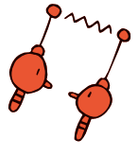
Grove Inventor Kit for micro:bit Project Guide

seeed Grove

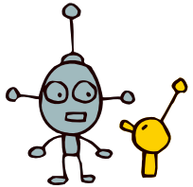
Big Inventions Start from Small Ideas

About Seeed



Diversified demands cannot be fully satisfied by mass production. The booming of open source hardware, 3D printing, crowd-funding and global logistics creates a evolutional easy platform to hardware innovators. Products are becoming democratized, as some of the consumers now calling themselves makers.

Seeed is a hardware innovation platform for makers to grow inspirations into differentiating products. By working closely with technology providers of all scale, Seeed provides accessible technologies with quality, speed and supply chain knowledge. When prototypes are ready to iterate, Seeed helps productize 1 to 1,000 pcs using in-house engineering, supply chain management and agile manufacture forces. Seeed also team up with incubators, Chinese tech ecosystem, investors and distribution channels to portal Maker startups beyond.



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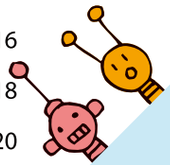
Content



Product Introduction

Grove Starter Kit for micro:bit

1.Grove Shield for micro:bit

Because micro:bit does not have Grove interface, the Grove Shield for micro:bit has many Grove interface on it and the micro:bit can be plugged on it. Then Grove modules can connect to the Grove shield and communicate with micro:bit.

2.Grove - Rotary Angle Sensor (P)

There is a 10k ohms resistor in the sensor, when you rotate the rotary knob, the value of this resistor will change, thus the output signal will change linearly based on the changing angle (0~300). You can use this rotary knob to control music volume or speed of motors etc.

3.Grove – Speaker

The speaker can emit a variety of sounds like car horn, doorbell and ignition. By changing the frequency of input signal, you will get different sounds. You can also adjust the loudness by changing the angle of the cross screw.

4.Grove – Ultrasonic Ranger

This sensor can measure distance without touching the object. Because it can detect the changing of distance, so it can be used to build fun projects that output different effects of lights or sounds according to different distances.

5.Grove – Light Sensor V1.2

Light sensor is used to detect the light levels and can output various signals. You can set different effect with different light levels. By using light sensor, you can use light to control a led to blink or a toy car to run.

6.Grove - WS2812 Waterproof LED Strip - 30 LEDs 1 meter

Firstly it is a RGB LED strip, RGB means each LED can change colors. And you can control every single LED to show different colors you like. It is also waterproof so you are free to use it outdoor without worrying about rain.

7.Grove – Gesture

Grove – Gesture can recognize 9 different gestures include hand moving up, down, left, right, forward, backward, finger circles and finger wave. You can use this sensor to build very fun applications such as use your gesture to switch songs or adjust the volume of music.

8.Grove - 4-Digit Display

This display is very suitable for displaying numbers, it can be used to display time, to be a stop watch, or display other sensor's values.

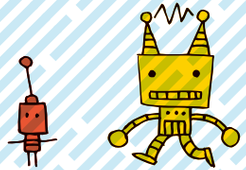
9.Grove - Red LED

This is a simple a LED that can flash Red light.

Grow the difference

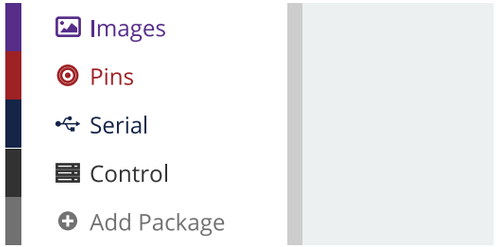
How to program Grove on micro:bit

To program Grove modules with micro:bit, you need to add the Grove PXT packages to your makecode programmer



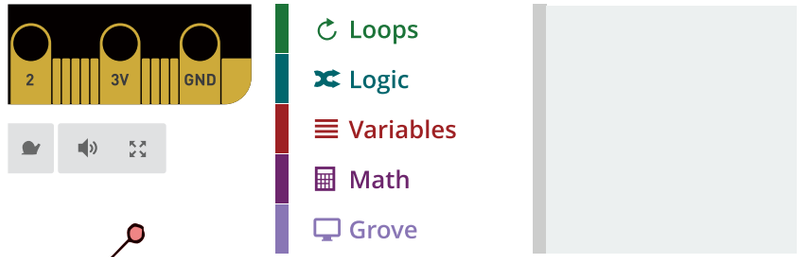
Steps

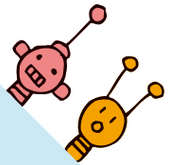
1. Find the "***Add Package***" block at the bottom



2. Now you can add Grove Packages by:
1) Searching keyword '***Grove***'
2) Simply enter project URL: ***github.com/seeed-studio/pxt-grove***

3.If you can find "***Grove***" under "Math", congratulations! You have added the Grove Package successfully!





1.Control the Light

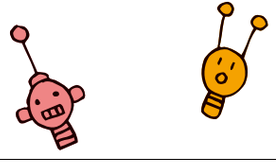
Difficulty Level ★☆☆☆

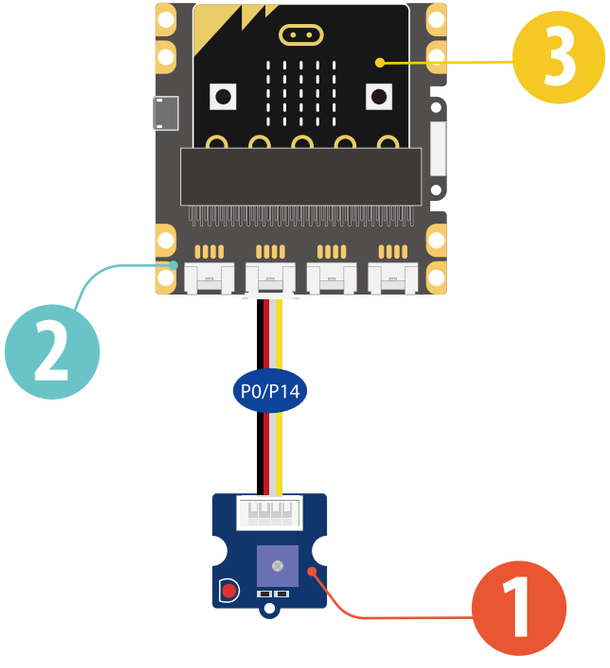
Part List

1. 1x Grove - Red LED
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

In this demo, you will learn how to use the 2 buttons on micro:bit to turn on and off the LED





Steps

1. Add a basic block *on start*, then add variable block *set item to 0* , rename "item" to "LED" and replace "0" with pin block *digital read pin P0*.

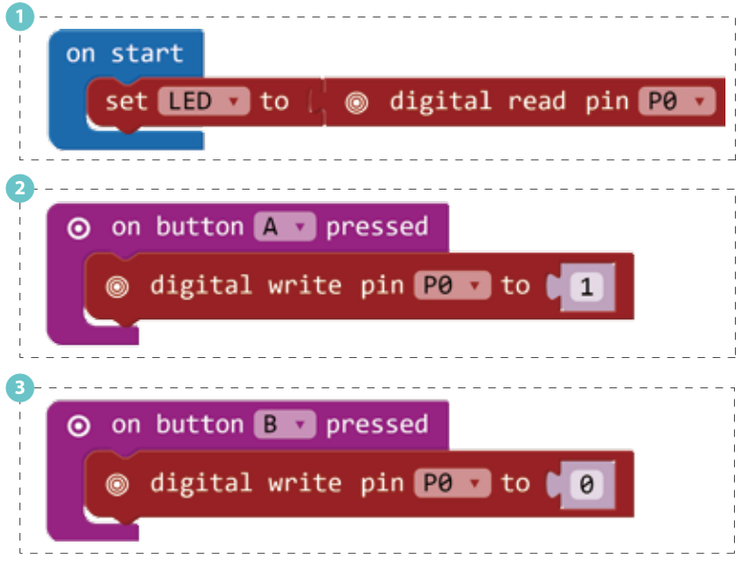
2. Add an input block for *on button A is pressed*, and add a pin block *digital write pin 0 to 1*.

3. Add an input block for *on button B is pressed*, and add a pin block *digital write pin 0 to 0*.

4. Hardware connection: Connect the Grove – Red LED to P0 port of Grove Shield for Micro:bit.

5. Click **Download** to transfer your code in your micro:bit!

6. Press **button A** and **button B** to see if the code works as expected.



Try to use this demo to create a traffic light that controlled by you.

2.Sunshine micro:bit

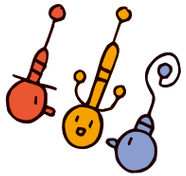
Difficulty Level ★☆☆☆

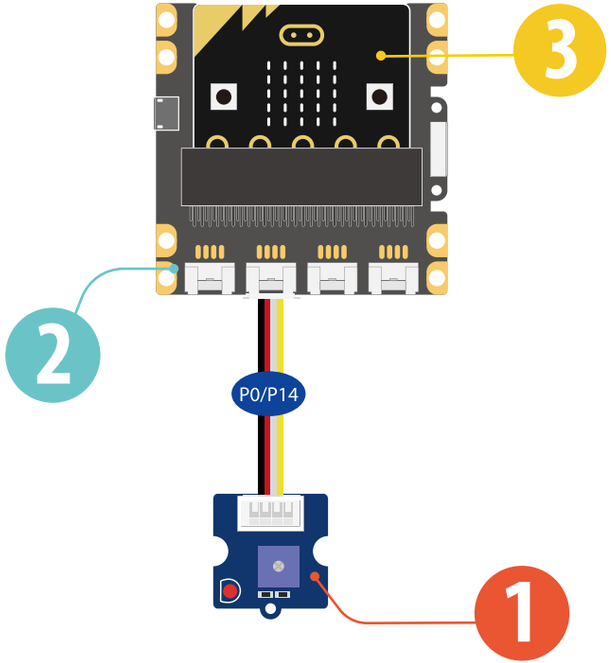
Part List

1. 1x Grove - Light Sensor
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

In this demo, you will learn how to use the LED bar graph on micro:bit to show the light level of sunshine. The stronger the sunshine, the more LEDs will be turned on.





Steps

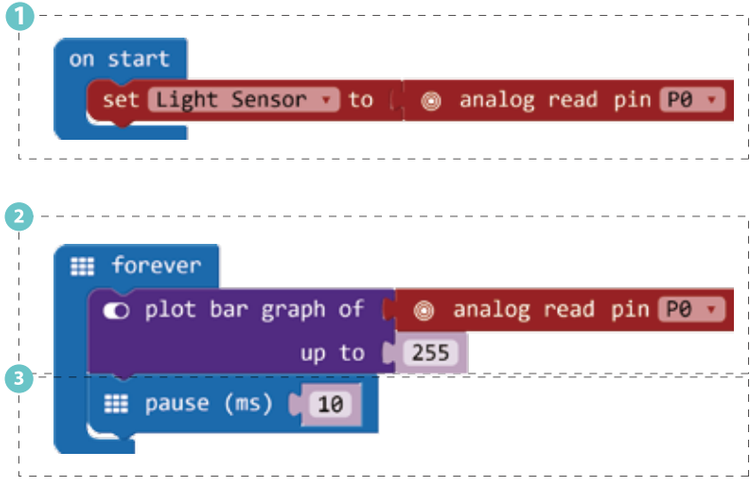
1. Add basic block *on start*, the add variable block *set item to 0*, rename "item" to "Light Sensor" and replace "0" with pin block "analog read pin P0".

2. Add basic block *forever*, then add LED block *plot bar graph of.....up to*, amend the block to be *plot bar graph of Light Sensor up to 255*.

3. Add basic block *pause(ms)*, change the value to "10".

4. Click **Download** to transfer your code in your micro:bit!

5. Put your hand over the light sensor to block the light, and see how the LEDs on micro:bit change.



Try to change the value 255 to other numbers and see what will happen.

3.LED Bar Control

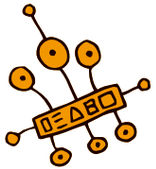
Difficulty Level ★☆☆☆

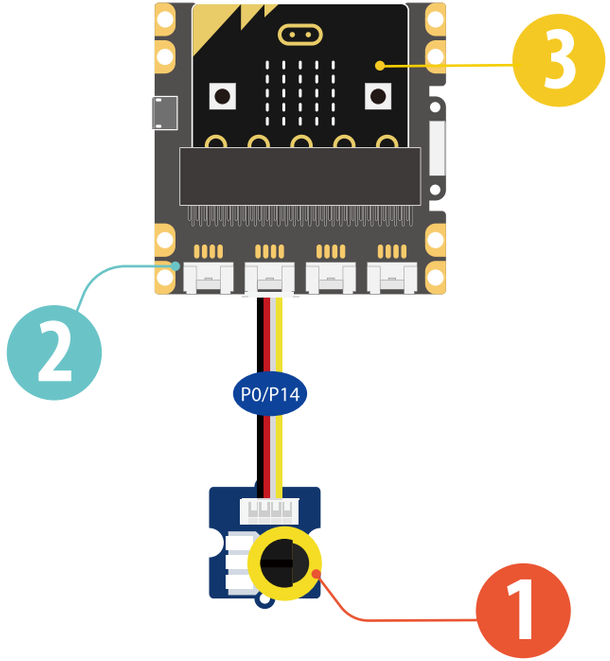
Part List

1. 1x Grove - Rotary Angle Sensor(P)
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

In this demo, you will learn to control the LED Bar on micro:bit with rotary angle sensor. The LED Bar level will go up and down when you rotate the knob in different directions.





Steps

1. Add basic block *on start*, the add variable block *set item to 0*, rename "item" to "Angle Value", replace "0" with pin block *analog read pin P0*.

2. Add basic block *forever*, then add Led block *plot bar*. Replace the first value with pin block *analog read pin P0*, and change the second value to "1023". Add basic block *pause (ms) (100)*.

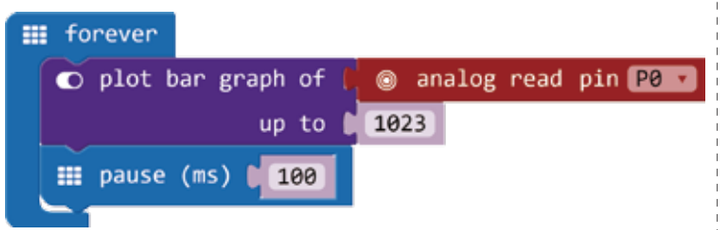
3. Hardware connection: Connect the rotary angle sensor to **P0 port** of micro:bit

4. Click **Download** to transfer your code in your micro:bit!

5. Rotate the **knob** on the rotary angle sensor and see the change of LED Bar.

1

2



Try to change the value 1023 to other numbers and see what will happen. What's the difference comparing to the last project?

4.Music Player

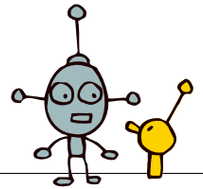
Difficulty Level ★☆☆☆

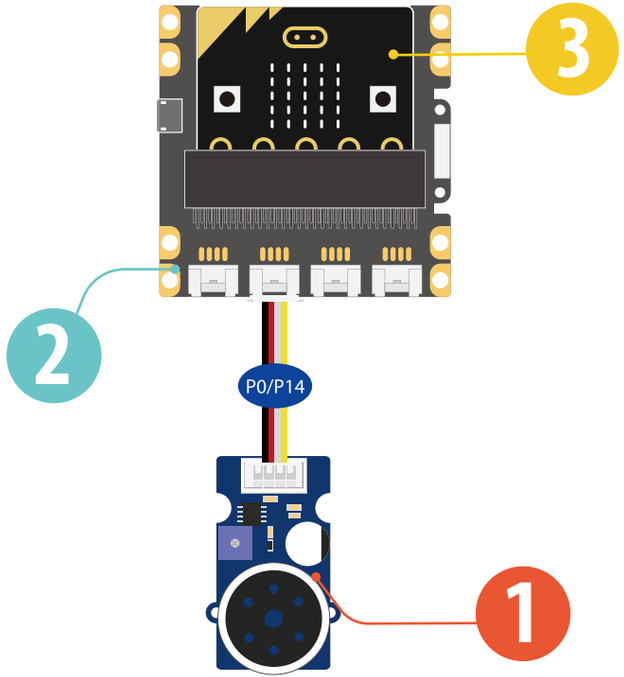
Part List

1. 1x Grove - Speaker
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

This demo will teach you how to use the 2 buttons on micro:bit to play music.





Steps

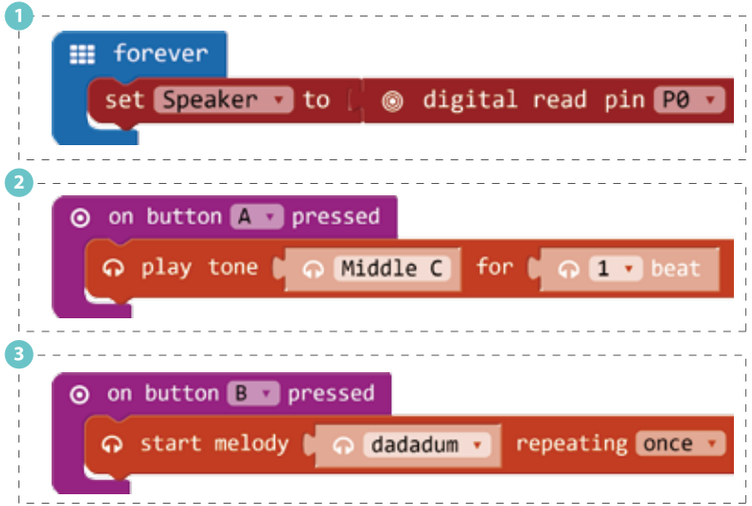
1. Add basic block *forever*, the add variable block *set item to 0*, rename "item" to "speaker" and replace "0" with pin block *digit read pin P0*.

2. Add an input block for *on button A is pressed*, the speaker executes *play tone middle C for 1 beat*.

3. Add an input block for *on button B is pressed*, the speaker executes *start melody dadadum once*.

4. Click **Download** to transfer your code in your micro:bit!

5. Press **button A** or **button B** to play the sounds.



Try to use block on button A+B pressed and let the speaker play other sounds or melodies.

5.Gesture Recognition

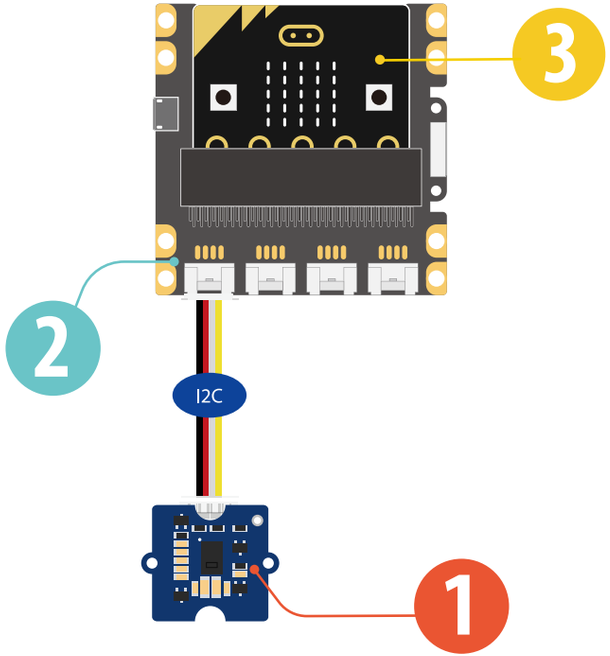
Difficulty Level ★★½☆☆

Part List

1. 1x Grove - Gesture
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

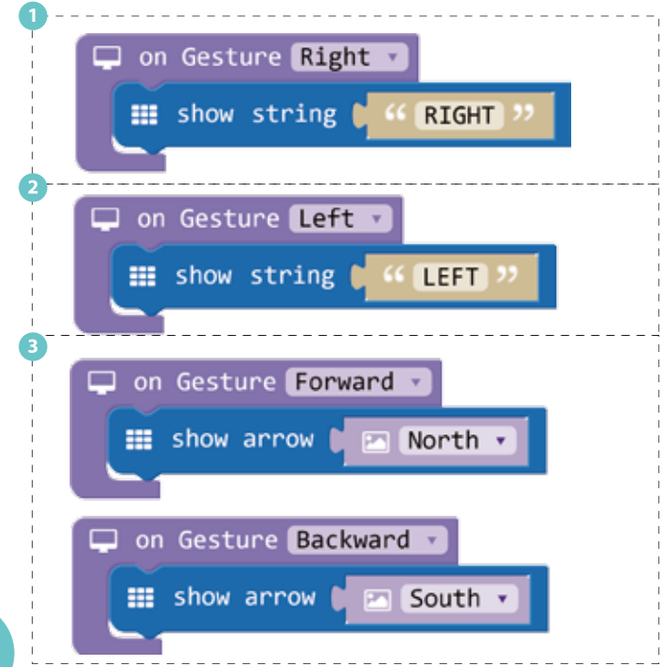
Description

The gesture sensor can recognize 9 different gestures, in this demo, you will learn how to display the recognized gesture name on micro:bit.



Steps

1. If you have added the 'Grove Package' successfully, add block *on Gesture Right*, then add basic block *show string*, amend the word to 'Right'.
2. Add another block *on Gesture Left*, then add basic block *show string*, amend the word to 'Left'.
3. Add another 2 block *on Gesture Forward* and *on Gesture Backward*. Then choose basic block *show arrow*, then choose 'North' and 'South'.
4. Hardware connection: Connect the Grove - Gesture to I2C port of Grove shield for micro:bit
5. Click **Download** to transfer your code in your micro:bit.
6. Use your hand to make different gesture in front of the gesture sensor and see if the micro:bit can show the exact gesture you are doing.



Try use other gestures to show different icons on your micro:bit.

6.Smart Guard

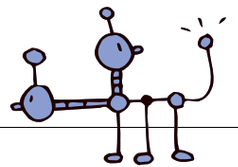
Difficulty Level ★★½☆☆

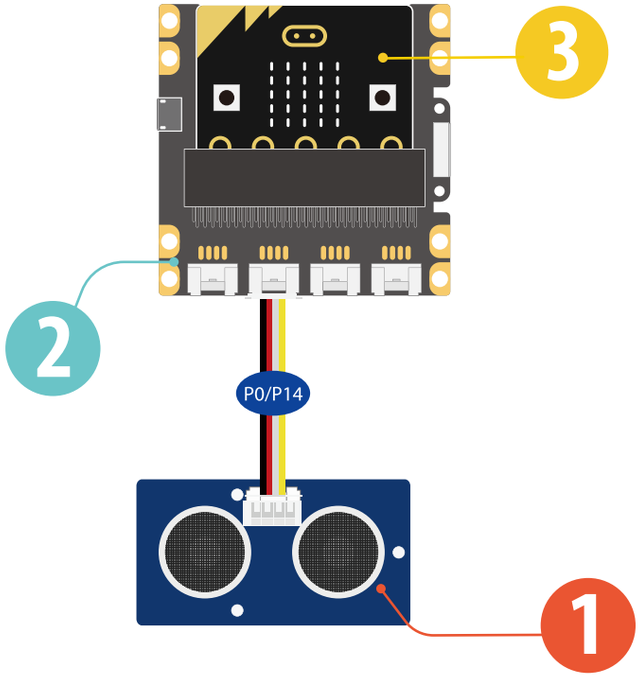
Part List

1. 1x Grove - Ultrasonic Ranger
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

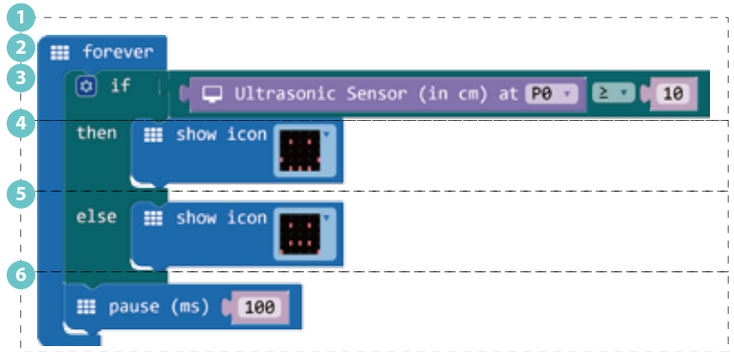
Ultrasonic ranger can detect distance without touching the object, in this demo, we will use the ultrasonic ranger to detect distance, if the object is too close (less than 10 cm), the micro:bit will show a sad face on it.





Steps

1. Add basic block *forever*, then add logic block *if…then…else…*
2. For condition 'if', add logic block *0≥0*
3. If you have added the Grove Package successfully, replace the left '0' with Grove block *Ultrasonic Sensor (in cm) at P0*.
4. For 'then', add basic block *show icon*, choose the 'happy face' icon.
5. For "else", add basic block *show icon*, choose the 'sad face' icon.
6. Add basic blocks *pause (ms) (100)*.



7.Hardware connection. Connect the Grove – Ultrasonic Sensor to **P0 port** of Grove shield for micro:bit.

8.Click **Download** to transfer your code in your micro:bit.

9. Move your hand up and down in front of the Ultrasonic Sensor, when your hand is less than 10cm close to the sensor, the micro:bit will show sad face.

Try to change the warning distance or the corresponding icons. You may also place this smart guardian on your favorite toy to protect it.

7.Shake Counter

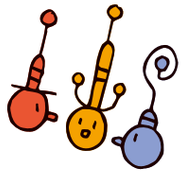
Difficulty Level ★★½☆☆

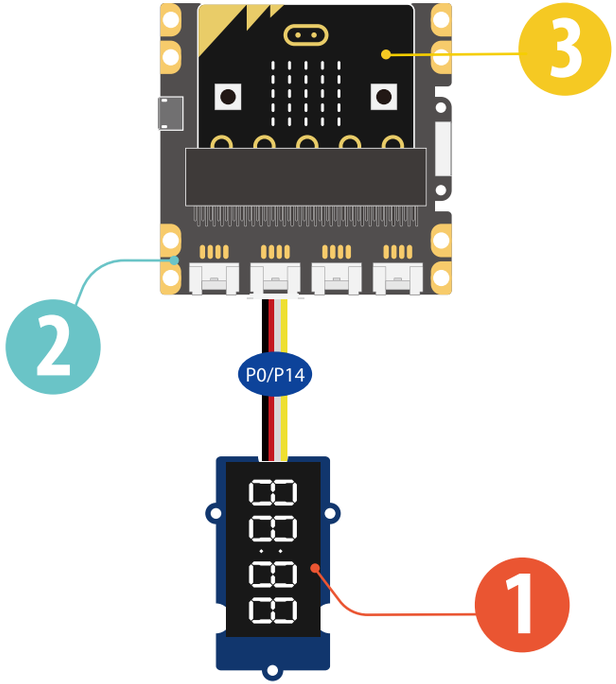
Part List

1. 1x Grove - 4-Digit Display
2. 1x Grove Shield for micro:bit
3. 1x micro:bit

Description

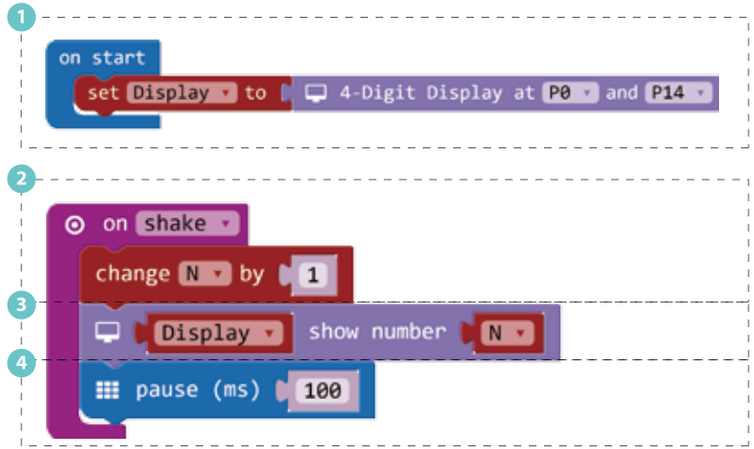
In this demo, every time your shake the micro:bt, it will add 1 to the number on the display.





Steps

1. Add basic block *on start*, then add variable block *set item to 0*, rename 'item' to 'Display'. If you have added the Grove Package successfully, add block *4-Digit Display at (P0) and (P14)*.
2. Add input block *on shake*, then add variable block *change item by 1*,rename 'item' to 'N'.
3. Add block item *show number* from Grove Package, rename 'item' to 'Display', replace '0' with variable block 'N'.
4. Add basic block *pause (ms) (100)*.



5. Hardware connection: Connect the Grove – 4-Digital Display to **P0 port** of Grove shield for micro:bit.
6. Click **Download** to transfer your code in your micro:bit.
7. Shake the micro:bit and you will find the number raises by 1 every time your shake the board.

Use this demo to play a game with your friends: Competing who can shake the biggest number in 1 minute.

8.Ultrasonic Meter

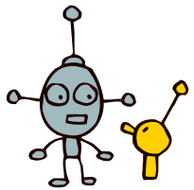
Difficulty Level ★★☆☆

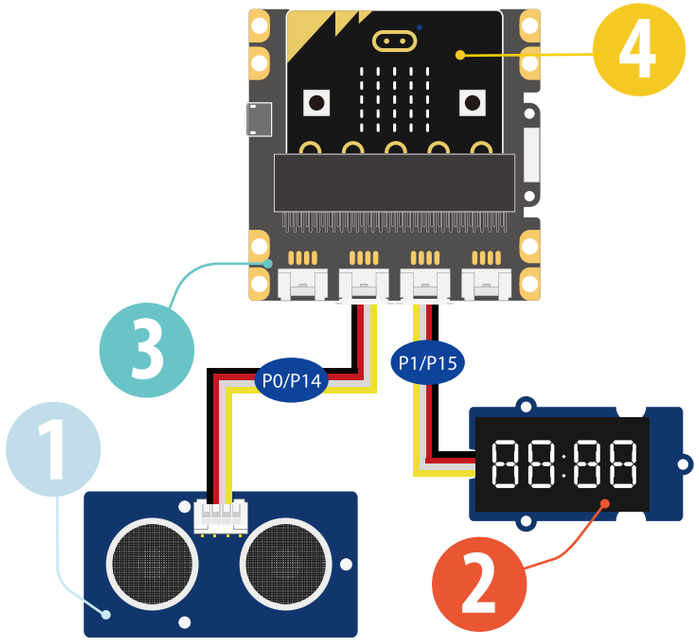
Part List

1. 1x Grove - Ultrasonic Ranger
2. 1x Grove - 4-Digit Display
3. 1x Grove Shield for micro:bit
4. 1x micro:bit

Description

In this demo, you will learn how to use the ultrasonic sensor to measure distance and show the value on a display.





Steps

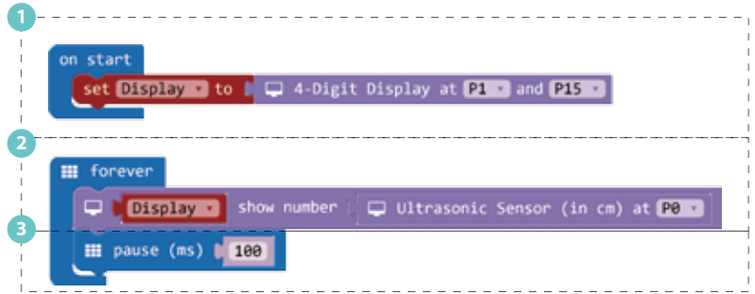
1. Add basic block *on start*, then add variable blocks *set item to 0*, rename 'items' to 'Display'. If you have successfully added the Grove package, replace "0"with Grove block *4-Digit Display at P1 and P15*.

2. Add basic block *forever*, then add Grove block item *show number 0*, rename 'item' to 'Display', replace '0' with Grove block *Ultrasonic Sensor (in cm) at P0*.

3. Add basic block *pause (ms) (100)*,

4. Click **Download** to transfer your code in your micro:bit!

5. Use your hand to move up and down on the ultrasonic ranger and read the value on the 4-Digit display.



Try to use ultrasonic meter to measure the distances between different objects in your room.

9.Rainbow on The Desk

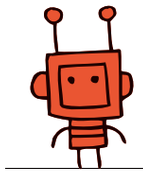
Difficulty Level ★★☆☆

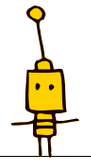
Part List

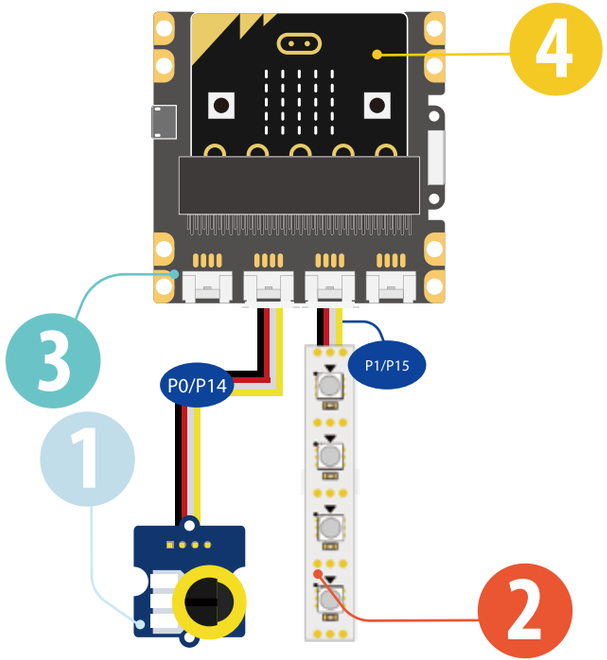
1. 1x Grove - Rotary Angle Sensor(P)
2. 1x Grove - WS2812b
3. 1x Grove Shield for micro:bit
4. 1x micro:bit

Description

There are 30 Leds on the Led strip, in this demo, you will learn to show rainbow color on the Led strip and use the Rotary Angle Sensor to let the rainbow flow on the Led strip.

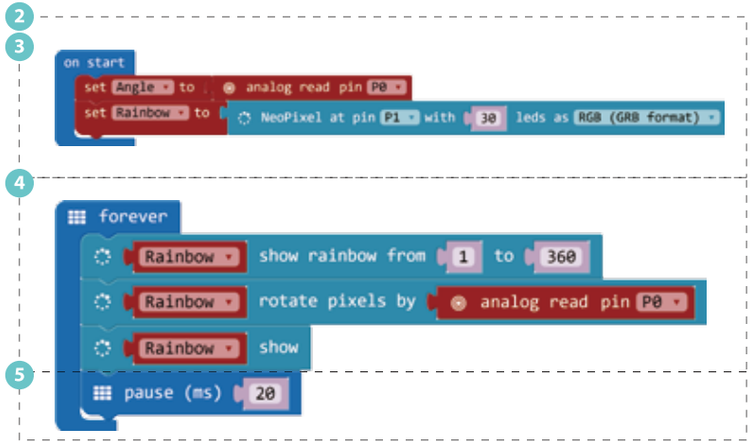






Steps

1. To use 'Grove - WS2812b LED strip', you need to add the '***neopixel***' package first.
2. Add basic block *on start*, then add variable block *set item to 0*, rename 'item' to 'Angle', replace '0' with pin block *analog read pin P0*.
3. Add another variable block *set item to 0*, rename 'item' to 'Rainbow', replace '0' with block *Neopixel at pin (P1) with (30) leds as RGB*.
4. Add basic block *forever*, then add 3 blocks to show rainbow on your LED strip, set the name and numbers as instructed.
5. Add basic block *pause (ms) (20)*.
6. Connect the hardrware pieces as instructed.
7. Click **Download** to transfer your code in your micro:bit!
8. Rotate the knob on the Grove – Rotary Angle Sensor and see if the rainbow flows.



Try to change the numbers of Leds to show the rainbow, or change use the pin block map to let the rainbow to flow slower.

10.Guardians of The Secrets in Your Bag

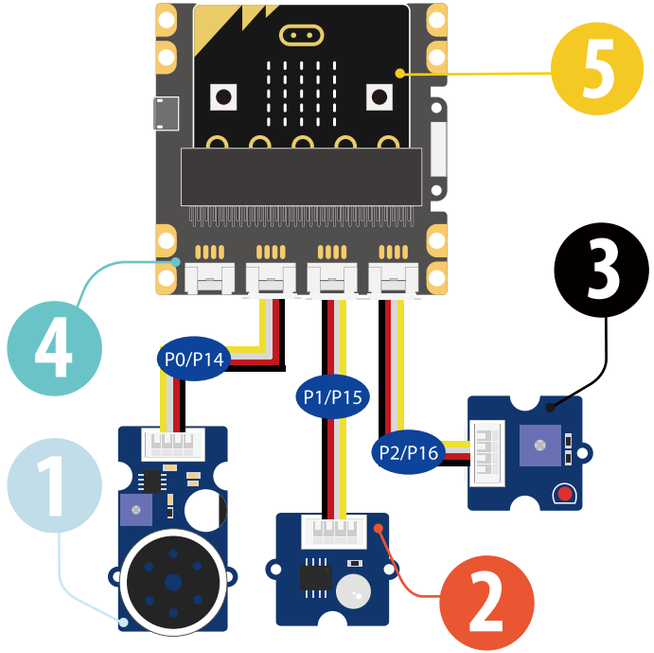
Difficulty Level ★★★☆

Part List

1. 1x Grove - Speaker
2. 1x Grove - Light Sensor
3. 1x Grove - Red LED
4. 1x Grove Shield for micro:bit
5. 1x micro:bit

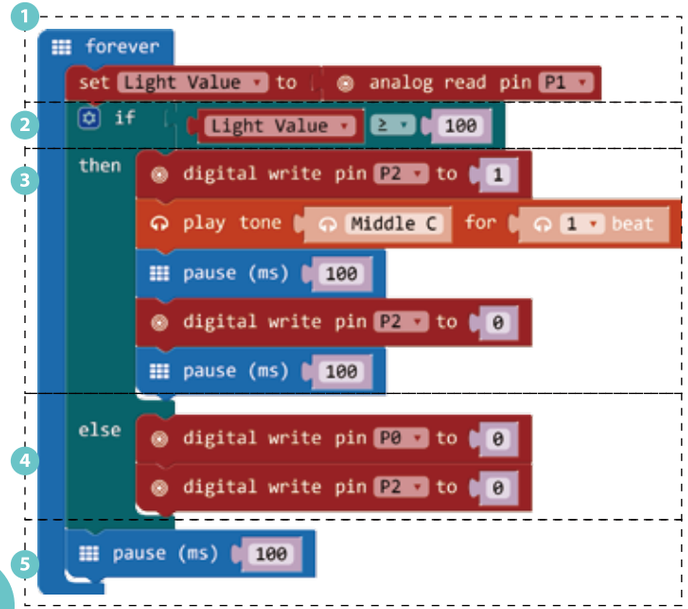
Description

In this demo, you will make a guardian to protect your secret box, if anyone opens the box, the light sensor will be triggered and the guardian will flash red warning light and play alarm.



Steps

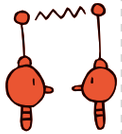
1. In the basic block *forever*, *set a variable* named 'Light Value' to *analog read pin P1*.
2. Now we add a logic block *if...then..else*, in this block we set the condition as if the 'Light Value' is greater than '100'
3. When the condition is triggered, we set the speaker to continuously *playing tone High C on P2(Pin2)*.
4. For 'else', add 2 pin blocks *digital write pin* and set pins to '0'. This will turn off the Led and speaker when the box is closed and no light is deteced.
5. Add basic block *pause (ms) (100)*.
6. Hardware connection: Connect the speaker to P0 port, Grove – light sensor to P1 port, Grove - Led to P2 port,
7. Click **Download** to transfer your code in your micro:bit!
8. Open and close your secret box to see how it works.



Try to use this creation to protect your secrets in the drawer.

11.Guardians of The Secrets in Your Room

Difficulty Level ★★★☆

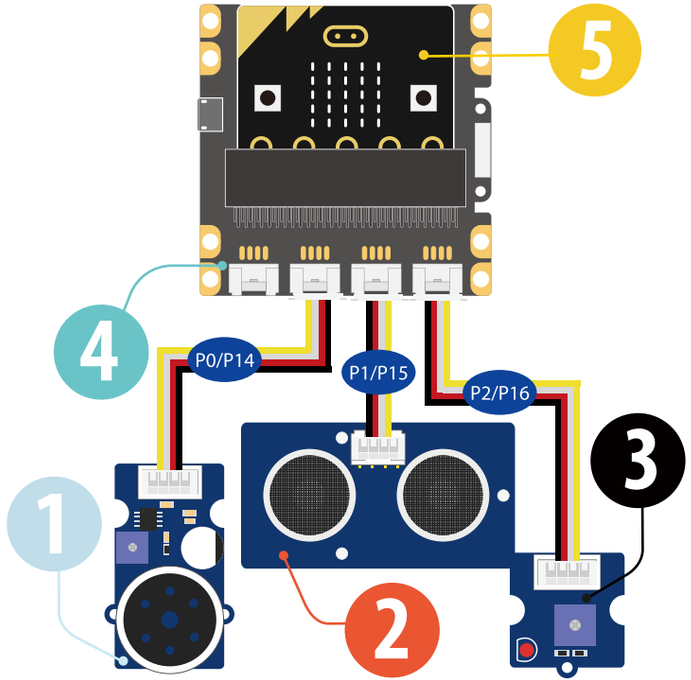


Part List

1. 1x Grove - Speaker
2. 1x Grove - Ultrasonic Ranger
3. 1x Grove - Red LED
4. 1x Grove Shield for micro:bit
5. 1x micro:bit

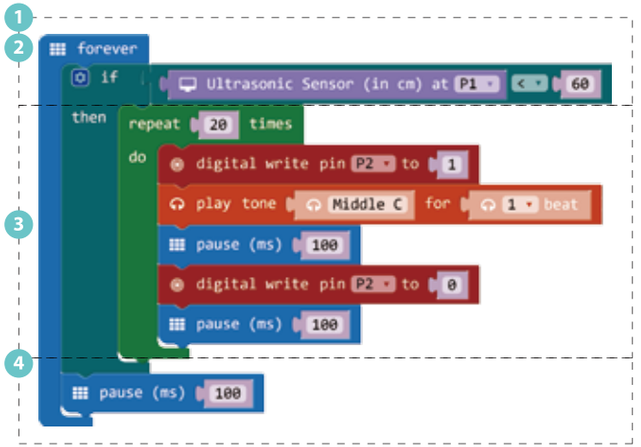
Description

This demo will make a guardian in your room, if anyone enters your room, the red led will flash and the speaker will play warning sound. It is similar to the guardian in your secret box, except that this demo uses ultrasonic sensor. If you have tried the demo "smart guard", this one should be a piece of cake.



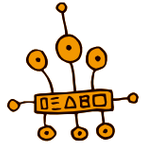
Steps

1. Add basic block *forever*, then add logic block *if…then…*.
2. For condition 'if', add logic block *0≥0*, if you have added the Grove package successfully, replace the first '0' with Grove block *Ultrasonic Sensor (in cm) at P1*, change another '0' to '60'.
3. For 'then', add loop block *repeat 20 times*, the add a pin block *digital write pin P1 to 1* and a music block *play tone High C for 1 beat*. Add block *pause (ms) (100)*, then add a pin block *digital write pin P2 to 0* and a block *pause (ms) (100)* after it.
4. Add the last basic block *pause (ms) (100)*.
5. Hardware connection: connect the Grove modules as instructed in page 25.
6. Click **Download** to transfer your code in your micro:bit!
7. Move your hand up and down in front of the ultrasonic sensor and see if your guardian works well.



Try to use this project to protect your secrets in your room.

12.Magic Musician



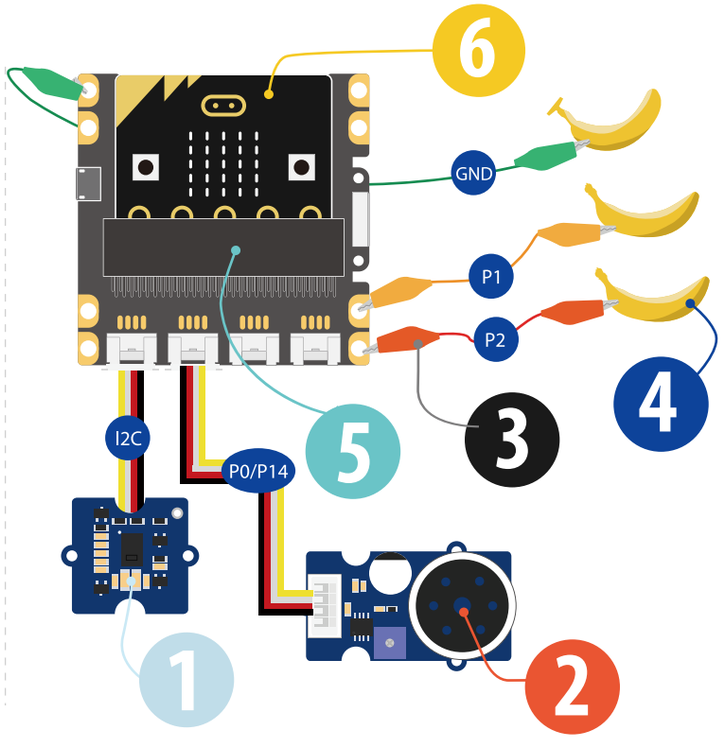
Difficulty Level ★★★★

Part List

1. 1x Grove - Gesture
2. 1x Grove - Speaker
3. 4x Crocodile Clip
4. 4x Bananas
5. 1x Grove Shield for micro:bit
6. 1x micro:bit

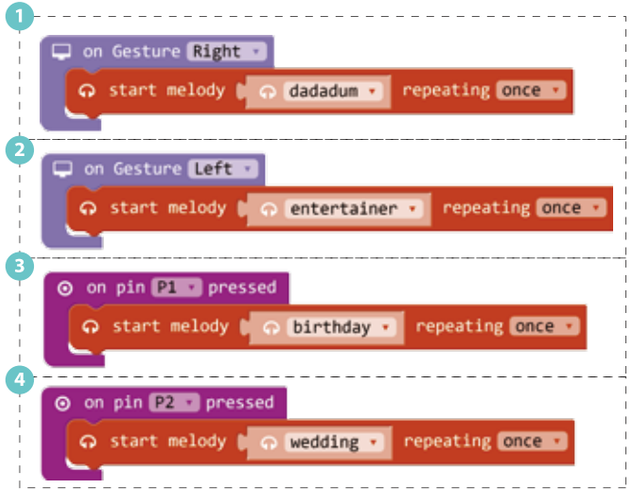
Description

This is a level 4 demo, however it is not as hard as it seems if you have tried the demo Gesture Recognition. This demo is very funny because you can use gesture and Bananas to let the speaker play different sounds and music. Show this demo to you friends and they will be amazed by you!



Steps

1. In the Grove Package, add *on Gesture Right* to trigger the speaker *start melody (dadadum) repeating (once)*.
2. In the Grove Package, add *on Gesture Right* to trigger the speaker *start melody (entertainer) repeating (once)*.
3. Add input block *on pin P1 pressed*, then add music block *start melody (birthday) repeating once*, or choose any melody you like except the two you have used in step 1 and 2.
4. Add another input block *on pin P2 pressed*, then add music block *start melody (wedding) repeating once*, or choose the another melody you like.
5. Connect the hardware pieces as instructed in page 27.
6. Click **Download** to transfer your code in your micro:bit!
7. For gesture control, use your hand to move left and right above the gesture sensor, you will hear different music.



8. For banana control, use one of your hand to touch the banana that is connected to **GND**, use another hand to touch the banana on **P1** or **P2**, you will hear different music.

Try to use more bananas or gestures to play more sounds and melodies you like.

Grow the difference