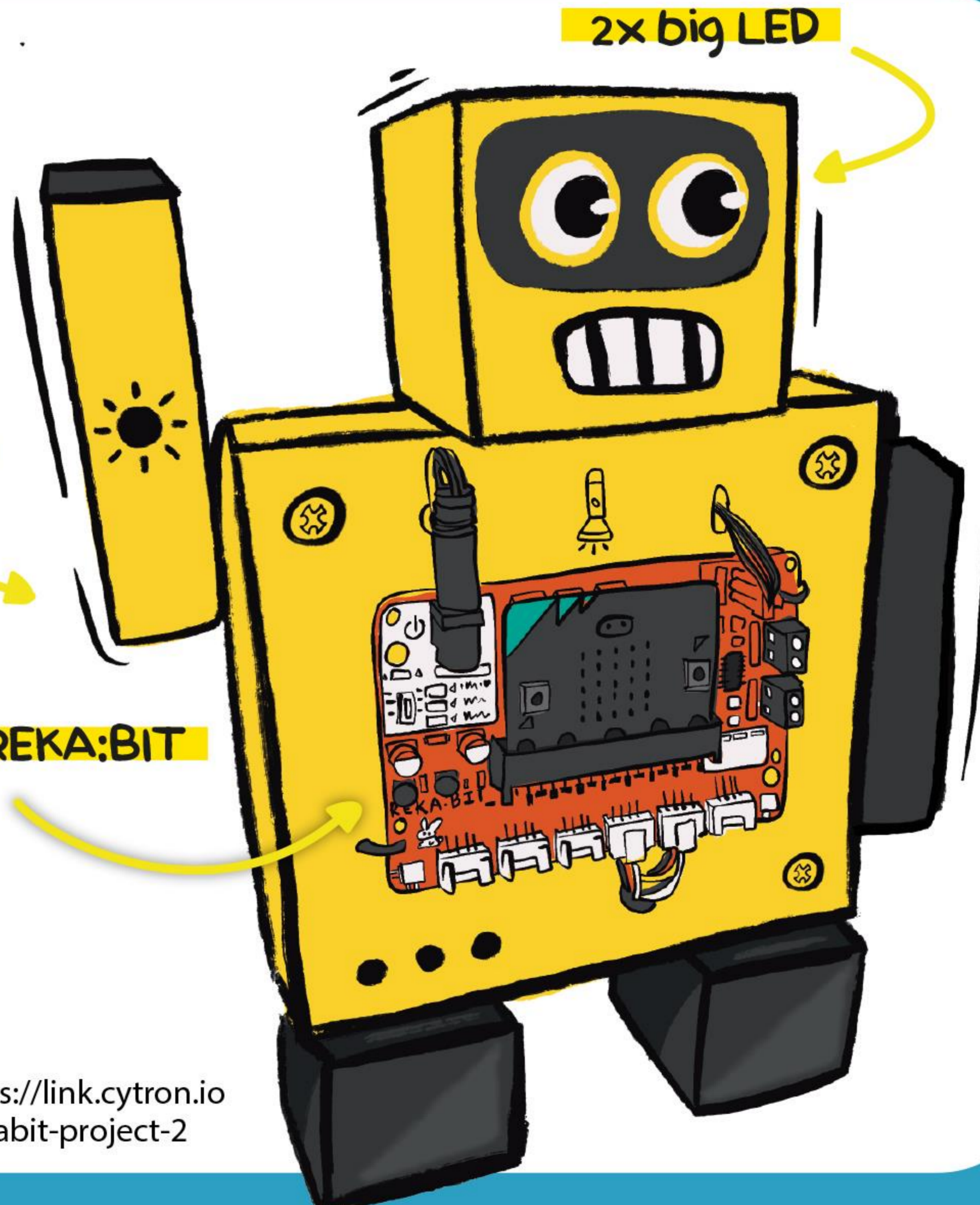
2x big LED

micro:bit-REKA:BIT

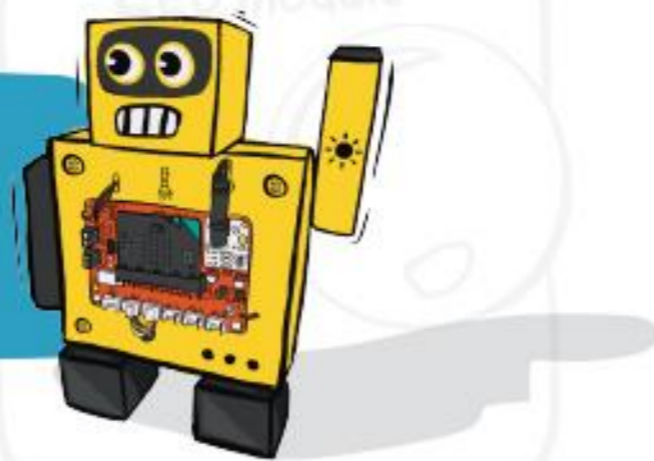
Scan Me!



<https://link.cytron.io/rekabit-project-2>

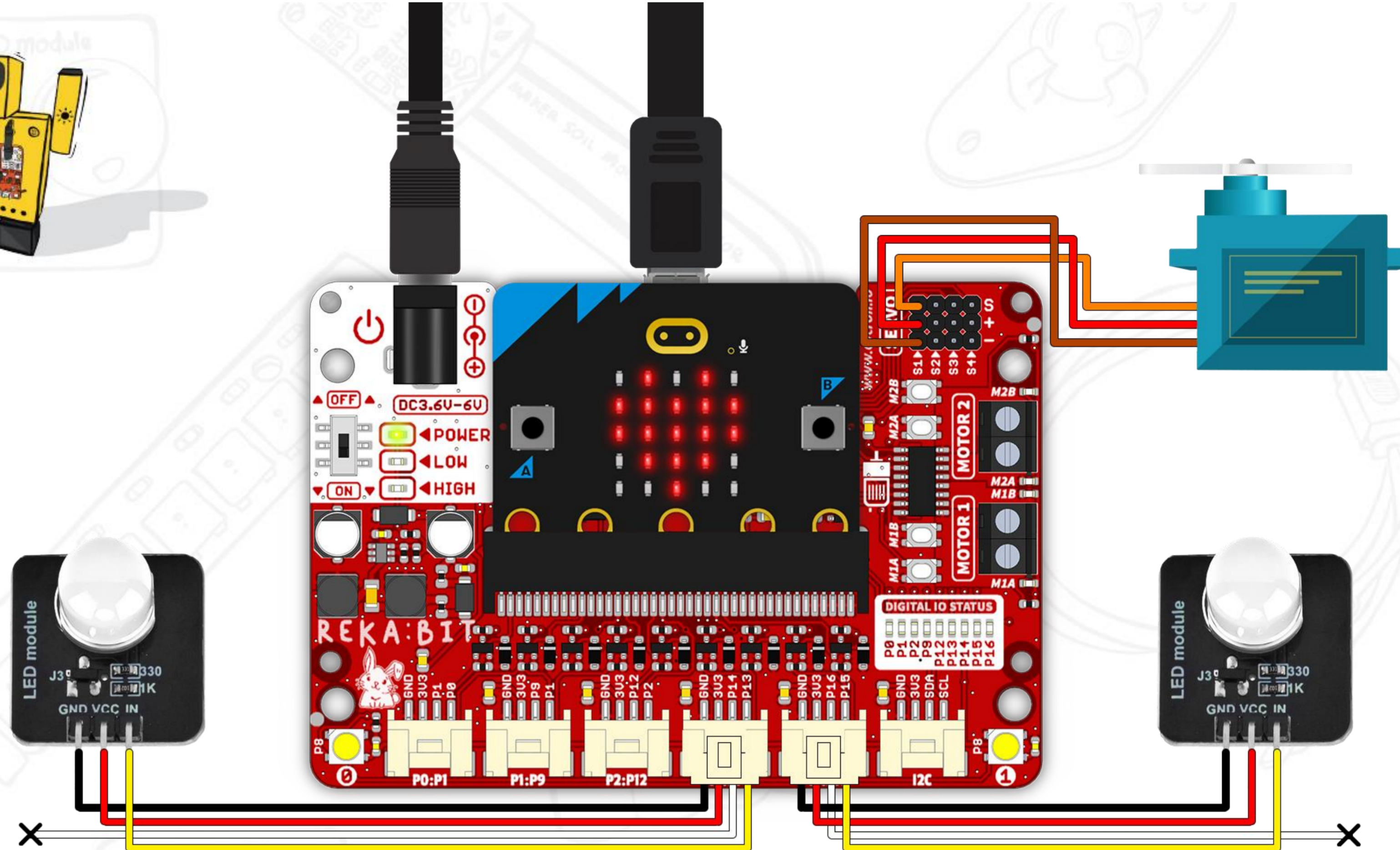


Project 2 : Interactive Robot



An **interactive robot** responds to human interactions.

Let's build a robot that can sing, move, display temperature, and light up at our commands.



Components:

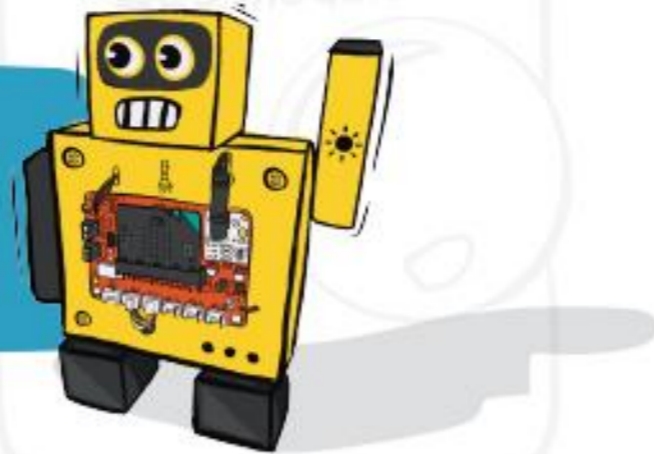
- REKA:BIT with micro:bit
- Servo motor
- 2x Big LED

Tools/Materials:

- Cardboard
- Scissors
- Cutter knife
- 2x Cable ties
- Hot glue gun

 Adult supervision required when using sharp tools.

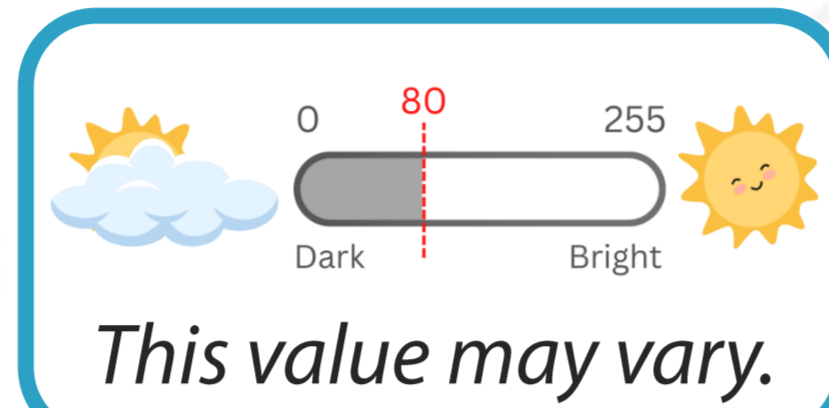
Project 2 : Interactive Robot



On start, display a heart icon (standby mode).

```

on start
  show icon [heart icon]
  
```



When Button A is pressed, play the birthday melody.

```

on button A pressed
  start melody [birthday] repeating [once]
  
```

Always check the surrounding light level.
If dim (<80), raise the robot's arm (180°) and turn ON both big LEDs.
Else (surrounding is bright), lower the robot's arm to its side (0°) and turn OFF both big LEDs.

```

forever
  if [light level] < 80 then
    set servo S1 position to 180 degrees
    set Big LED at pin P13 to on
    set Big LED at pin P15 to on
  else
    set servo S1 position to 0 degrees
    set Big LED at pin P13 to off
    set Big LED at pin P15 to off
  
```

When Button B is pressed, blink 4 times (i.e. turn ON the big LEDs, and then turn OFF, at 200ms intervals).

```

on button B pressed
  repeat 4 times
    do
      set Big LED at pin P13 to on
      set Big LED at pin P15 to on
      pause (ms) 200
      set Big LED at pin P13 to off
      set Big LED at pin P15 to off
      pause (ms) 200
  
```

When logo is touched, display temperature reading (in Celsius) and then show heart icon.

```

on logo touched
  show number [temperature (°C)]
  show icon [heart icon]
  
```

When a loud sound is detected, display a beating heart animation.

```

on loud sound
  repeat 4 times
    do
      show icon [beating heart icon]
      show icon [beating heart icon]
  
```

Project 3:

Auto Plant Watering System

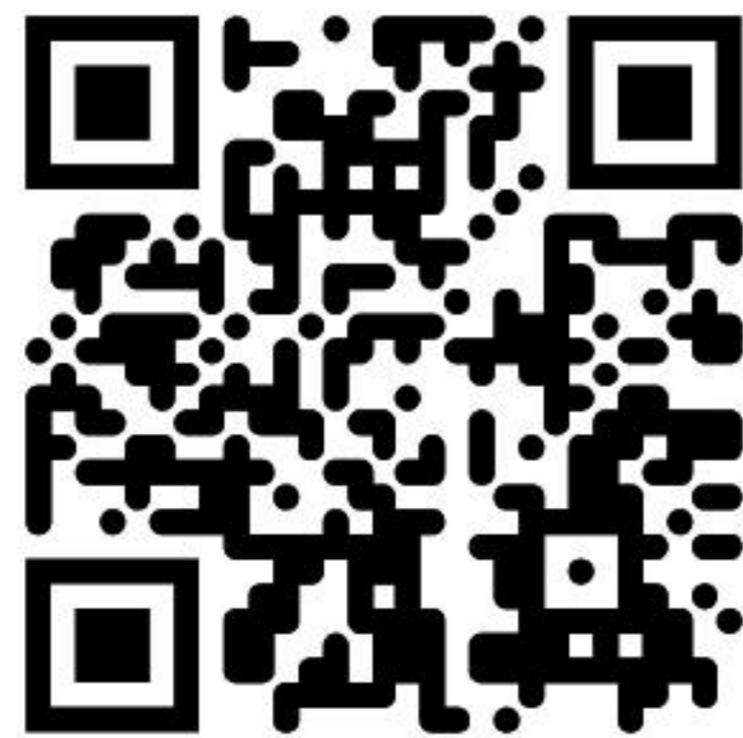
servo motor

micro:bit-REKA:BIT

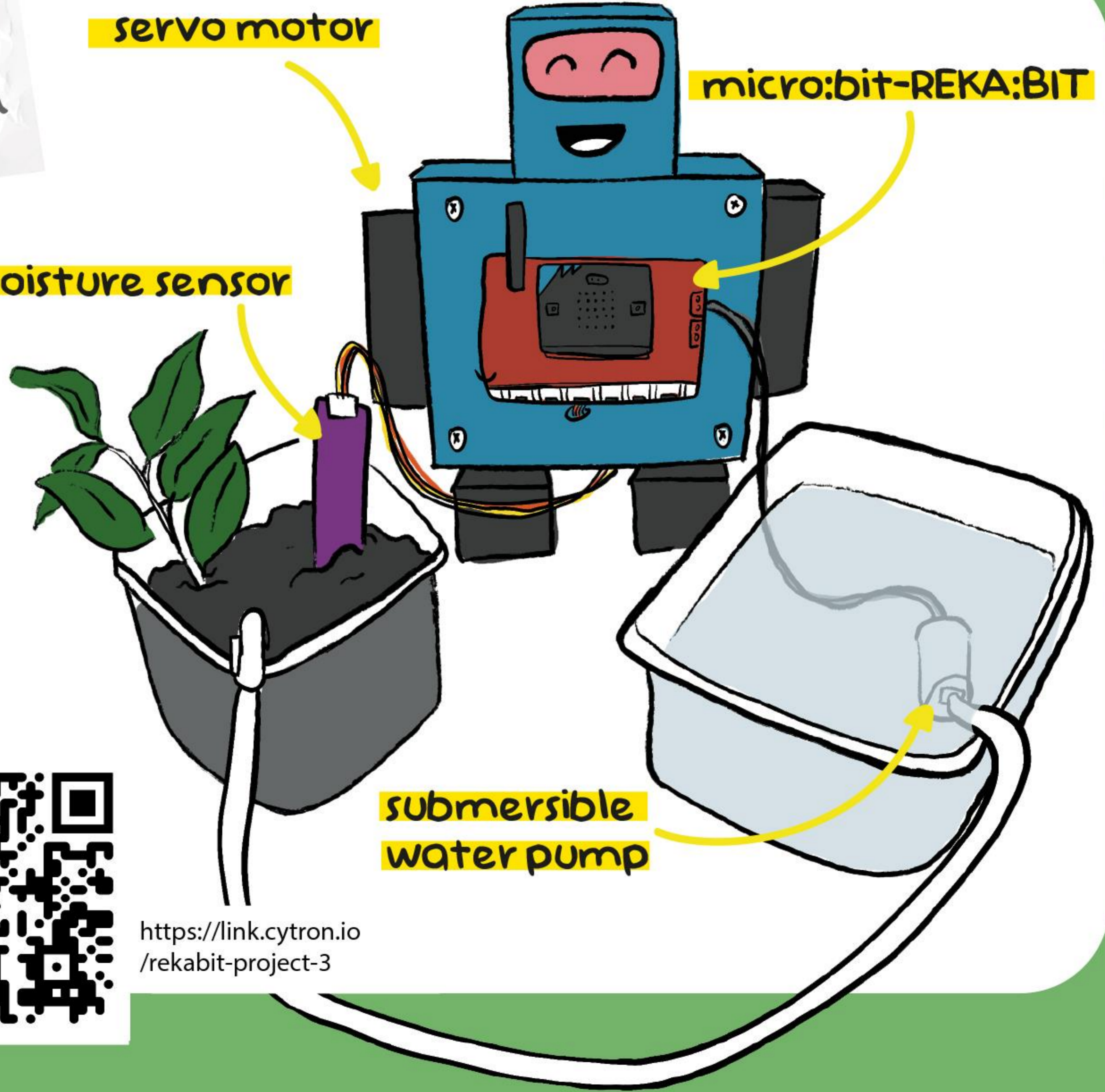
soil moisture sensor

submersible
water pump

Scan Me!



<https://link.cytron.io/rekabit-project-3>

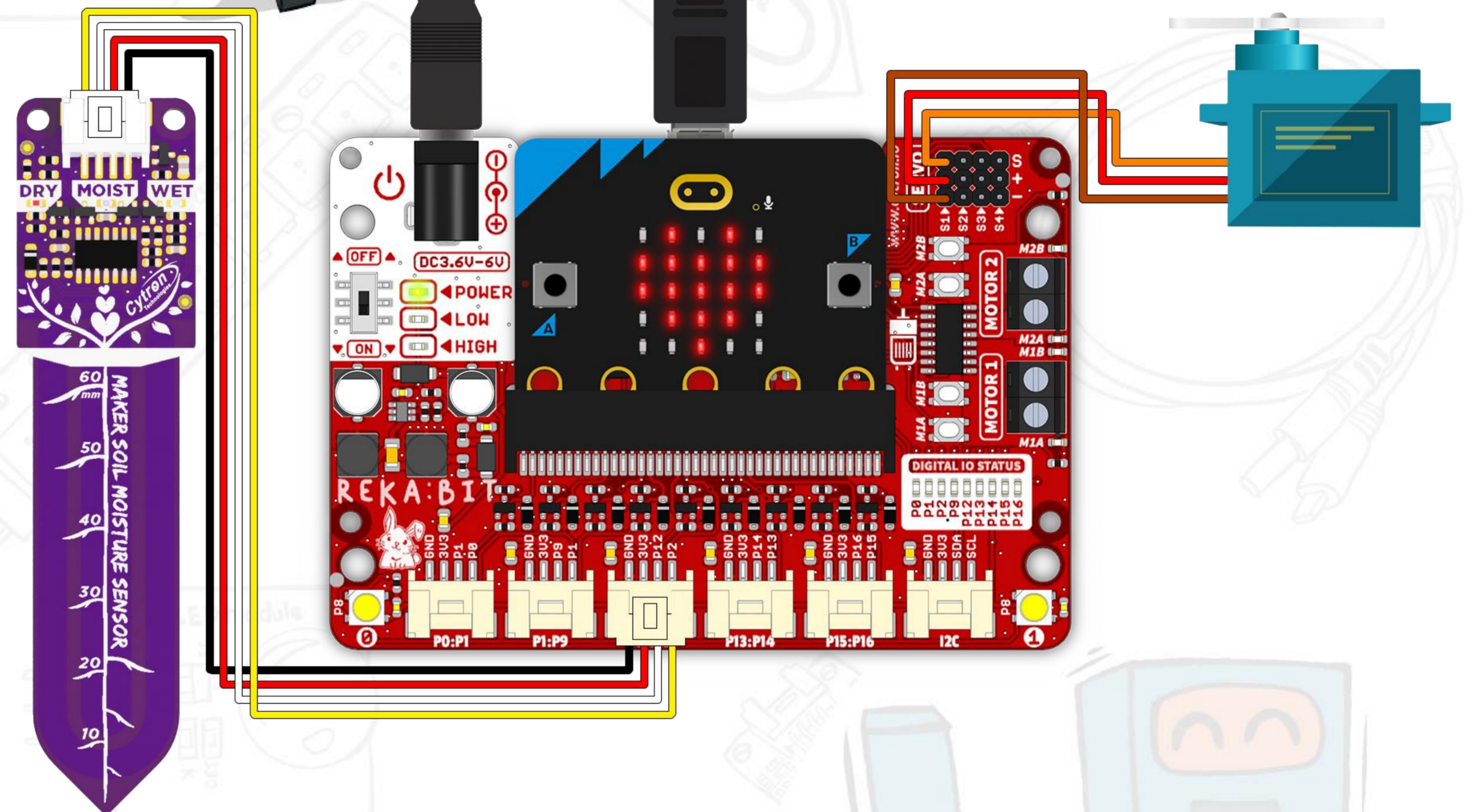


Project 3 : Water Level Detection Robot

In this first part of the project, we will build a **water level detection robot**.

The robot, will alert you with a warning tone and ask for water when it is 'thirsty'.

Just refill the container and the robot will be happy again.



Components:

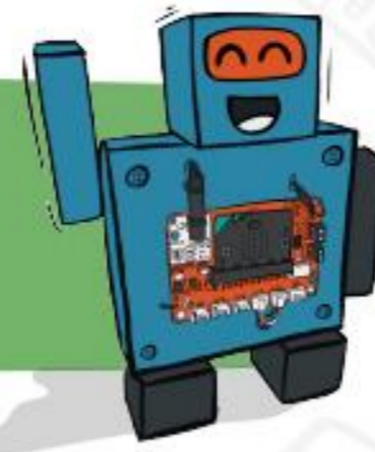
- REKA:BIT with micro:bit
- Servo motor
- Soil moisture sensor

Tools/Materials

- Cardboard
- Scissors
- Cutter knife
- 2x Cable ties
- Hot glue gun

 Adult supervision required when using sharp tools.

Project 3 : Water Level Detection Robot



On start, display the 'happy' icon and set servo S1 position to 0° (i.e. robot's arm by its side, standby mode).

Always check the moisture level. If the reading is below 550, which means water is detected above the minimum level, show the 'yes' icon.

Else (if water falls below the minimum level),

i. show the 'no' icon,

ii. play a warning tone,

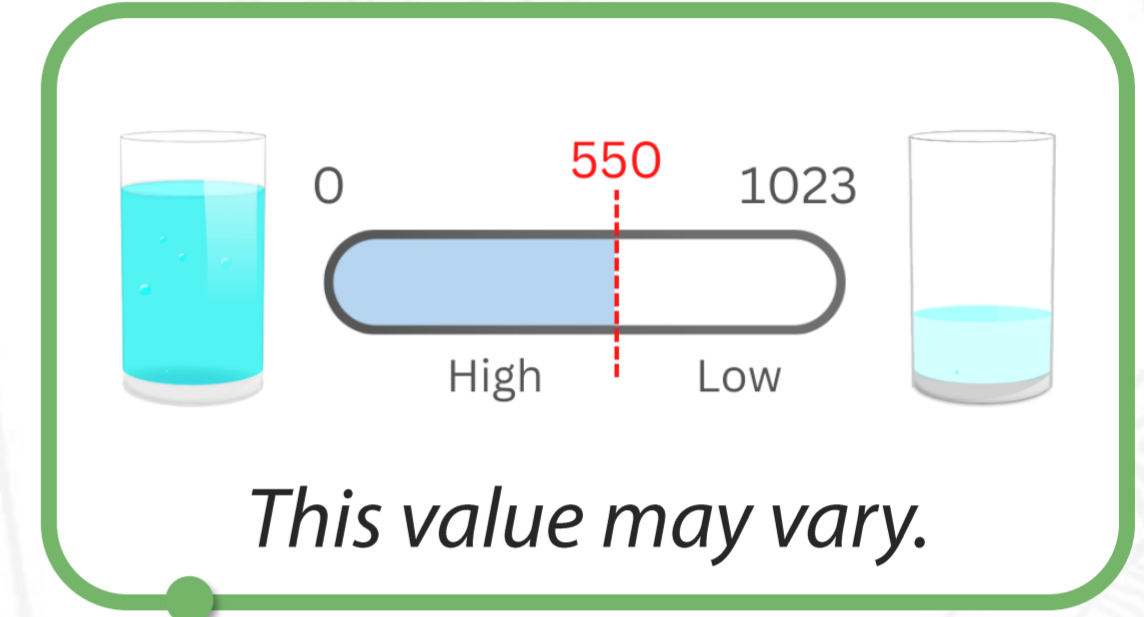
iii. raise the robot's arm (180°) for 1 second,

and then,

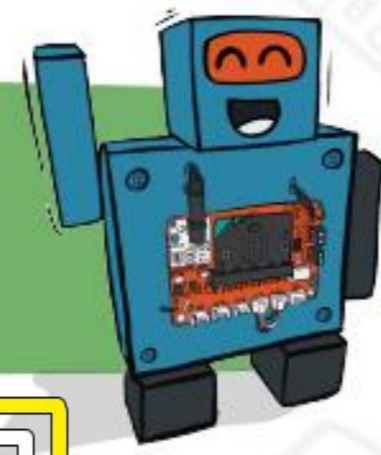
iv. lower the arm back to its side (0°) for 1 second.

```
on start
  show icon [happy icon]
  set servo S1 position to 0 degrees

forever
  if soil moisture level at pin P2 < 550 then
    show icon [yes icon]
  else
    show icon [no icon]
    play tone Middle C for 2 beat
    set servo S1 position to 180 degrees
    pause (ms) 1000
    set servo S1 position to 0 degrees
    pause (ms) 1000
```

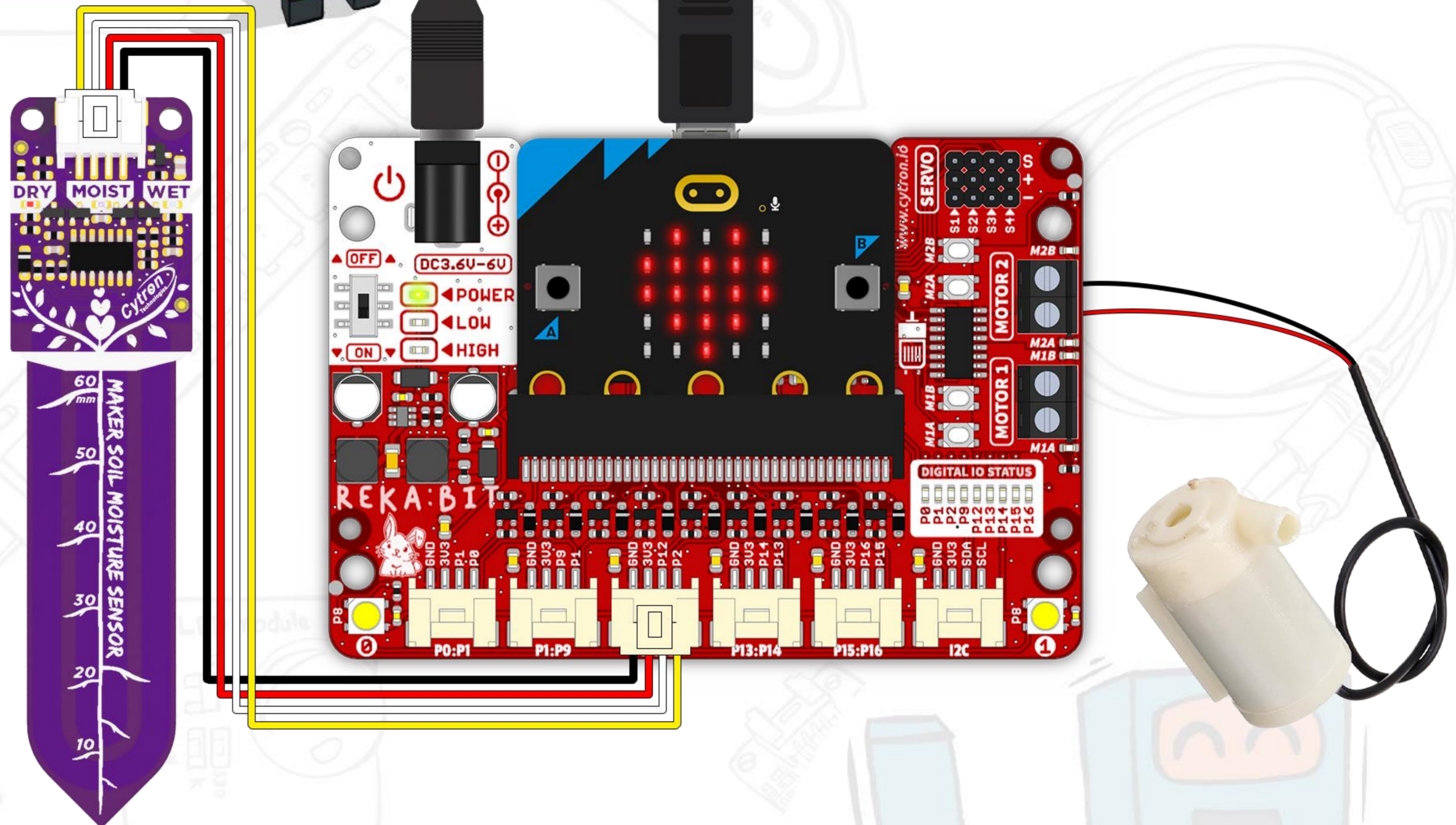


Project 3 : Auto Plant Watering Robot



An **auto plant watering robot** is a great helper to keep your plants alive and well even when you're away for days.

This robot will monitor the soil moisture level; and when the soil dries out, it activates the water pump to water the soil.



Components:

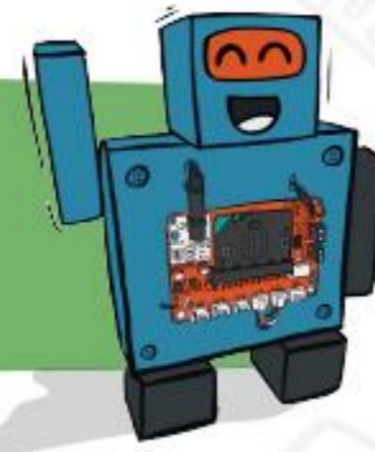
- REKA:BIT with micro:bit
- Soil moisture sensor
- Submersible water pump

Tools/Materials:

- Cardboard
- Scissors
- Cutter knife
- 2x Cable ties
- Hot glue gun

Adult supervision required when using sharp tools.

Project 3 : Auto Plant Watering Robot



Press Button A to display the current soil moisture reading.

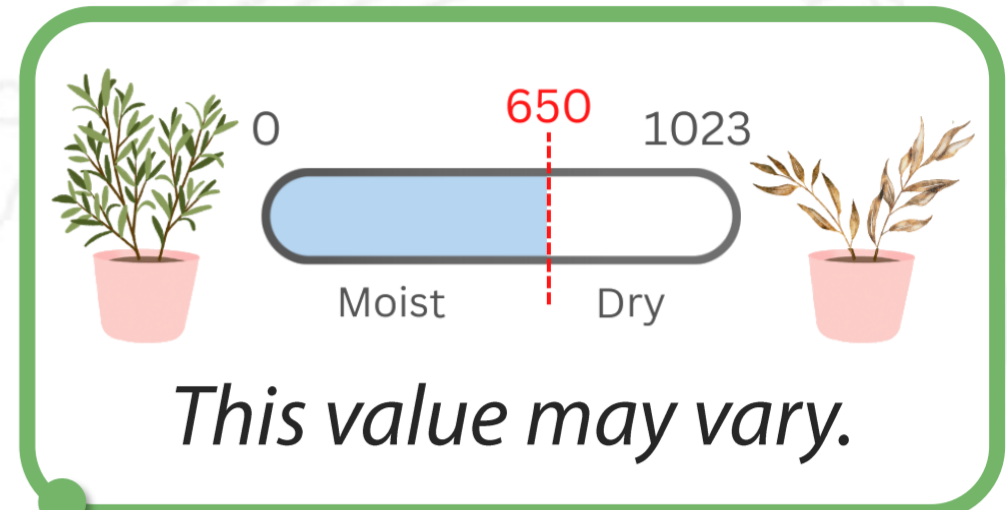
Always check the soil moisture level.
If the reading is above 650 (i.e. the soil is dry),

- i. light up the RGB pixels on REKA:BIT in RED,
- ii. display 'sad' icon
- iii. activate the water pump at M2 to pump water for 5 seconds,
- iv. and then stop the pump.

Else (if the soil is moist),

- i. light up the RGB pixels on REKA:BIT in GREEN
- ii. and display 'happy' icon.

```
forever
  if button A is pressed then
    show number soil moisture level at pin P2
  if soil moisture level at pin P2 > 650 then
    set all RGB pixels to red
    show icon sad
    run motor M2 forward at speed 128
    pause (ms) 5000
    brake motor M2
  else
    set all RGB pixels to green
    show icon happy
```



Change the value to adjust the duration to pump water.

Project 4:

Coin Eating Robot

servo motor (inside)

ultrasonic sensor

micro:bit-REKA:BIT

<https://link.cytron.io/rekabit-project-4>



Scan Me!

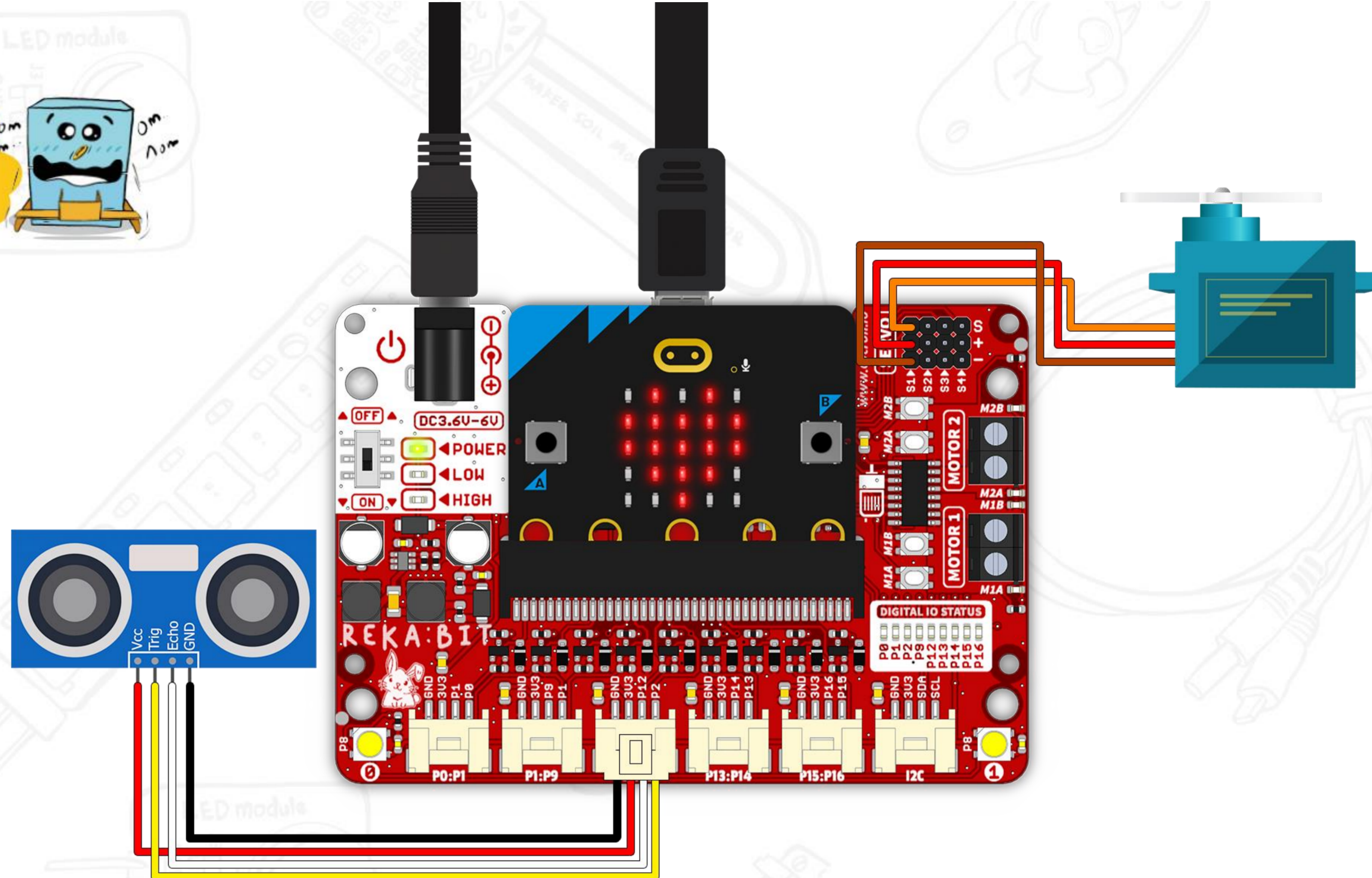


Project 4 : Coin Eating Robot



A **coin eating robot** is used to store small amounts of money.

When the robot 'sees' you placing a coin in its holder, it will open its mouth and swallow the coin. It's quite fascinating to watch!



Components:

- REKA:BIT with micro:bit
- Servo motor
- Ultrasonic sensor

Tools/Materials:

- Cardboard
- Scissors
- Cutter knife
- Pliers
- Iron wire
- Popsicle sticks
- Hot glue gun

 Adult supervision required when using sharp tools.

Project 4 : Coin Eating Robot



On start, set ultrasonic pins to (Trig:P2 | Echo:P12) and set servo position to 0° (standby mode).

Always check ultrasonic sensor reading.
If an object is detected at less than 10cm away,

- play 'power up' melody,
- set servo S1 position to 110° to open the robot's mouth and raise the holder to drop the coin, wait for 500ms, and then
- set servo S1 position back to 0° to close the mouth and return the holder to standby position.

```
on start
  set Ultrasonic pins to Trig:P2 | Echo:P12
  set servo S1 position to 0 degrees

forever
  if ultrasonic distance < 10 cm then
    start melody power up repeating once
    pause (ms) 500
    set servo S1 position to 110 degrees
    pause (ms) 500
    set servo S1 position to 0 degrees
    pause (ms) 1000
```

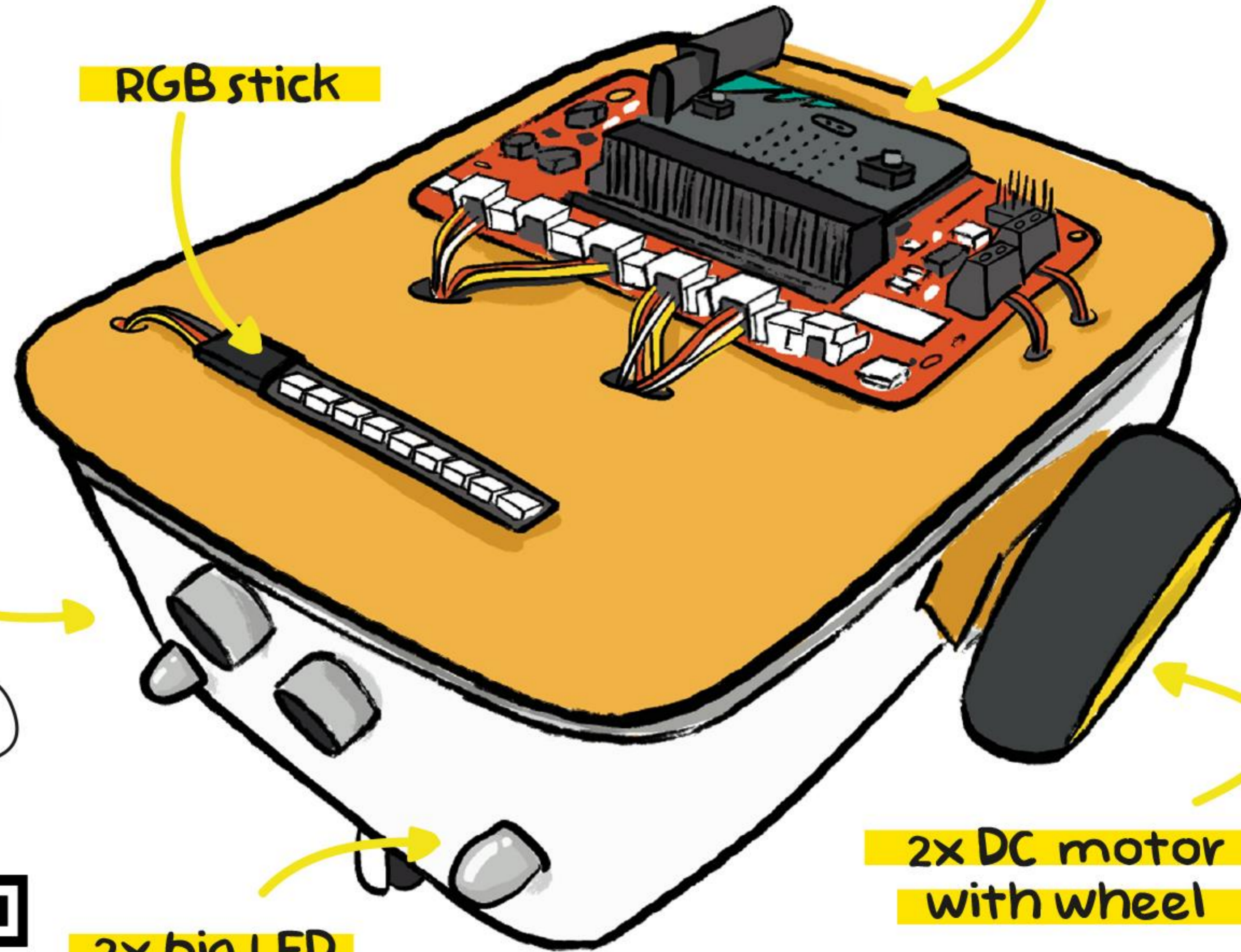
Project 5:

Mobile Robot Car

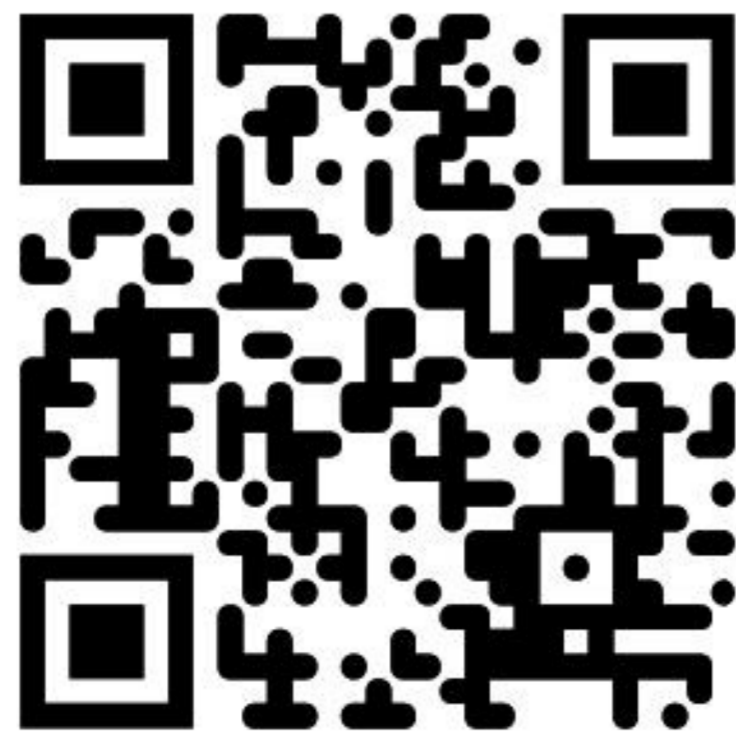
micro:bit-REKA:BIT

RGB stick

ultrasonic sensor



Scan Me!



2x big LED

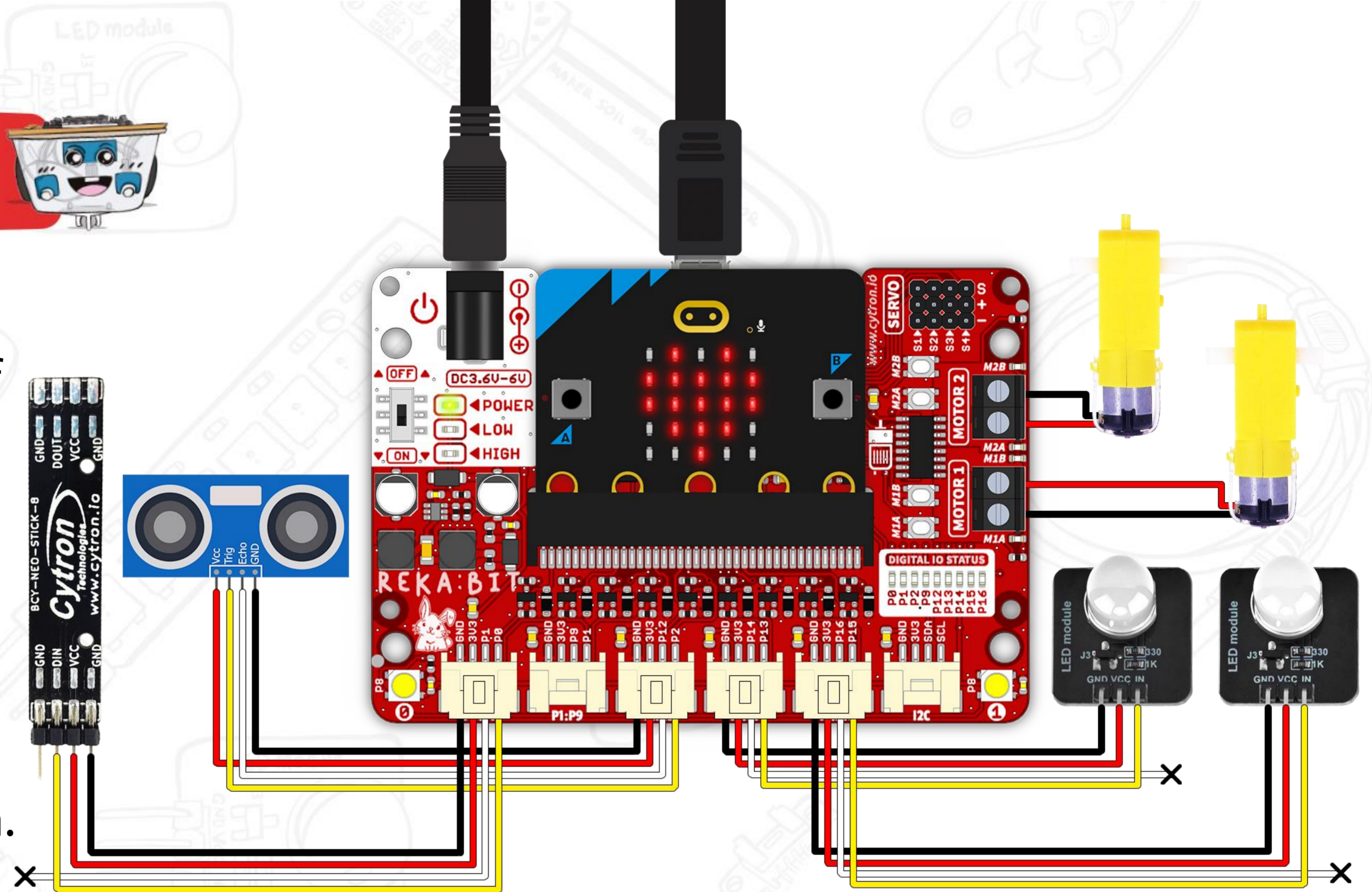
<https://link.cytron.io/rekabit-project-5>

Project 5 : Mobile Robot Car



A **mobile robot** is capable of moving around on its own and performing a variety of tasks.

Let's build a mobile robot that can move around freely, avoiding obstacles in its path.



Components:

- REKA:BIT with micro:bit
- Ultrasonic sensor
- 2x DC motor with wheel
- 2x Big LED
- RGB Stick

Tools/Materials:

- Plastic food container
- Cardboard
- Cutter knife
- 4x Cable ties
- Blu tack
- Hot glue gun

 Adult supervision required when using sharp tools.

Project 5 : Mobile Robot Car



On start, display a heart icon, set ultrasonic pins to (Trig:P2| Echo:P12) and RGB stick pin to P0, turn ON both big LEDs, and set variable 'Go' to 0 (standby mode).

```
on start
  show icon [heart icon]
  set Ultrasonic pins to Trig:P2 | Echo:P12
  set RGB Stick at pin P0
  set Big LED at pin P13 to on
  set Big LED at pin P15 to on
  set Go to 0
```

Press Button A to set variable 'Go' to 1 (moving mode).

```
on button A pressed
  set Go to 1
```

Press Button B to set variable 'Go' to 0 (standby mode).

```
on button B pressed
  set Go to 0
```

Press Buttons A & B at the same time to 'toggle' the big LEDs.

```
on button A+B pressed
  toggle Big LED at pin P13
  toggle Big LED at pin P15
```

Always check 'Go' variable. If it is 1, run 'moving mode'.
Moving mode: Always check ultrasonic sensor. If obstacle is detected <15cm away, STOP and light up RGB stick in RED. Then turn right for 1200ms to steer away from the obstacle.
Else (if no obstacle is detected), keep moving forward and light up RGB stick in GREEN.
Else (if variable 'Go' is not 1), then run 'standby mode'.
Standby mode: Stop and light up RGB stick in rainbow colours).

```
forever
  if Go = 1 then
    if ultrasonic distance < 15 cm then
      brake motor all
      set RGB Stick to red
      pause (ms) 500
      run motor M1 forward at speed 80
      run motor M2 backward at speed 80
      pause (ms) 1200
      brake motor all
    else
      run motor all forward at speed 128
      set RGB Stick to green
    else
      brake motor all
      show rainbow on RGB Stick
```

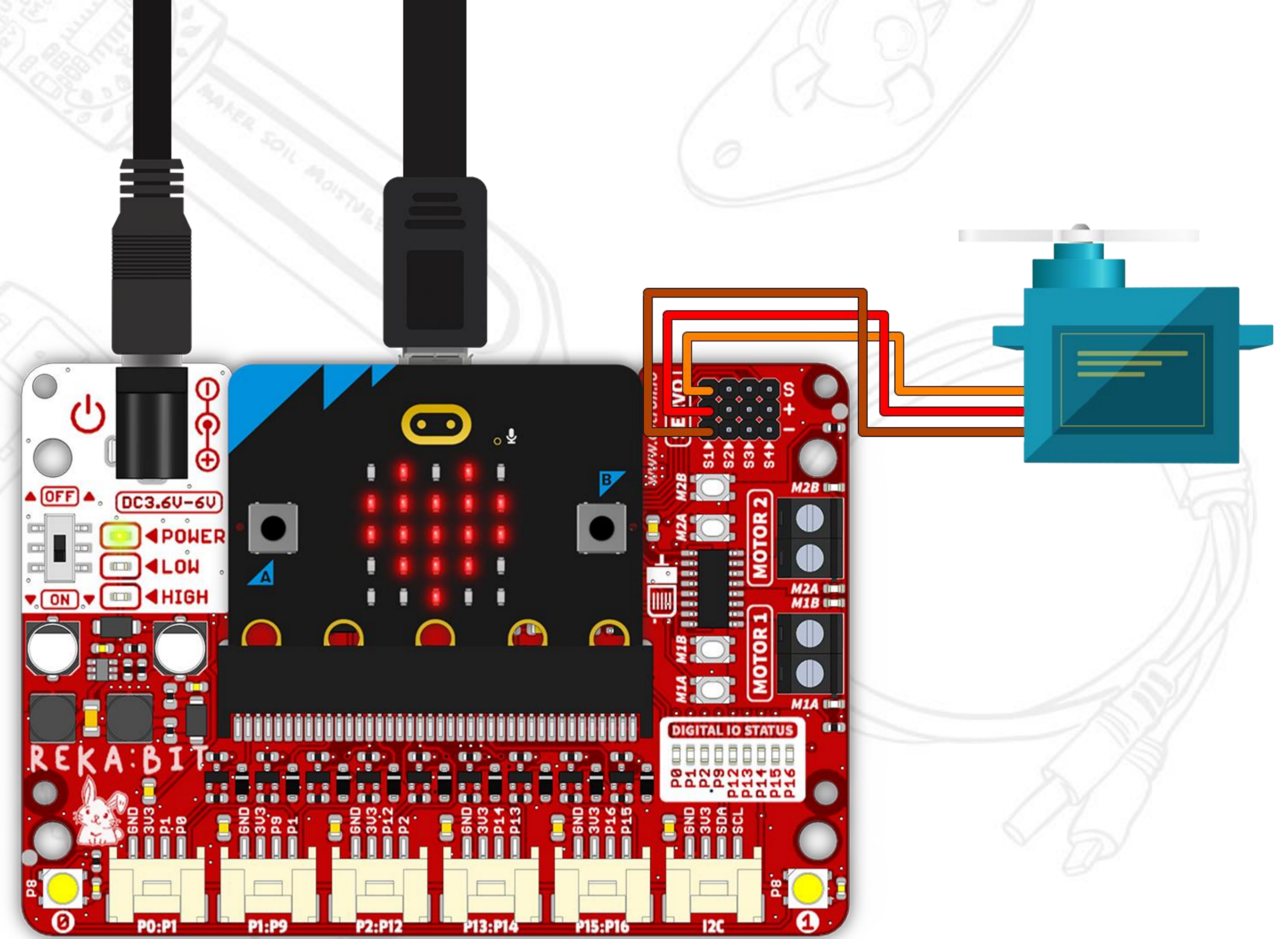
Servo Motor

The **servo motor** included in this kit is also known as a RC (radio control) servo. The operating voltage is between 3.0V to 6.0VDC.

The operating angle range is between 0° to 180°, i.e. you can control the servo motor to rotate to your desired angle within that range.

REKA:BIT expansion board can support up to 4 servo motors at the same time. To connect a servo motor, plug in the cable to the servo port on the upper right corner of REKA:BIT board as shown.

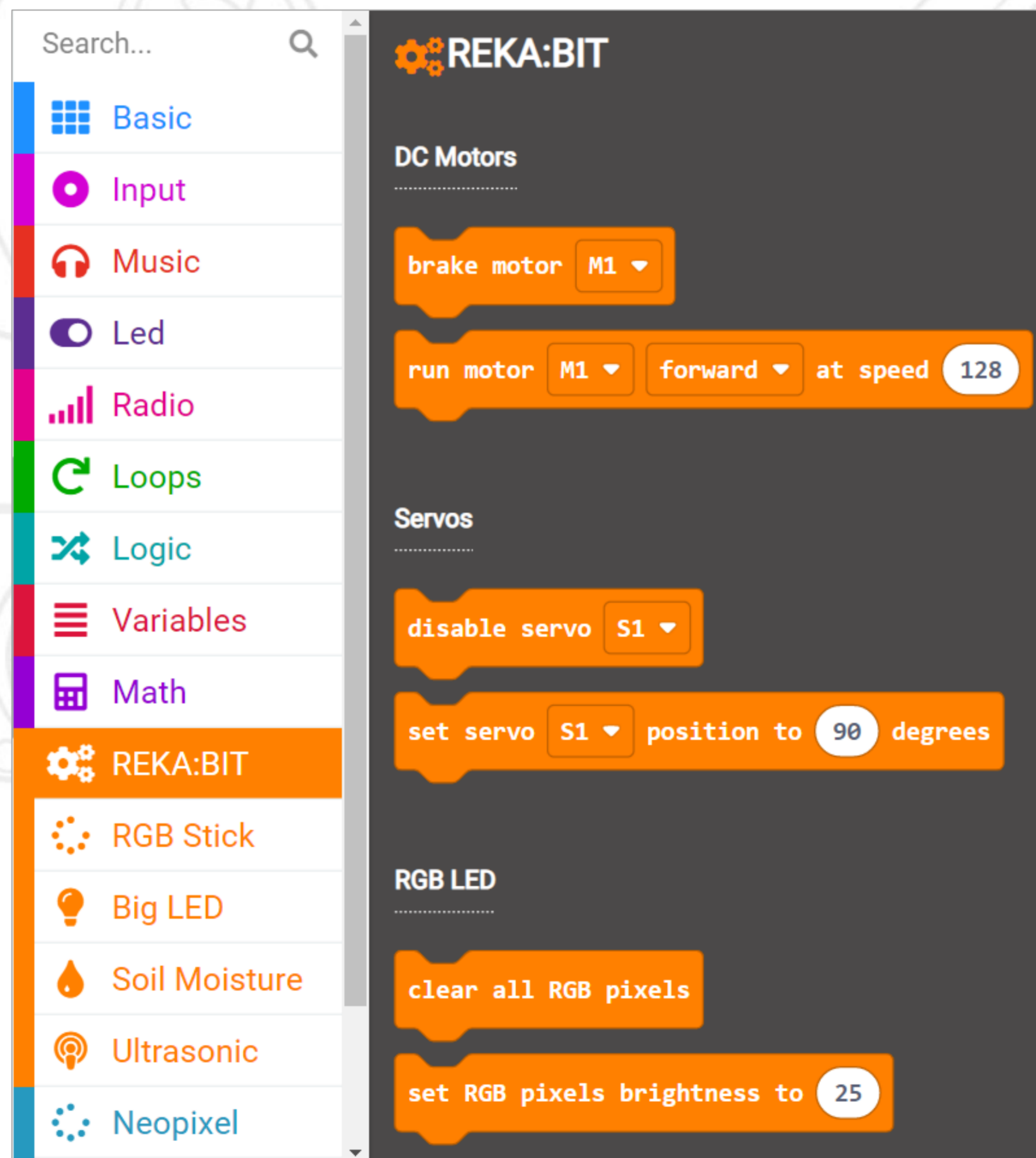
The length of the servo cable is ~20cm. A servo extension cable is provided should you need to extend its length.



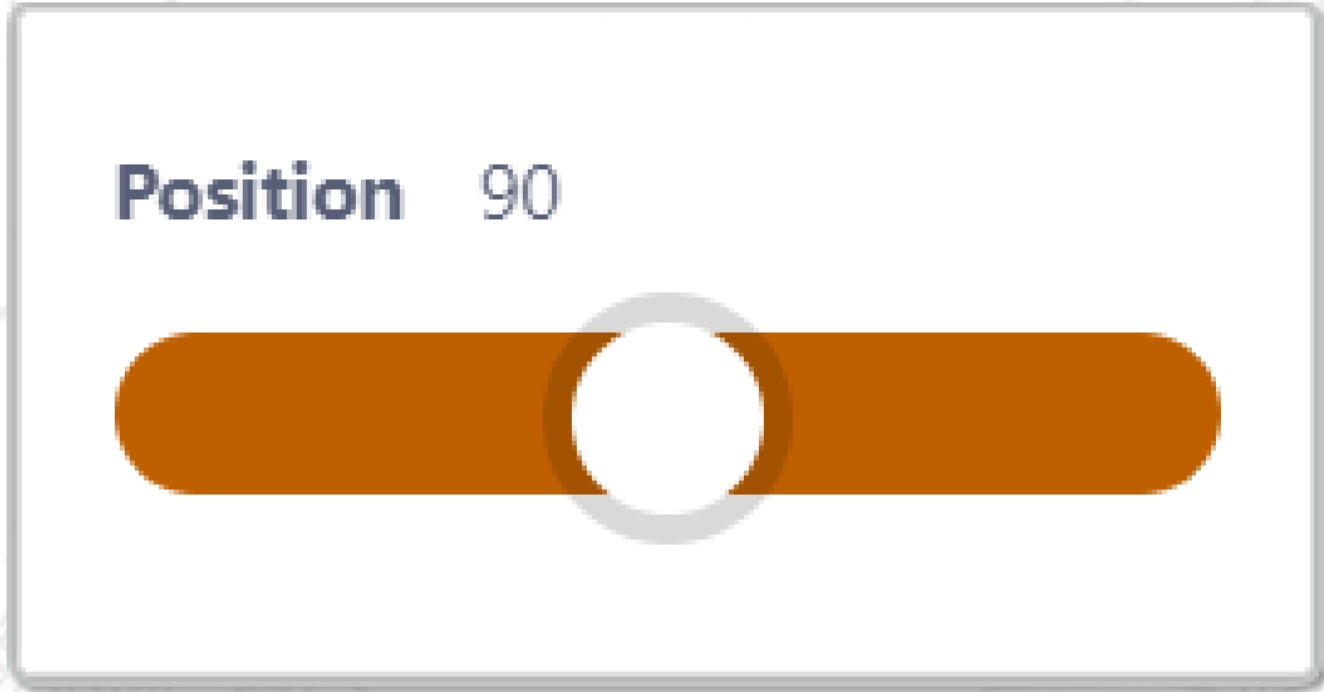
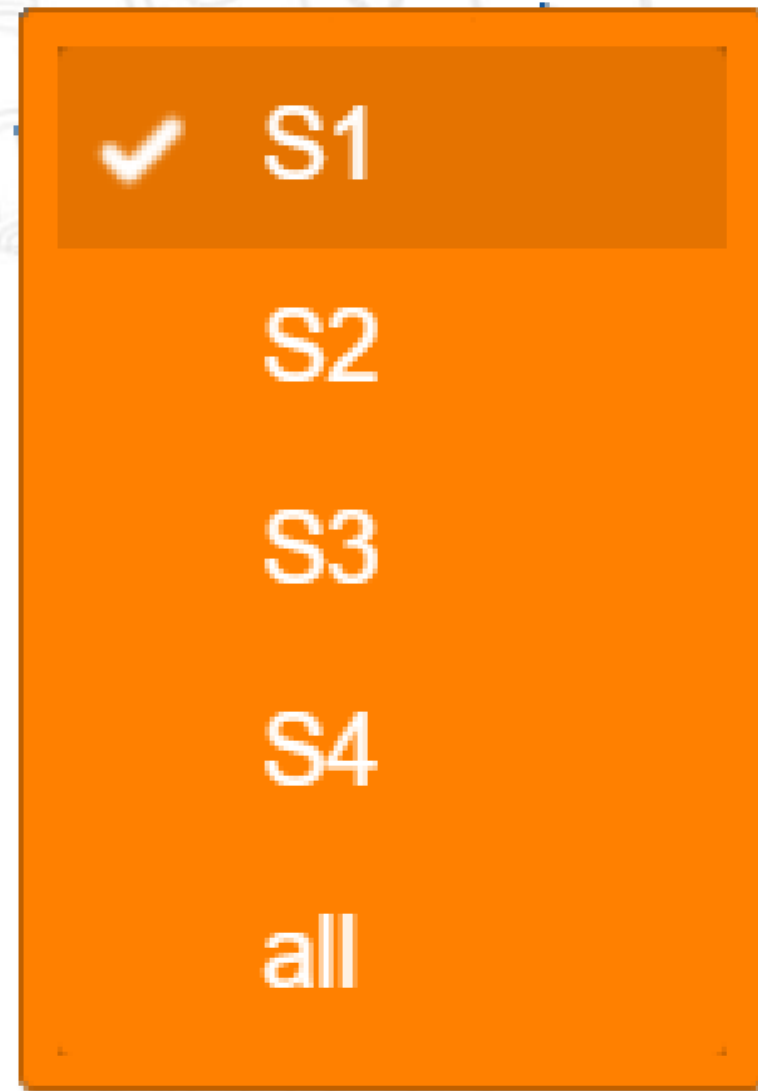
REKA:BIT Servo Port	Extension Cable	Servo Motor Cable
s (Signal)	White	Orange
+ (Power)	Red	Red
- (Ground)	Black	Brown

Servo Motor

You can easily program connected servo motor(s) using blocks from REKA:BIT RBT Project Kit Extension: **[REKA:BIT-Servos]** category drawer.



Use this block to disable selected servo motor(s) when not in use. This will prevent the servo(s) from twitching.



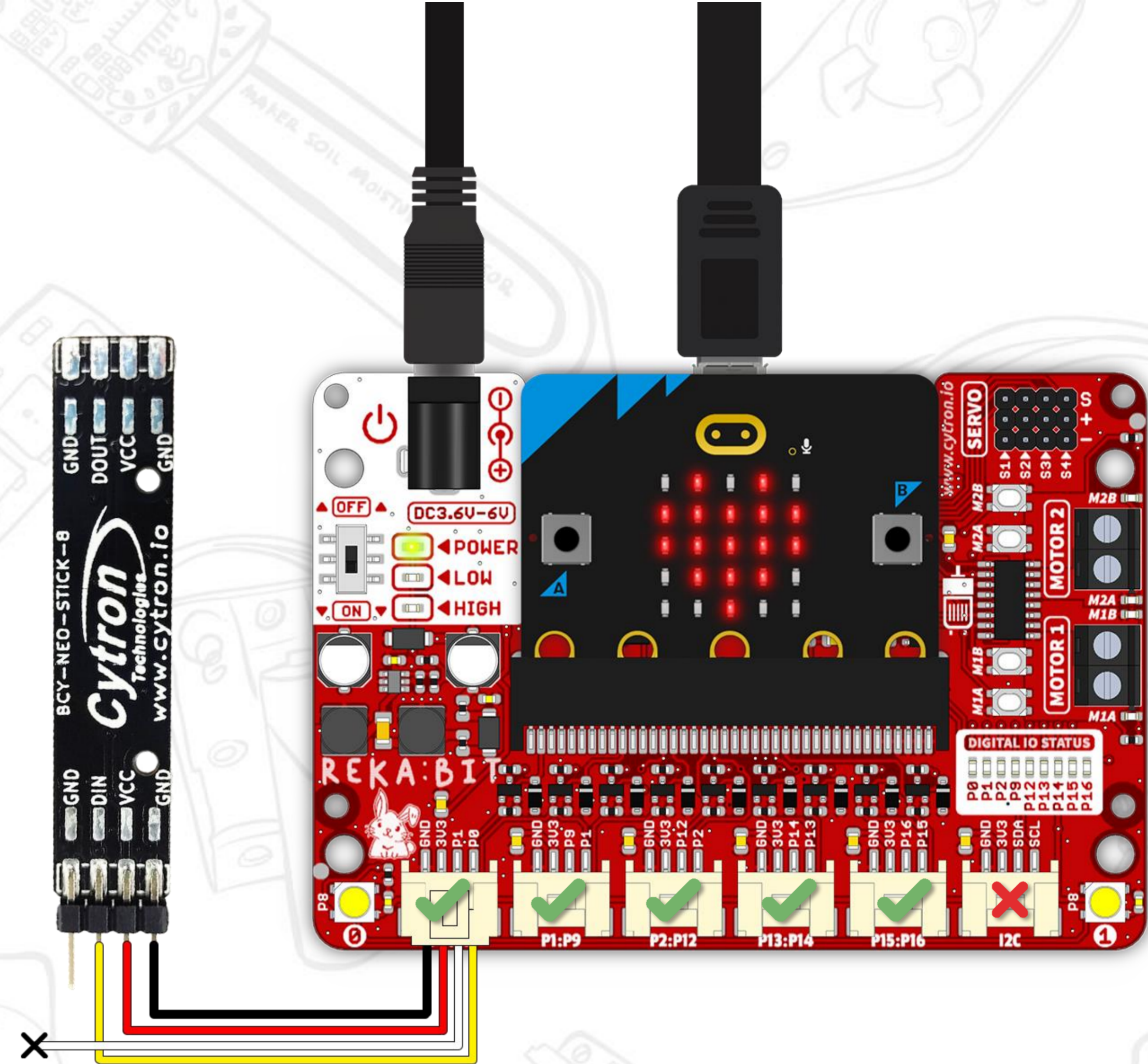
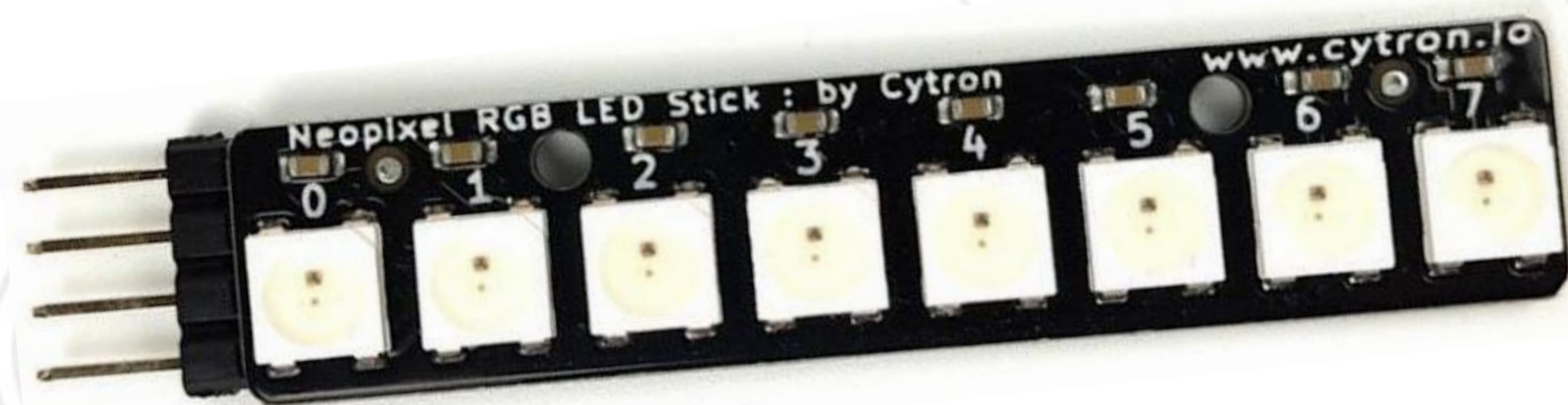
Set selected servo motor(s) to turn to this angle. Range: 0° to 180°.

Select to control each servo motor (S1-S4) individually or all connected servos at the same time.

RGB stick

This component comes as a single stick with **8 addressable RGB LEDs**. You can program the RGB LEDs to light up in different colours.

Each RGB LED is assigned an identification number (0-7). Use this number to program each RGB LED individually.



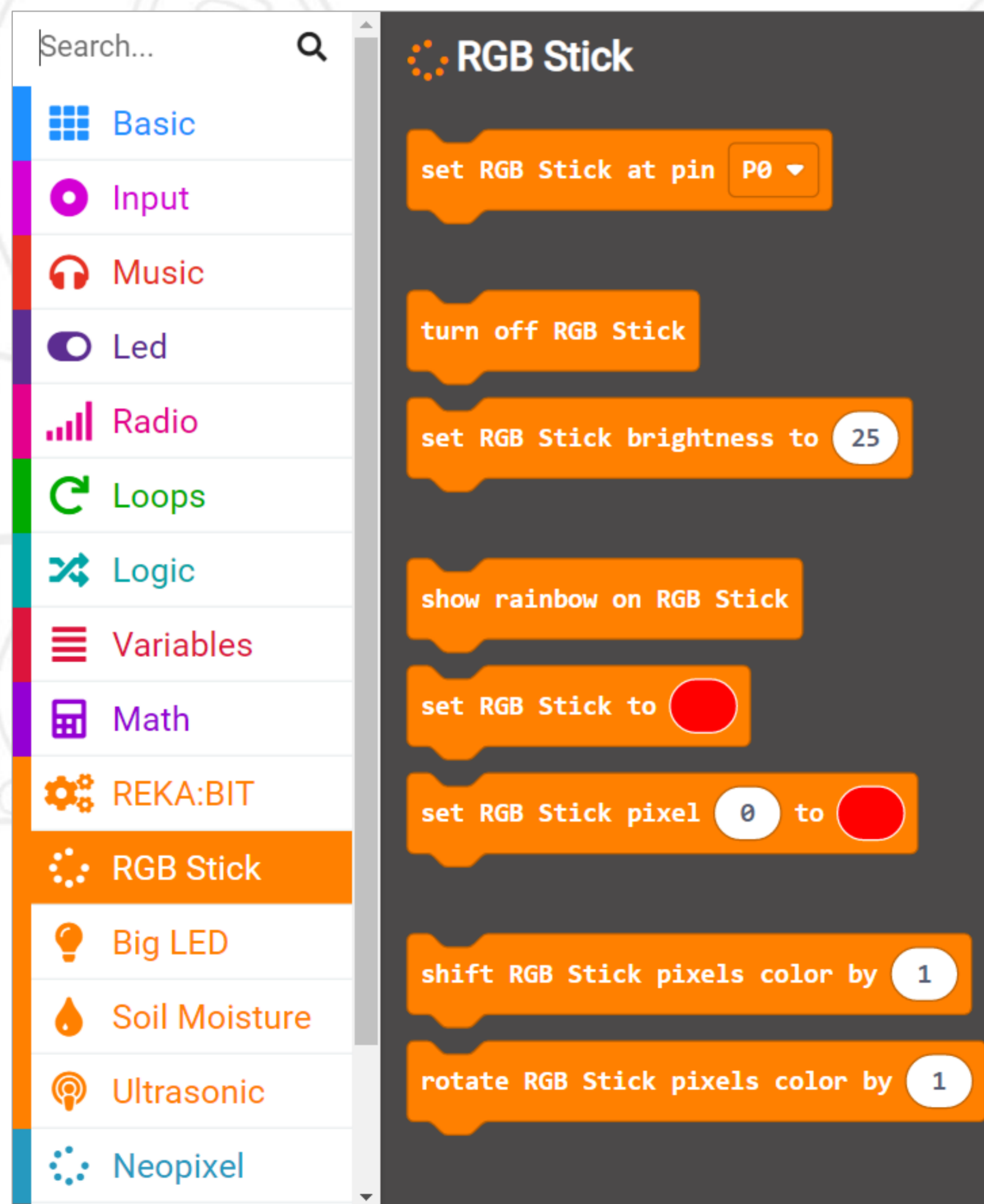
You can connect the RGB stick to any IO port on REKA:BIT using the Grove to female header cable provided.

*Leave the white wire unconnected.

REKA:BIT IO Port					Grove Cable	RGB Stick
GND					Black	GND (ground)
3V3					Red	VCC (power)
-					White	Not connected
P0	P1	P2	P13	P15	Yellow	DIN (digital input)

RGB stick

You can easily program the RGB stick using blocks from REKA:BIT RBT Project Kit Extension: **[RGB Stick]** category drawer.



set RGB Stick at pin P0

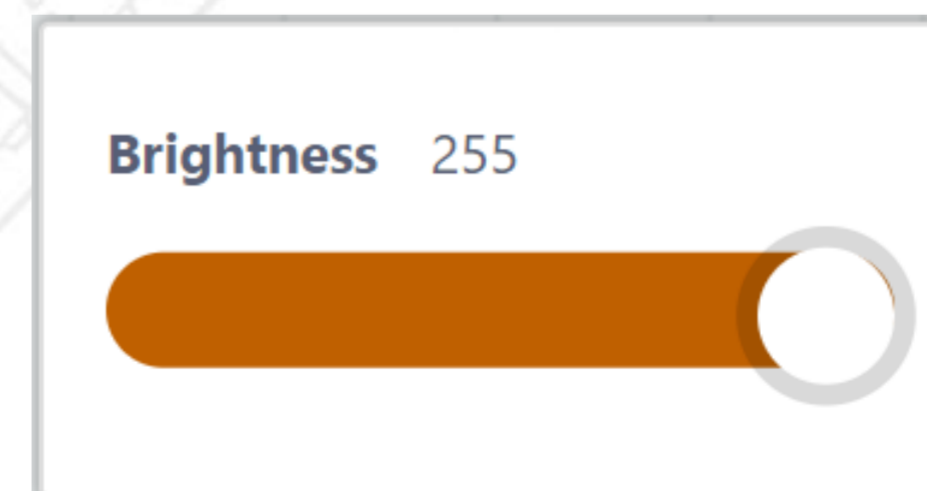
- ✓ P0
- P1
- P2
- P13
- P15

To program the RGB stick, you need to add this to [on start] block and set the pin number to match the port on REKA:BIT to which you connected the RGB stick.

turn off RGB Stick

To turn OFF all RGB LEDs

set RGB Stick brightness to 255



Use this block to adjust the brightness level of the RGB LEDs. The range is between 0 and 255.

RGB Stick

show rainbow on RGB Stick

Program the stick to light up in rainbow colours.

set RGB Stick to

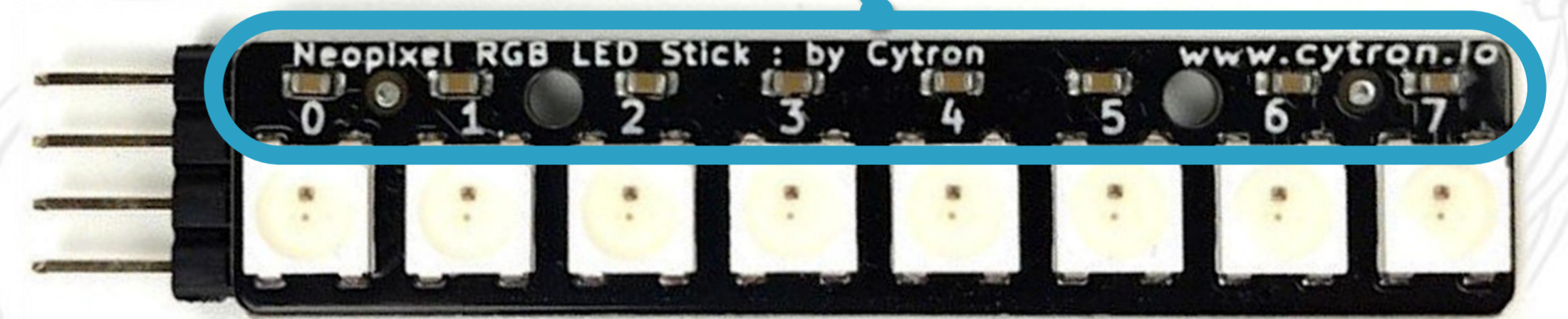


Program the RGB stick to light up in the selected colour.

red 255 green 255 blue 255

The RGB LEDs produce colours by combining red, green, and blue light in varying intensities. If the colour you want is not included in the selection, you can manually set it by adjusting the brightness, or intensity of red, green and blue light.

set RGB Stick pixel 0 to



Use this block to program each individual RGB LED (labelled 0 to 7) to light up in the selected colour.

rotate RGB Stick pixels color by 1

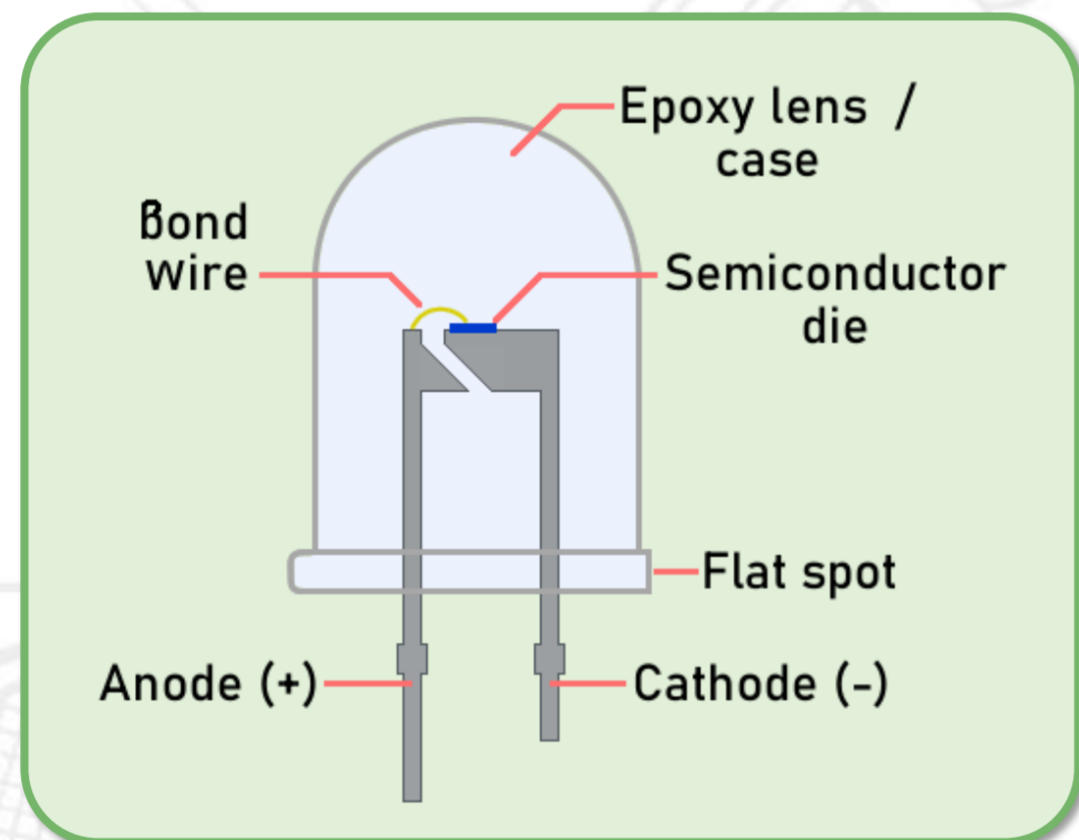
shift RGB Stick pixels color by 1

To rotate or shift the lights around to create different colour patterns (e.g. running light effect).

Big LED

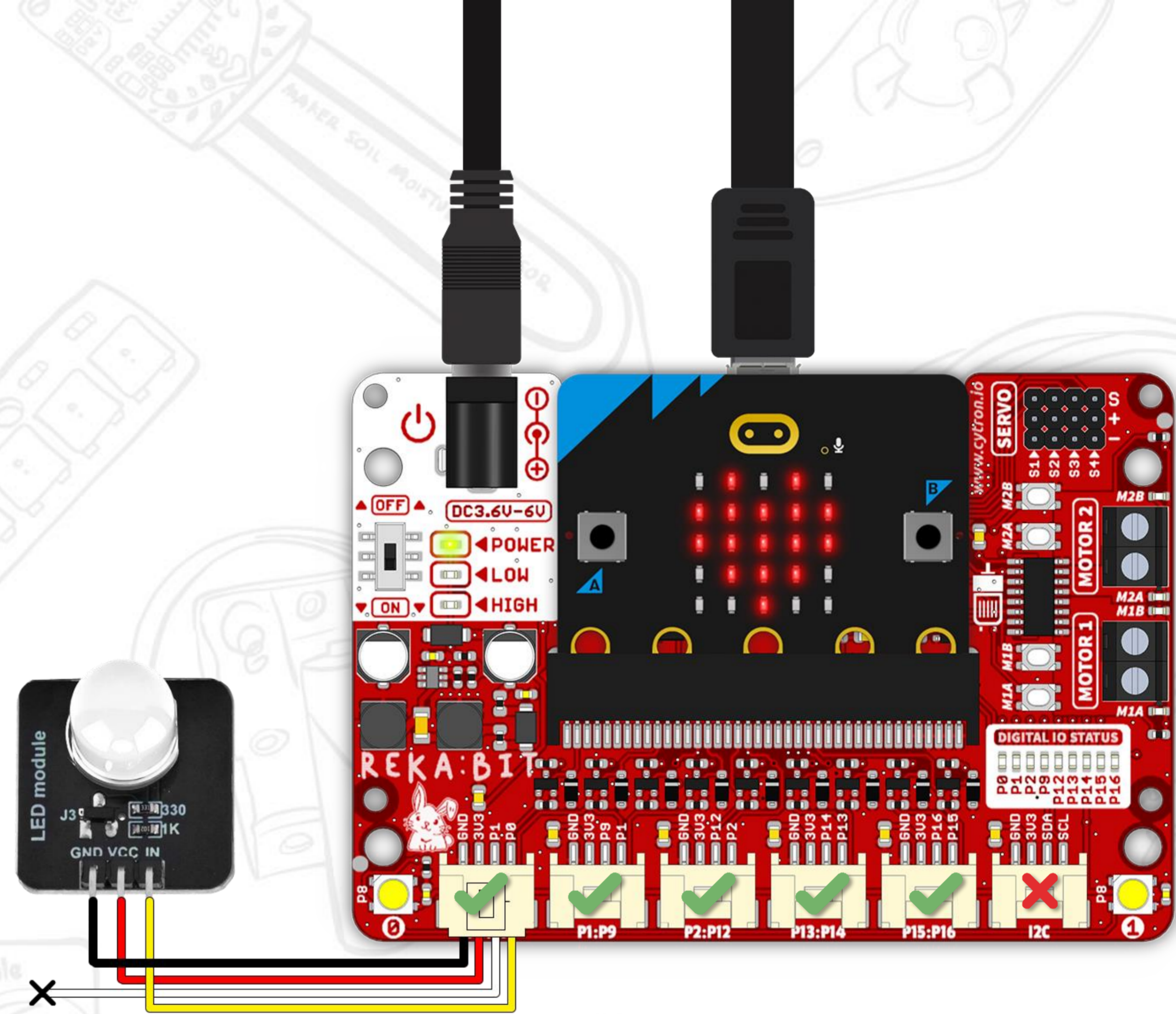
A **light-emitting diode (LED)** is a semiconductor device that produces light when current flows through it.

Observe the big LED and see if you can spot the parts as shown in this diagram :



You can connect the LED module to any IO port on REKA:BIT using the Grove to female header cable provided.

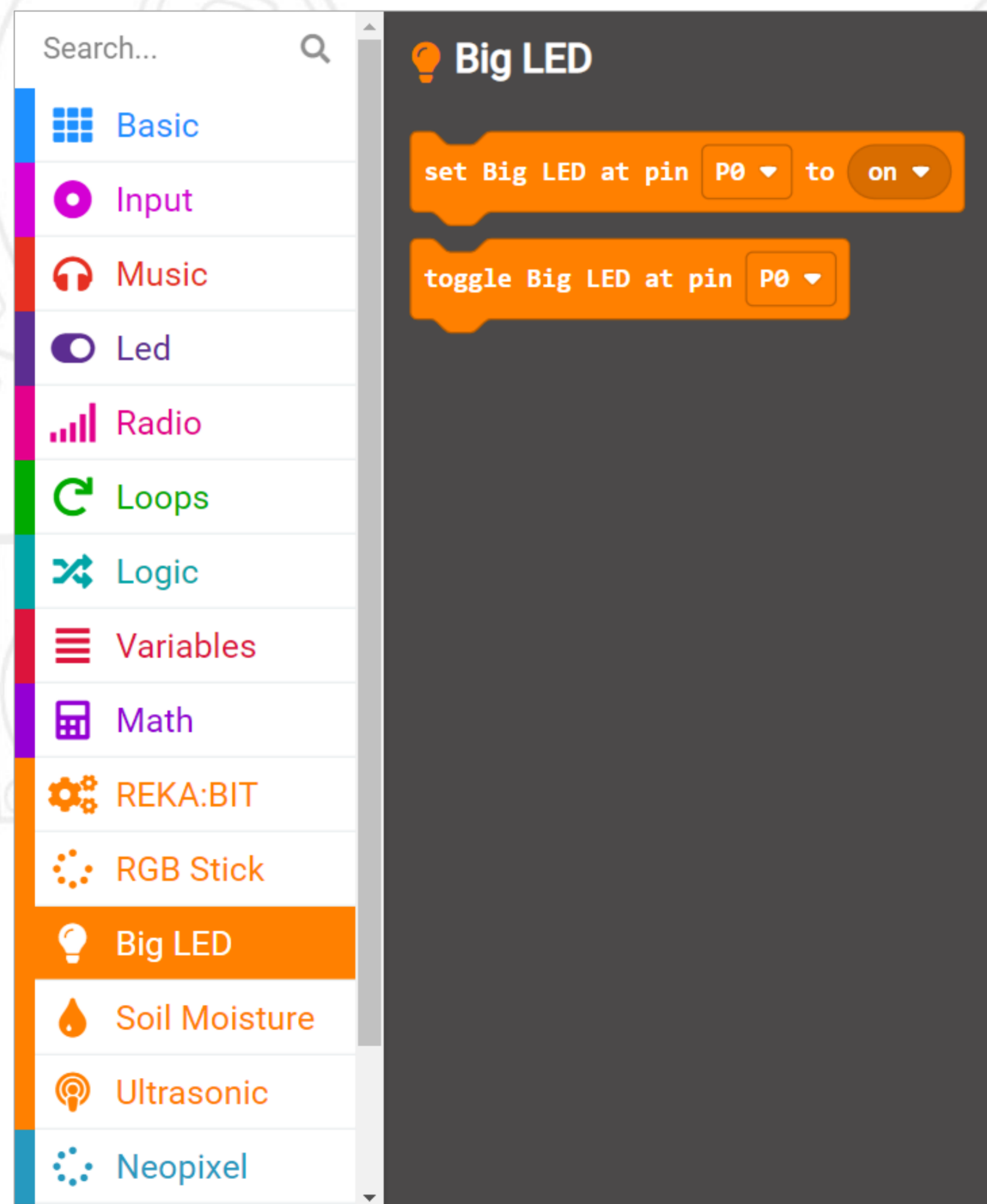
*Leave the white wire unconnected.



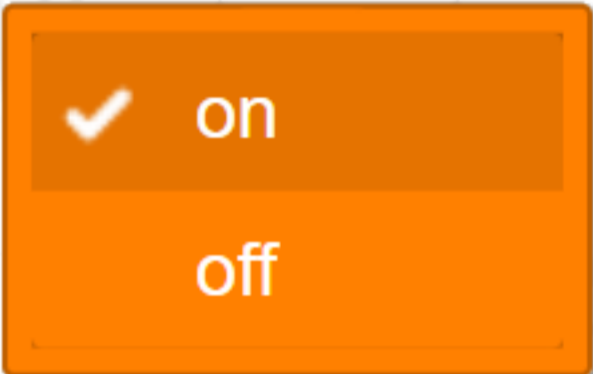
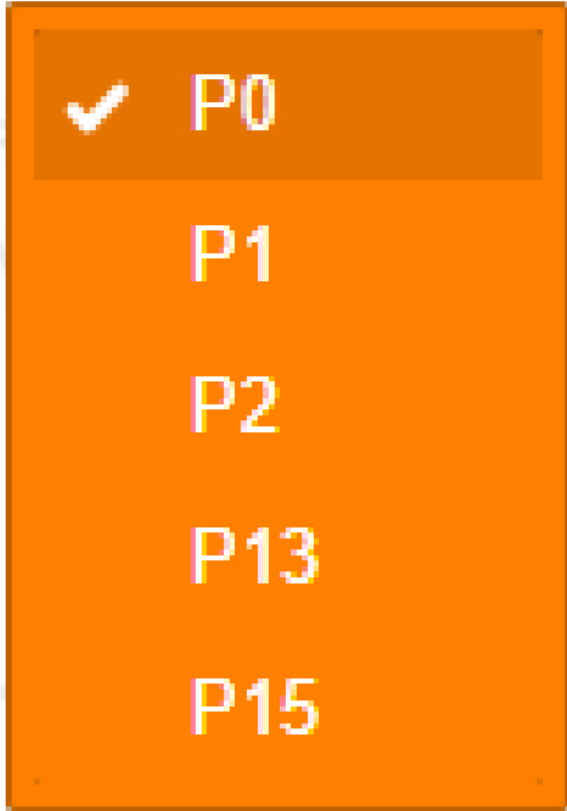
REKA:BIT IO Port					Grove Cable	Big LED Module
GND					Black	GND (ground)
3V3					Red	VCC (power)
-					White	Not connected
P0	P1	P2	P13	P15	Yellow	IN (input)

Big LED

You can easily program the big LED using blocks from REKA:BIT RBT Project Kit Extension: **[Big LED]** category drawer.



Set the pin number to match the port on REKA:BIT to which you connected the LED module.



Select to turn ON (or OFF) the LED.



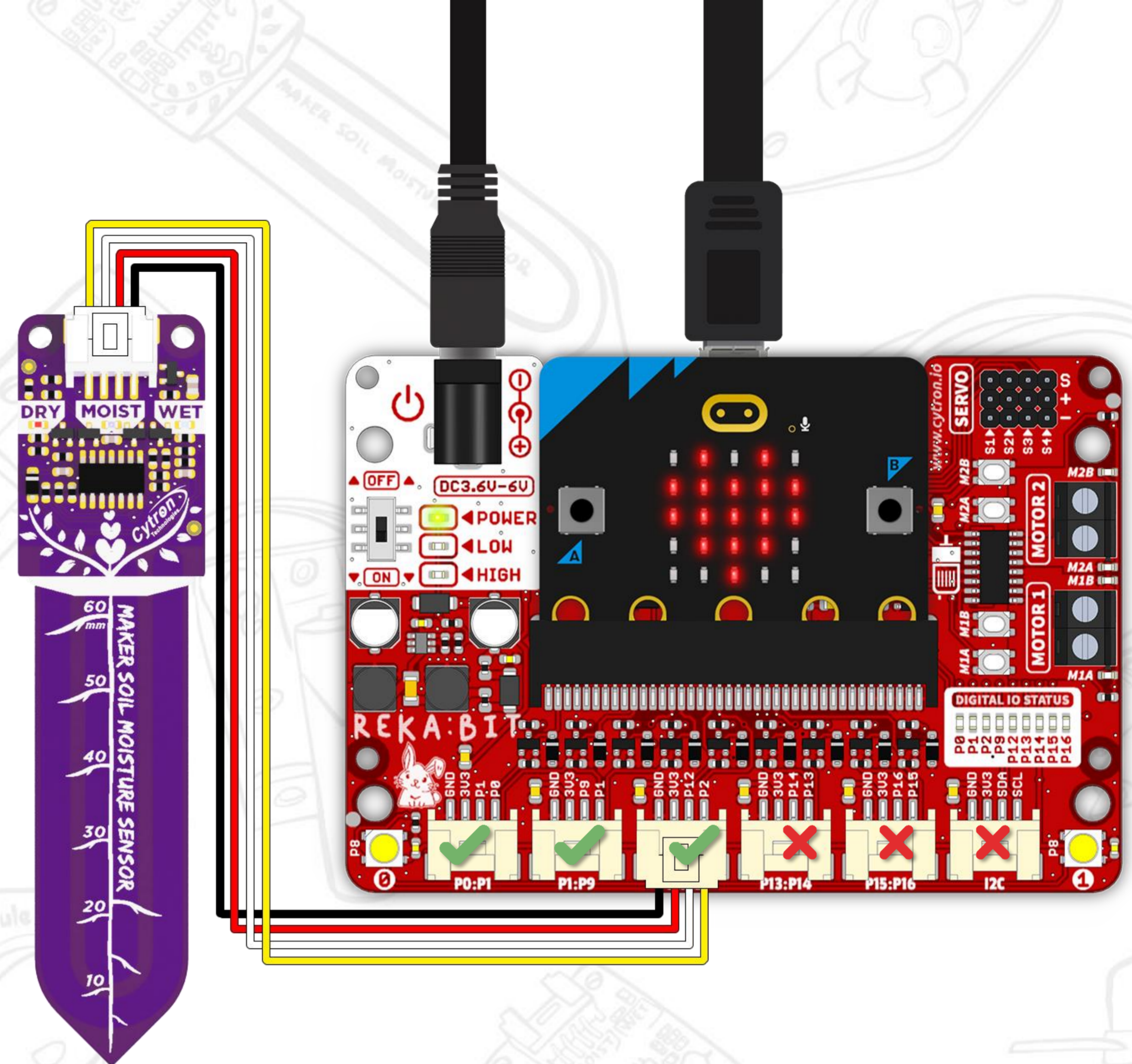
To "toggle" means to switch from one state to another. If the current state is ON, then it will switch to OFF; and vice versa. Thus, when we toggle an LED repetitively, the LED will appear to be blinking.

Soil Moisture Sensor

This **soil moisture sensor** measures moisture level using capacitive sensing. The higher the water content of the soil, the lower the output voltage. Therefore, you can expect to get a relatively lower reading when the probe is inserted in wet soil, and higher reading when the soil is dry.

You can also use this sensor to detect presence of water or measure the water level in a container.

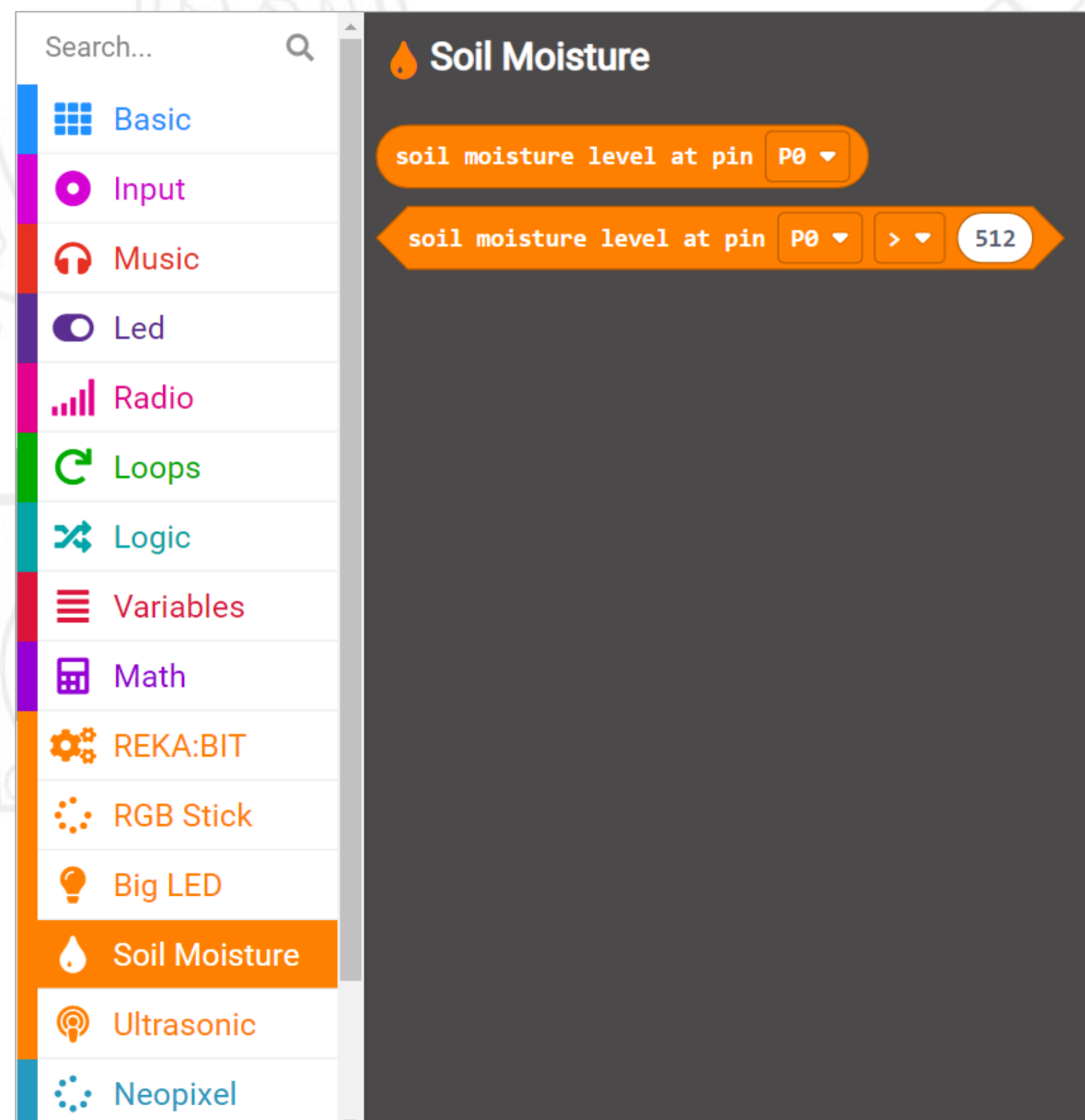
The sensor gives an analog output. You can only connect the soil moisture sensor to analog ports (P0/P1/P2) on REKA:BIT.



REKA:BIT IO Port			Grove Cable	Soil Moisture Sensor
GND			Black	GND (ground)
3V3			Red	VCC (power)
P1	P9	P12	White	DIS (disable pin)
P0	P1	P2	Yellow	OUT (analog output)

Soil Moisture Sensor

You can easily program the soil moisture sensor using blocks from REKA:BIT RBT Project Kit Extension: **[Soil Moisture]** category drawer.



soil moisture level at pin P0 ▾

Use this block to get reading of the soil moisture level. Set the pin number to match the port on REKA:BIT to which you connected the soil moisture sensor.

✓ P0
P1
P2

Threshold value

soil moisture level at pin P0 ▾ > ▾ 512

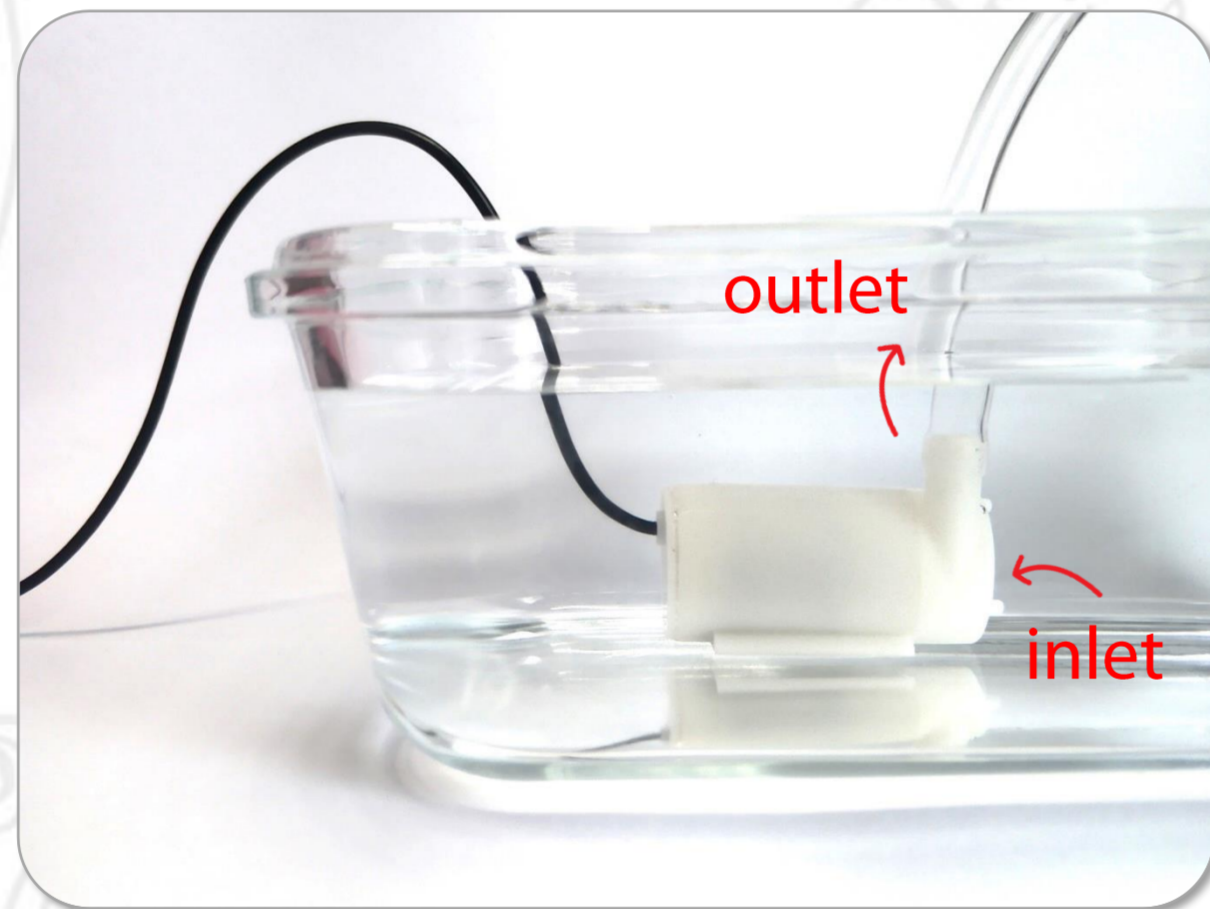
Use this block to compare soil moisture level reading with a desired threshold; it returns 'true' or 'false'.

✓ P0
P1
P2

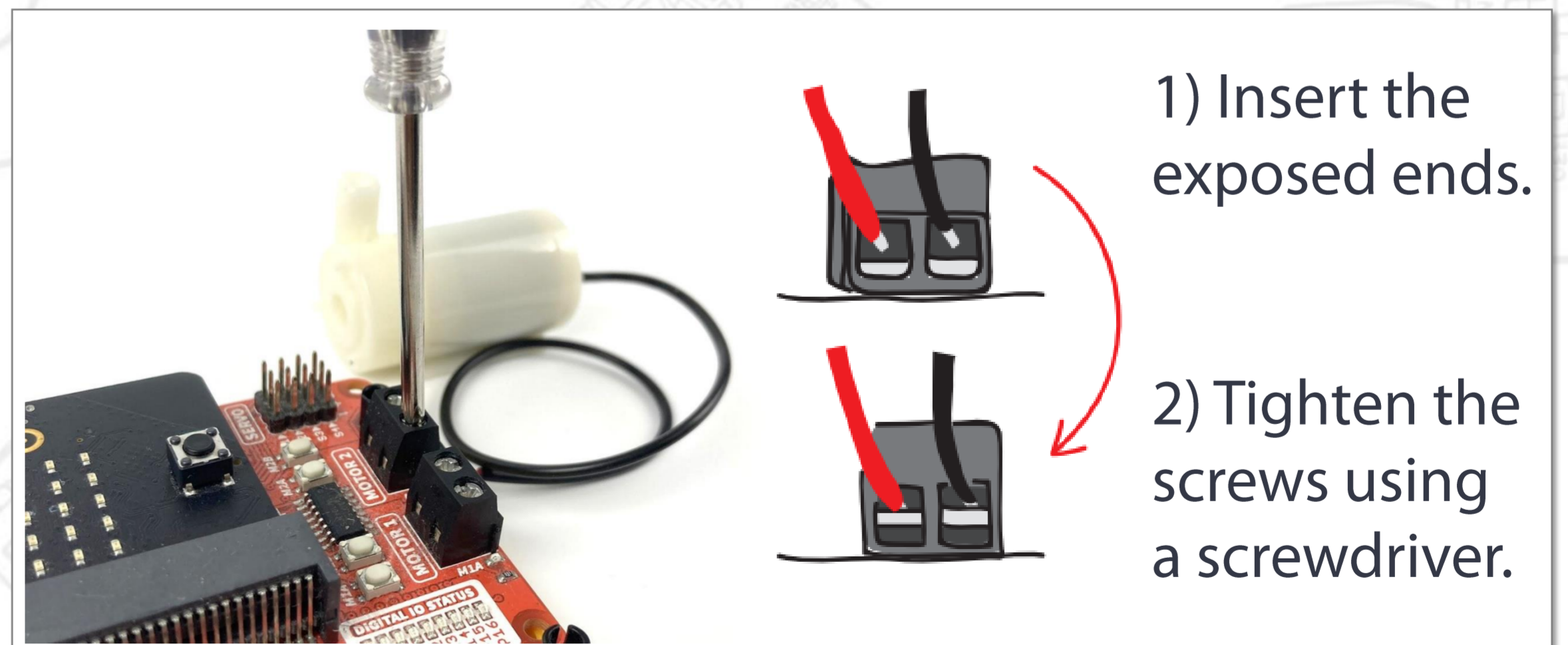
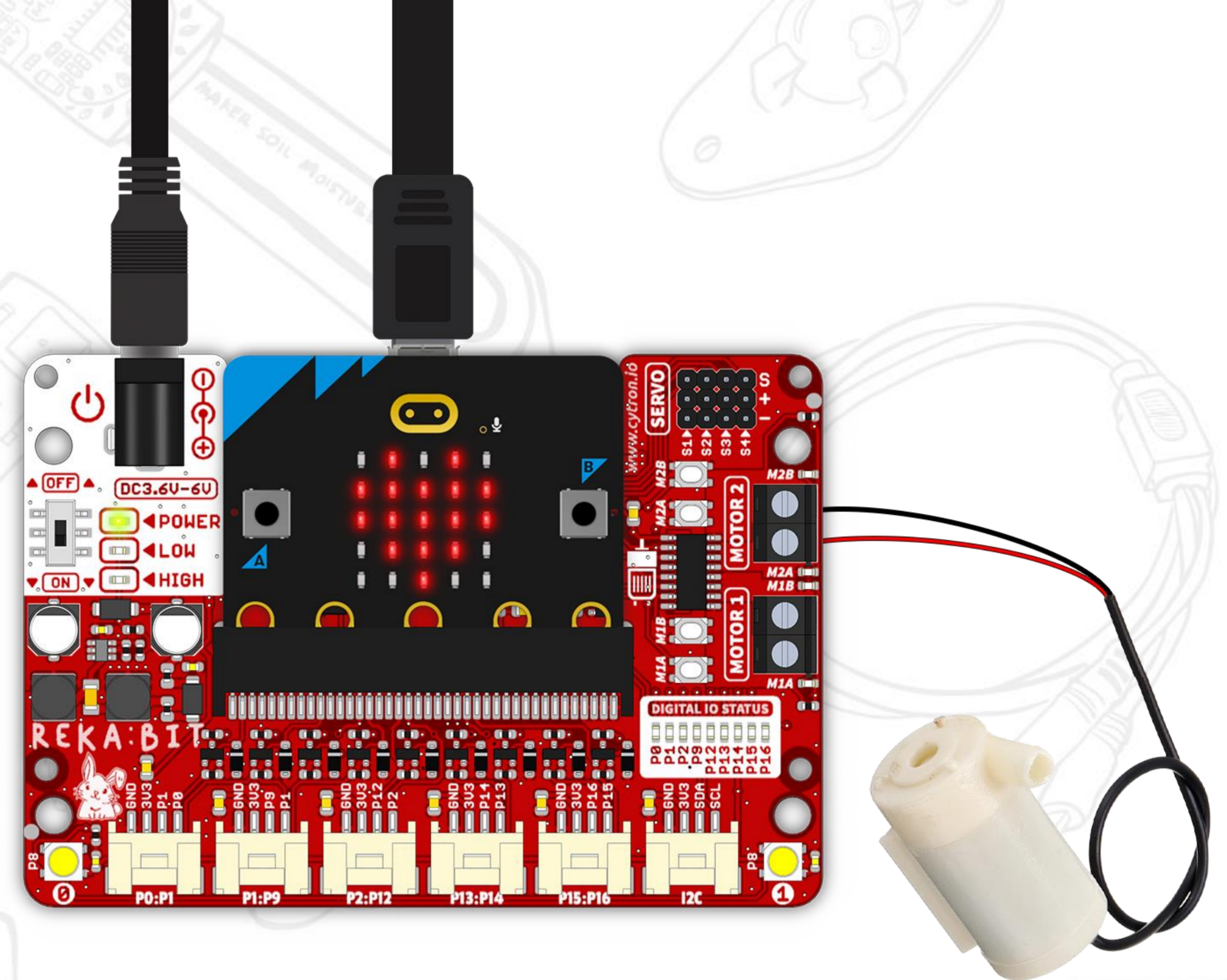
✓ >
<

Submersible Water Pump

This **submersible water pump** comes with a 1-meter rubber tube. You need to connect the rubber tube to the pump outlet and then fully submerge the water pump in (a container filled with) water for it to work.



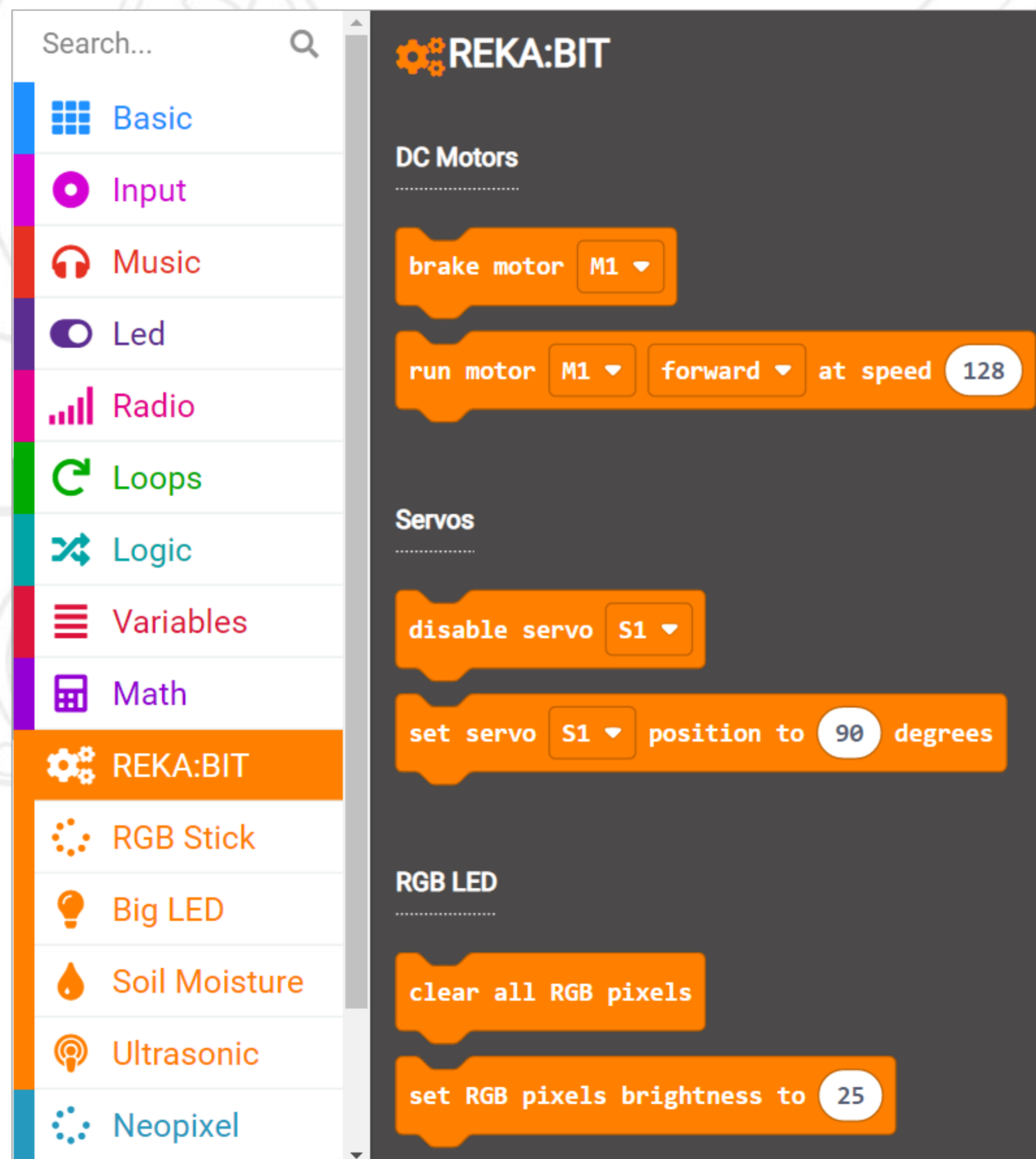
You can connect the pump to either terminal (MOTOR 1 or MOTOR 2) on REKA:BIT. The water pump is not polarity sensitive; thus, the red/black wire connections can be either way round.



⚠️ Clamp the exposed wire lead, and not the insulator.

Submersible Water Pump

You can easily program the water pump using blocks from REKA:BIT RBT Project Kit Extension: **[REKA:BIT - DC Motors]** category drawer.



brake motor M1

Use this block to stop the motor, i.e. stop pumping water.

Use the block below to activate the water pump.

run motor M1 forward at speed 128

M1
M2
all

forward
backward

Speed 128

Select (M1 or M2) to match the channel on REKA:BIT to which you connect the water pump. Select 'all' if you want to control two connected pumps at the same time.

Spinning direction. This water pump can work in either direction.

This controls the pumping speed, i.e. the flow rate. The range is between 0 and 255.

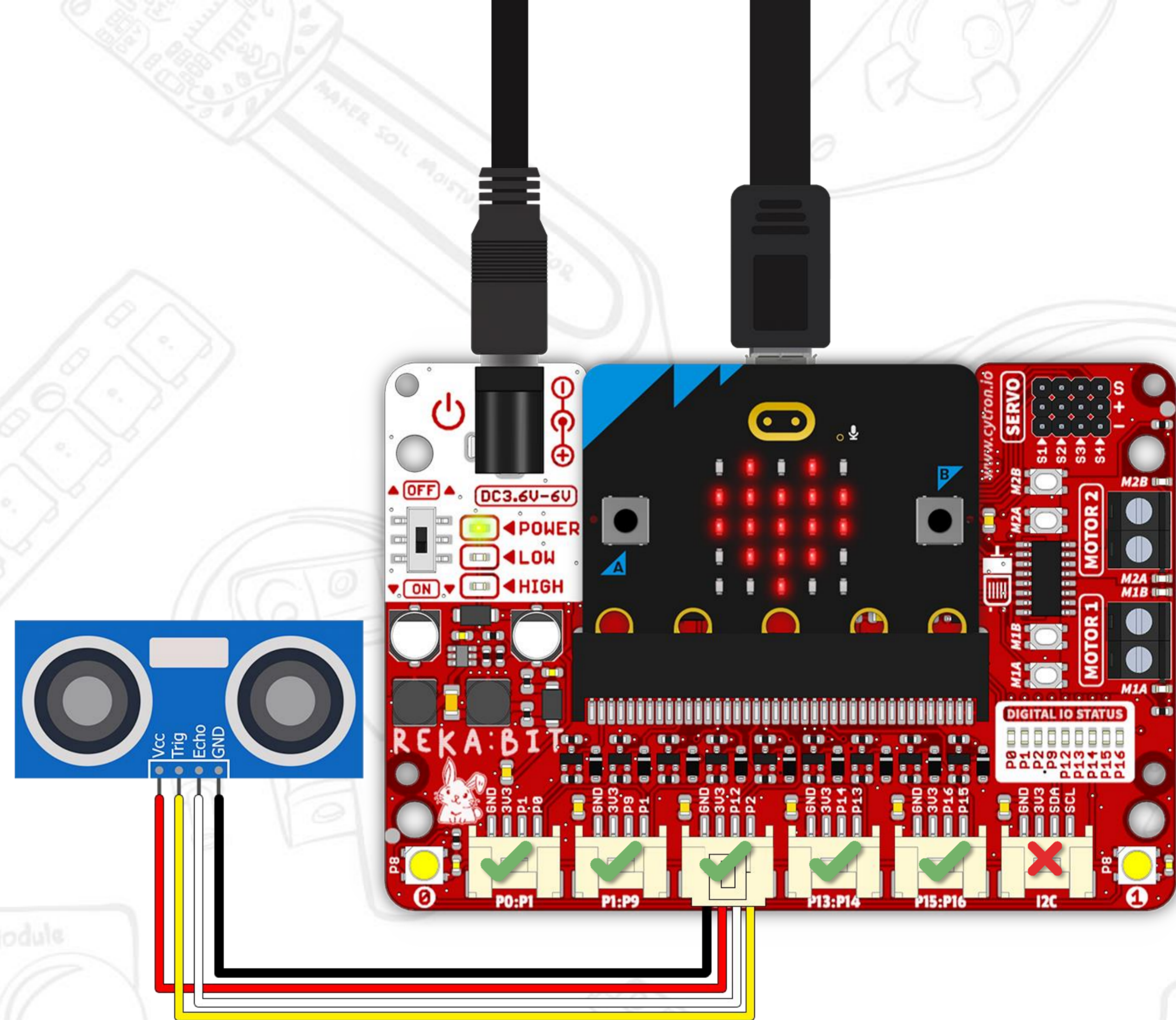
Ultrasonic Sensor

Ultrasonic sensors are used to detect obstacles and measure distances.

An ultrasonic sensor is made up of two main parts - a transmitter and a receiver. The transmitter emits an ultrasound wave. If there is an object blocking its path, the ultrasound wave will be reflected back towards the receiver.

The operating voltage of the ultrasonic sensor in this kit is between 3.0V and 5.5V. It provides non-contact detection ranging from 2cm to 300cm away.

You can connect the sensor to any IO port on REKA:BIT using the Grove to female header cable provided.



REKA:BIT IO Port					Grove Cable	Ultrasonic Sensor
GND					Black	GND (ground)
3V3					Red	VCC (power)
P1	P9	P12	P14	P16	White	Echo (echo)
P0	P1	P2	P13	P15	Yellow	Trig (trigger)

Ultrasonic Sensor

You can program the ultrasonic sensor using blocks from REKA:BIT RBT Project Kit Extension: **[Ultrasonic]** category drawer.

To program the ultrasonic sensor, you need to add this to [on start] block and set the pin numbers to match the port on REKA:BIT to which you connect the sensor.

set Ultrasonic pins to Trig:P0 | Echo:P1 ▾

- ✓ Trig:P0 | Echo:P1
- Trig:P1 | Echo:P9
- Trig:P2 | Echo:P12
- Trig:P13 | Echo:P14
- Trig:P15 | Echo:P16

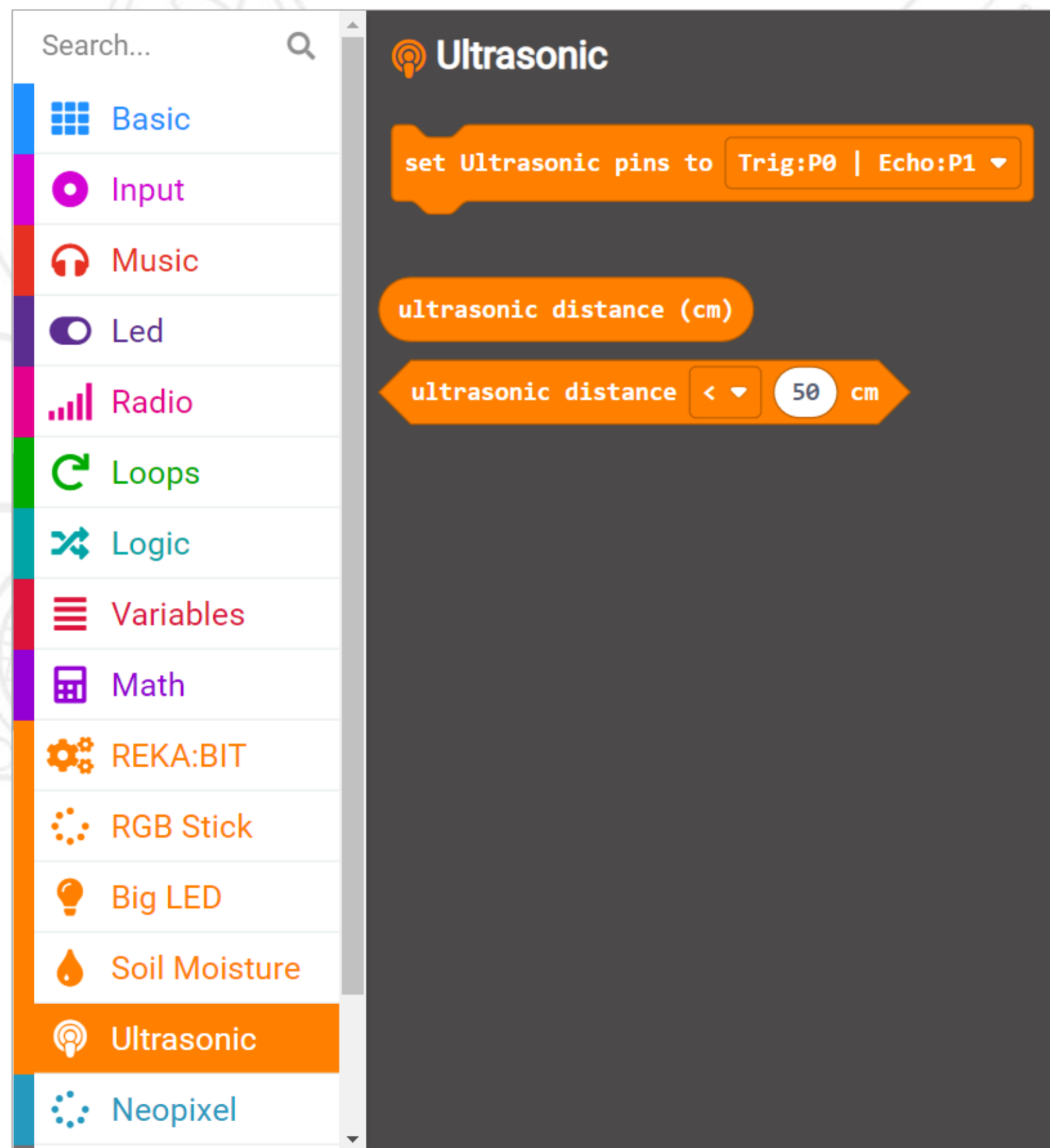
ultrasonic distance (cm)

Use this block to get the reading of the ultrasonic sensor.

Use this block to compare ultrasonic distance reading with a desired threshold; it returns 'true' or 'false'.

ultrasonic distance < ▾ 50 cm

Threshold value



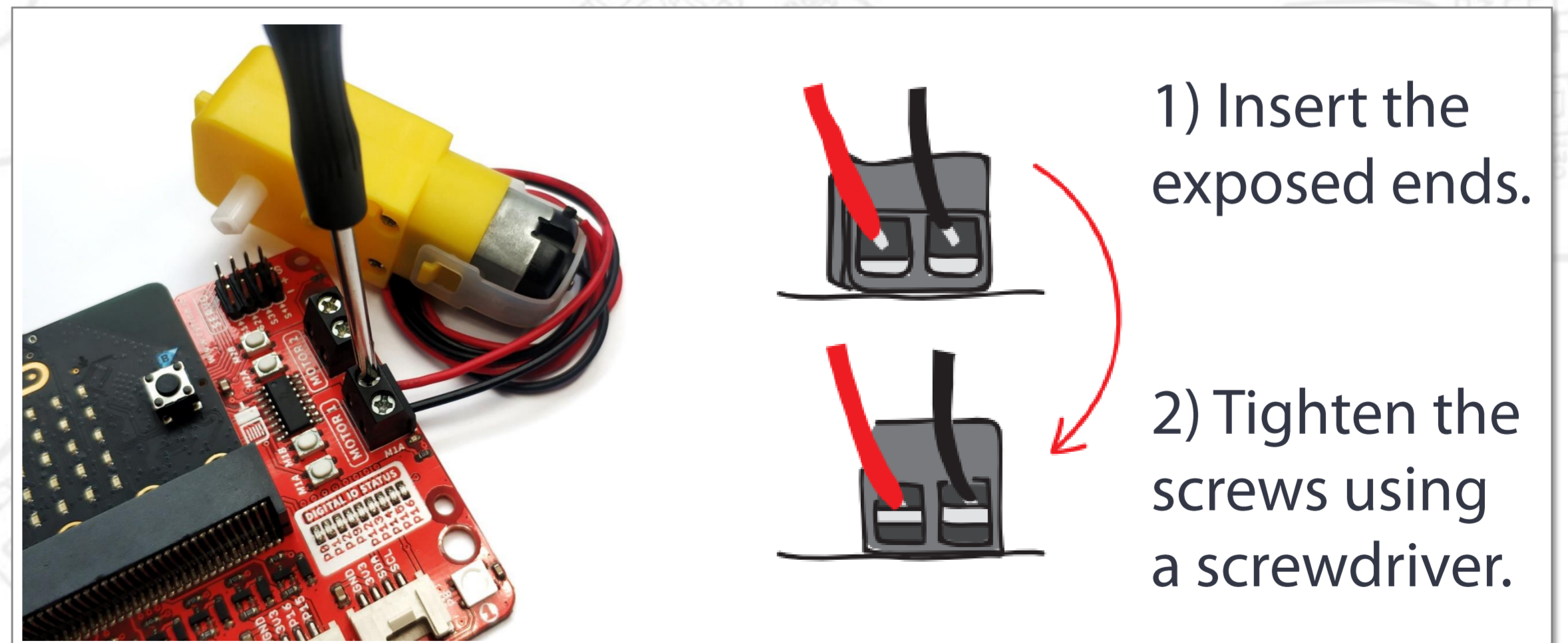
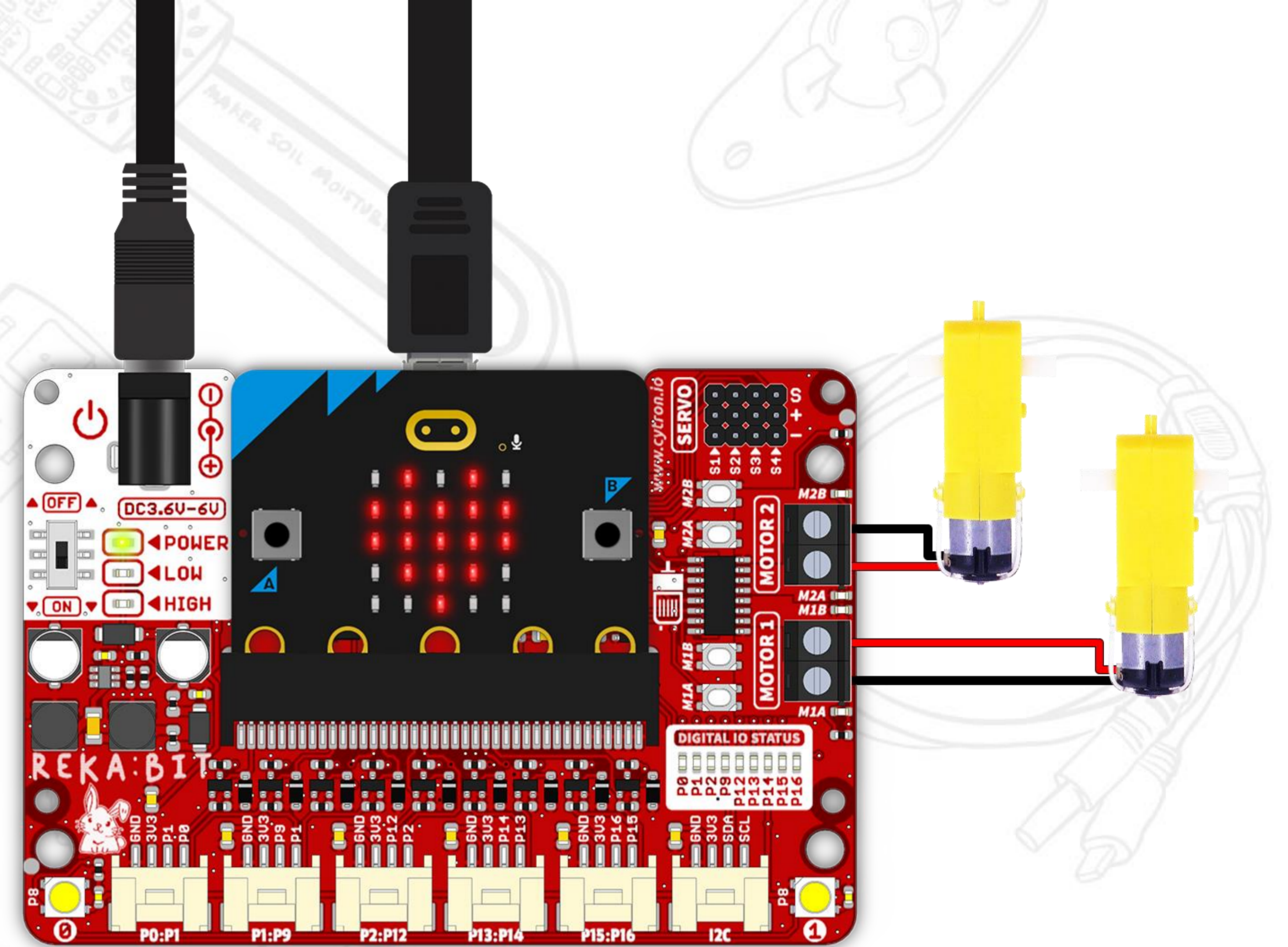
DC Motor

A direct current motor, or more commonly known as **DC motor**, is a rotating electrical device that converts electrical energy into mechanical energy.

We need to apply input voltage to make a DC motor spin. The higher the input voltage, the faster the motor spins.

DC motors can spin in both clockwise and counterclockwise directions. To change the spinning direction, you can either swap the red and black wire connections OR change the direction setting in your code.

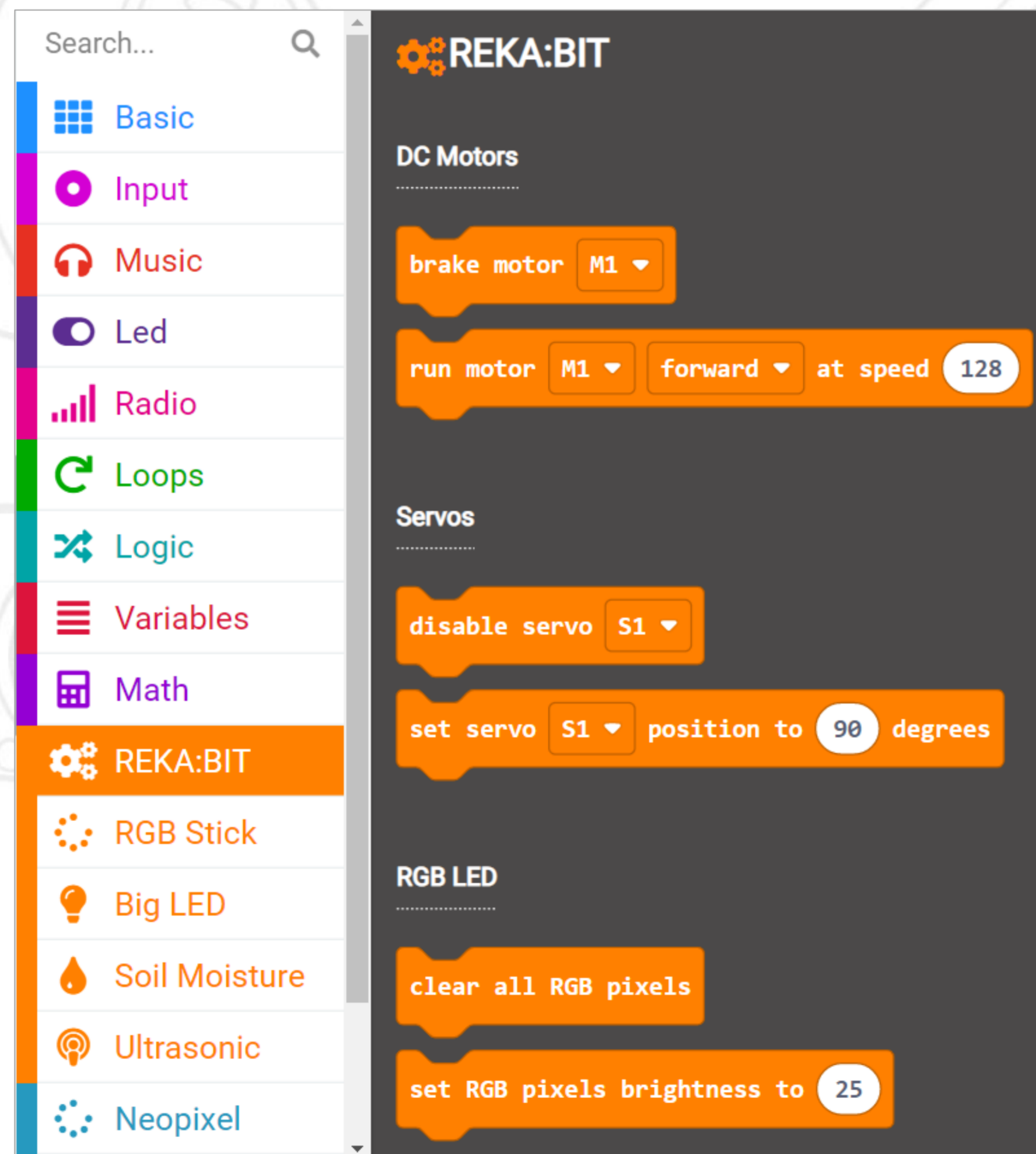
REKA:BIT board can support up to 2 DC motors.



⚠️ Clamp the exposed wire lead, and not the insulator.

DC Motor

You can easily program DC motors using blocks from REKA:BIT RBT Project Kit Extension: **[REKA:BIT – DC Motors]** category drawer.



brake motor M1

Use this block to stop the motor.

Use the block below to run connected DC motor(s) at your desired speed.

run motor M1 forward at speed 128

M1
M2
all

forward
backward

Speed 128



Select (M1 or M2) to match the channel on REKA:BIT to which you connect the DC motor. Select 'all' if you want to control two connected motors at the same time.

Spinning direction.

This is a relative value ranging from 0 to 255.

The higher the value, the faster the motor spins.

Note from rero EDUteam

Dear Jr Maker,

We are so proud of you for making it this far. You've learnt to build robotics projects using various components provided in this kit and to program them using MakeCode Editor. That's quite an accomplishment!

Now do not stop here... get innovative and reuse the components in this kit to build your own projects. Be creative and have fun exploring the endless possibilities. Scan the QR code for more project ideas and if you need extra components, you can always get them at www.cytron.io

Keep learning, and happy making~

Cheers,

Adam & Anna



<https://link.cytron.io/rekabit-projects>





RBT Project Kit for micro:bit