1. Introduction to Mind+

With so many different graphical Programming software products on the market, how can you get the right one? It may disappoint you when you found that your software only supports certain hardware and robots or even cannot work with any hardware at all. Where to find the most suitable software?

Why not try our Mind+ graphical Programming software!

Mind+ is a graphical Programming platform that supports all kinds of open-source hardware such as Arduino, micro: bit. It is not only suitable for primary and secondary school students, but also able to provide a great learning environment for makers who want to improve themselves by studying high-level Programming language such as Arduino, Python, C, C++, etc. Drag and combine code blocks to make programs, easy to find the joy of creating.

From beginners to experienced makers, Mind+ can satisfy all your needs: learning Programming, running programs without downloading, experiencing IoT (Internet of Things), sharing ideas with Mind+ community and so on.

1.1 Download and Install Mind+

STEP1: Download Mind+ Programming Software (The tutorial is based on Mind+ V1.7.0)

Open the webpage and download: https://mindplus.cc/en.html

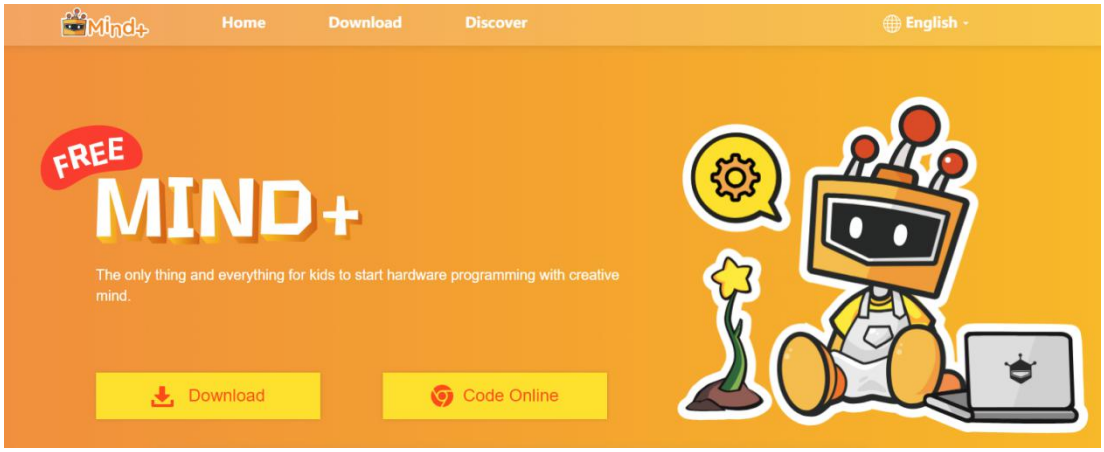


Figure 1.1.1 Mind+ Download Interface

STEP2: Install Driver

Download and install the software, open and click “Learning” to learn how to install driver.

1. Click to open Learning ->Video Tutorials.

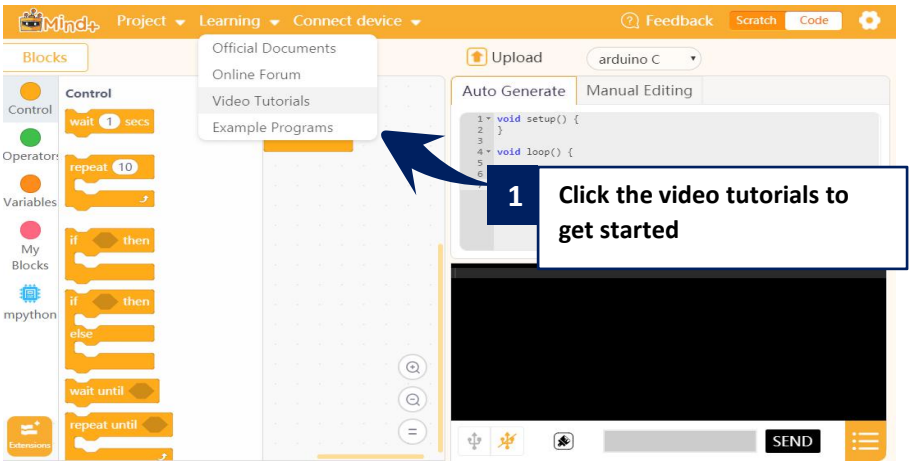


Figure1.1.2 Video Tutorials

2. Click the related tutorial, and play the video.

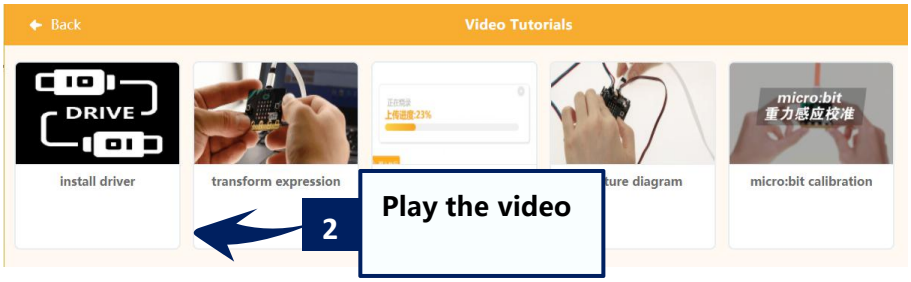


Figure 1.1.3 Click to play the video

3. Install the SerialPort driver according to the instruction.

   And you just need to install the driver for once.

1.1.4 Install SerialPort Driver

STEP3: Switch to "Offline" mode (The tutorial is based on "Offline" mode).

1. Click "Offline" icon at the right corner to switch mode.

2. Switched to "Offline" mode successfully.

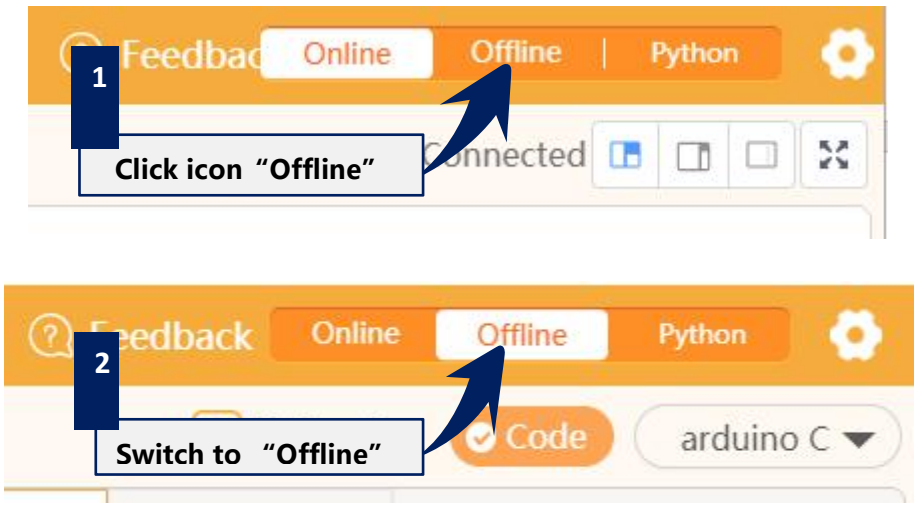
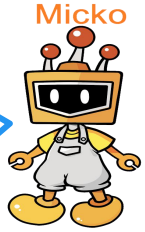


Figure 1.1.5 Switching mode

Mr. Micko, what's the difference between these two modes?

Micko



My little friend, the mode Online allows you to use microcontrollers to interact with PC in real time, while the mode Offline allows to upload the code and let

1.2 Mind+ Interface

To convenient the operation, first we should be familiar with the basic functions of the software's interface. If we compare the Mind+ software as a stage, what are the functions of its different sections?

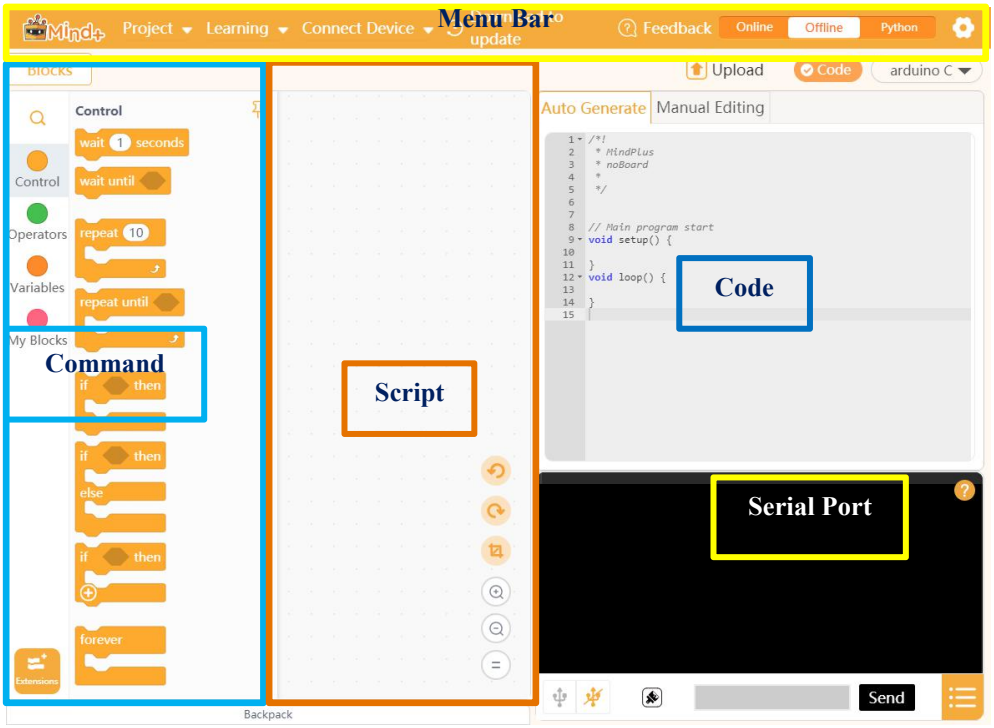


Figure 1.2.1 Mind+ Interface

Menu Bar: Software setting area.
This is the backstage of the whole "stage". Without the help of the menu bar, we can do nothing with this software. What functions are there behind the "stage"?

"Project": create a new project, load a project, save a project as.

"Learning": where you can find lots of useful tutorials and examples programs.

"Connect Device": detect the connected device, and you can select to connect or disconnect the device.

"Scratch/Code" icon: switch mode to run program.

"Setting" icon: set the theme and language of the software; share and learn on our community or E-mail us your feedback.

Command: This is the “tool section” of the stage. We need all kinds of tools to give an excellent performance on the stage, and we can get more extra tools in “Extensions” to support different hardware.

Script: Here is the core of the “stage performance”. All performances will be acted under the instruction of “script”. This is what we called graphical Programming, easy and simple for beginners to understand. Just drag the code blocks in the “Command” to here then you can program.

Code: If you want to check the codes of the blocks in the “script”, this is the right place.

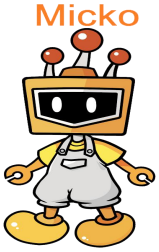
Serial Port: How do you know whether you have made a successful performance? -Interact with your audience. This is the place your audiences give you their “opinion” about the performance. The downloading situation will be displayed on there, so you can check whether your download is successful, or if not, what’s the reason. Besides, you can see the programs running here. The serial port communication data will also be displayed. That is to say, if your micro: bit board is connected with an external sound sensor, you can find the related data here. This section also includes: serialport open/close, scroll display open/close, clear output, baud setting, serialport input and output format control.

Project 3: Digital Pocket Pet

1. Story of Cat and Micko

Mr. Micko, what's your favorite animal?

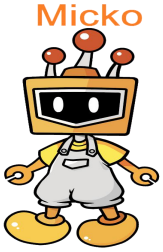
Micko



I love dogs best! They are so cute when wagging their tails if pleased!

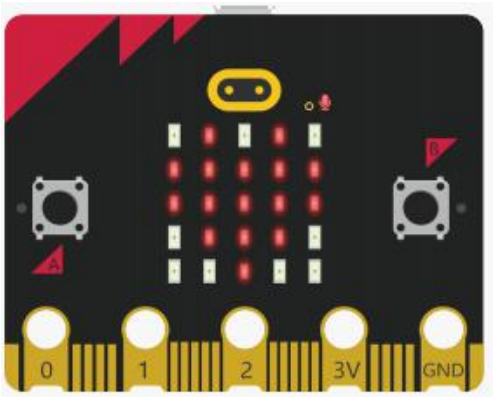
I am also so fond of puppies, but keeping a pet requires much energy and a strong sense of responsibility. If only I had an electronic pocket pet playing with me all the time!

Micko

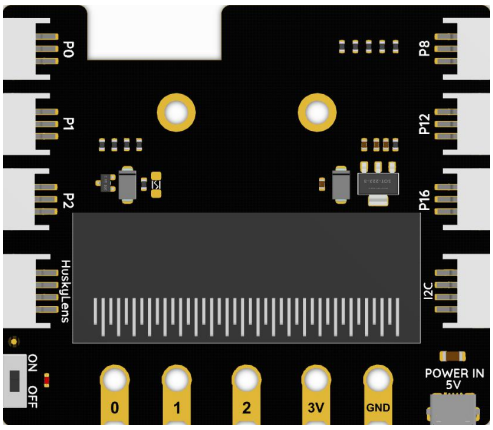


Well, my friend, let's start from the basics!

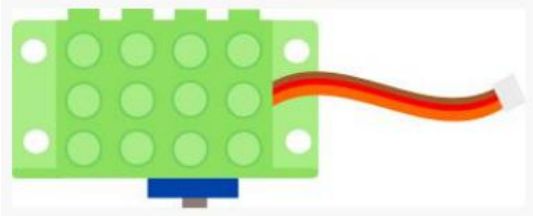
2. Micko's Pocket



1× micro: bit



1× Boson Expansion Board



1× Servo

1× micro USB Cable

1× Motion Sensor Module

1× Sound Sensor

3. Dream of Cat: Wagging Tail

4. Micko's Blackboard

STEP1: Connect micro: bit board to computer with USB cable, and connect the servo to pin P1 of the expansion board.

Note: **We learned how to control the servo to rotate to a specific angle in the last lesson. And now, we will make the servo swing to**

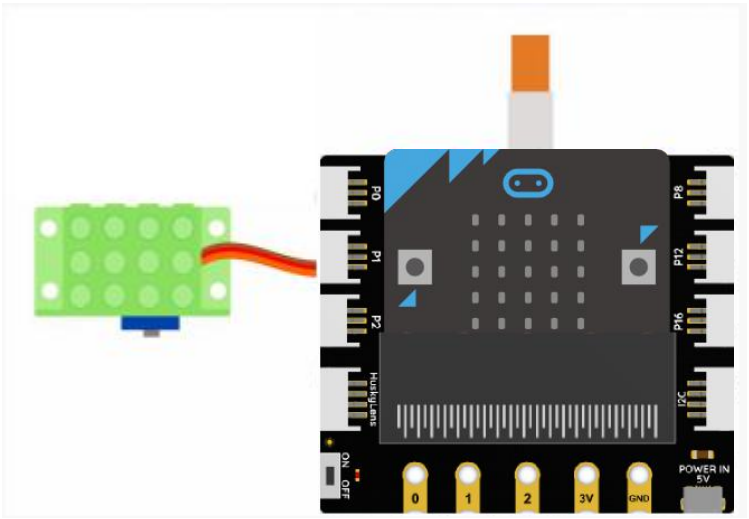


Figure 3.3.1 Connection Diagram

STEP2: Programming

1. Click the Extensions at the left bottom, and add Actuator-> Micro Servo.

2. Control the servo to swing to and fro between 45 degrees and 135 degrees by "set pin P1 servo to XX degree". Add "wait XX seconds" to give the servo enough time to swing. Remember to connect extra power to the expansion board.

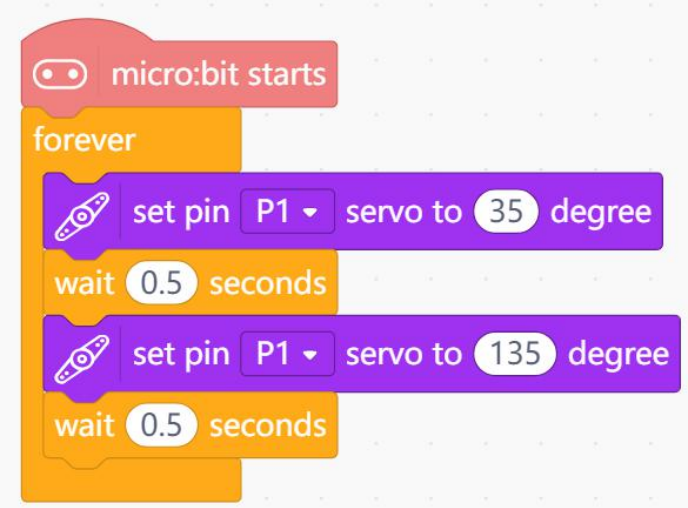
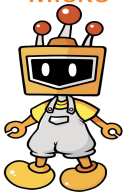


Figure 3.3.2 Control Servo to Swing

How amazing! A servo can even swing to and fro like a puppy's tail!

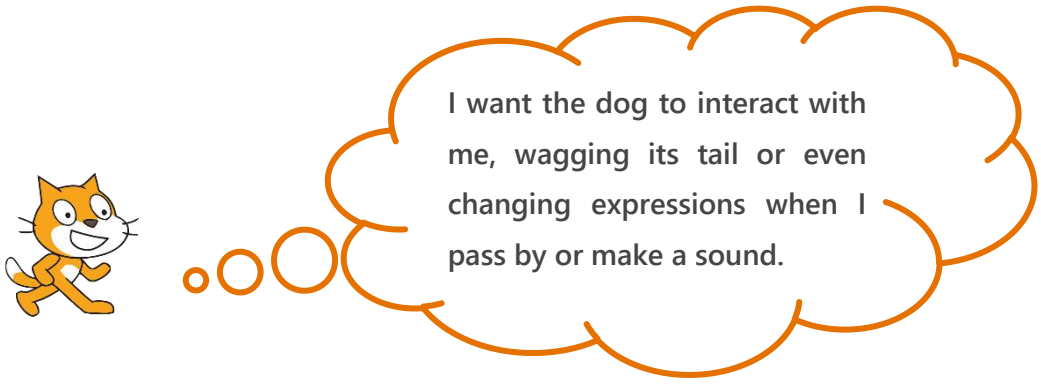
Micko



Ha-ha, this is just a tip of the iceberg.

You will find more interesting functions

5. Dream of Cat: Interactive Pet



6. Micko's Blackboard

STEP1: Connect the sound sensor to pin P0 of the expansion board and the motion sensor to pin P2.

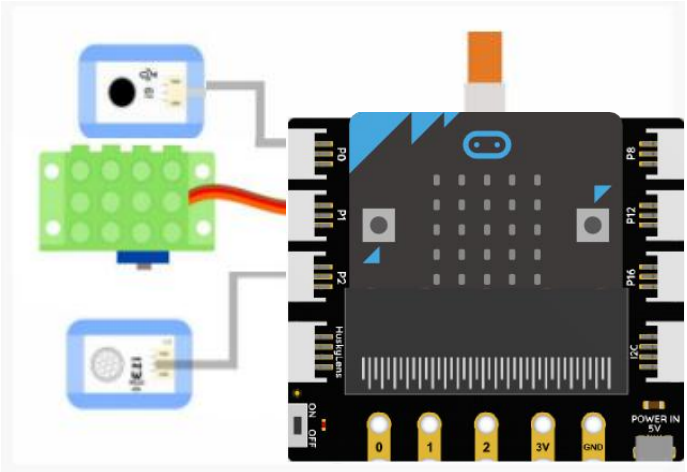
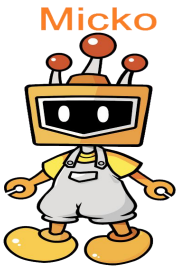


Figure 3.3.3 Connection Diagram



Sweetie, note that the sound sensor outputs an analog value, while the motion sensor outputs a digital value of 0 or 1. So remember to select the correct pin!

STEP2：Programming

1. Select "OR" function in the "Operators" module, determine whether "read analog pin P0" > 500 or "read digital pin P0" =1, when one of the conditions is met, set the servo angle to certain degrees to simulate swing.

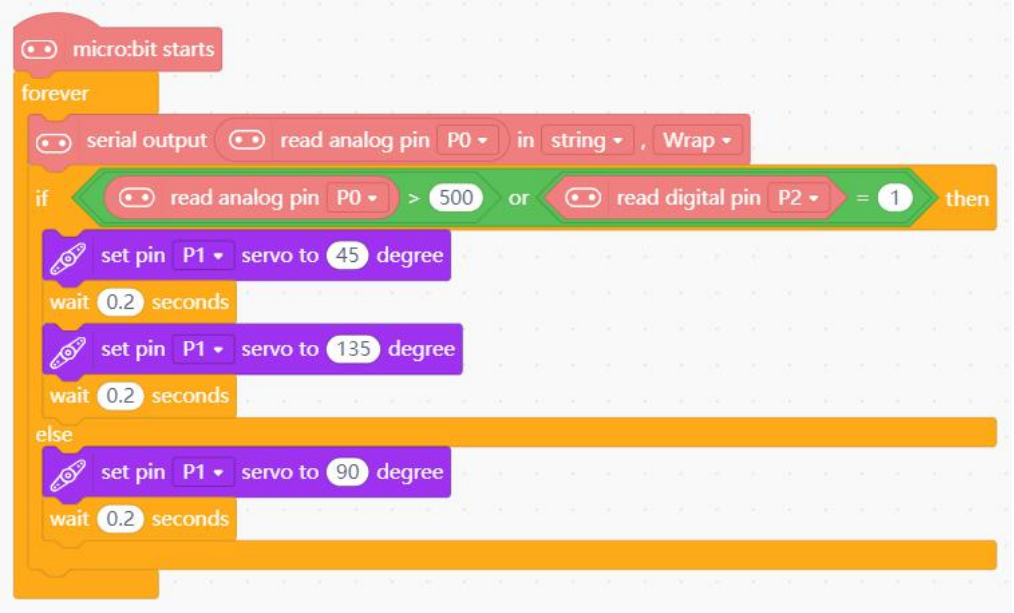


Figure 3.3.4 Run the Program

Note: **Enable the serial string output function, and open the serial port in the serial monitor at the lower right corner to display the read**

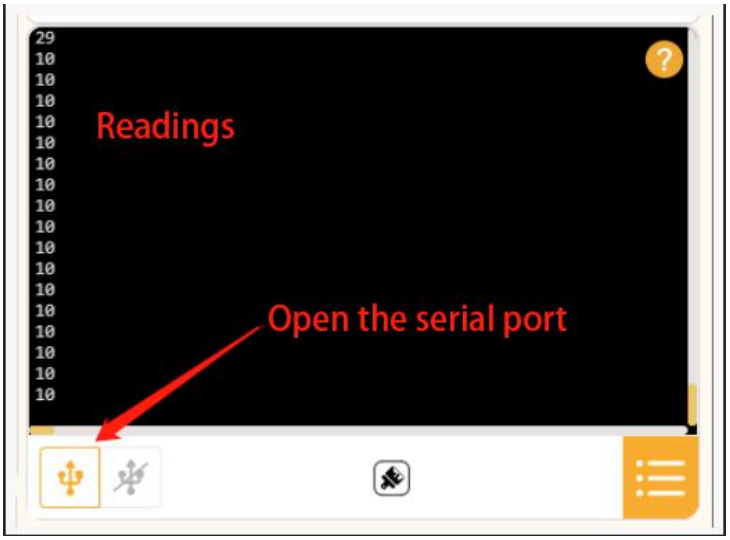


Figure 3.3.5 Serial Monitor

2. Design dynamic expressions for sleeping and waking up. Adjust the time of the tail wagging to make your pocket pet cleverer. Complete program:

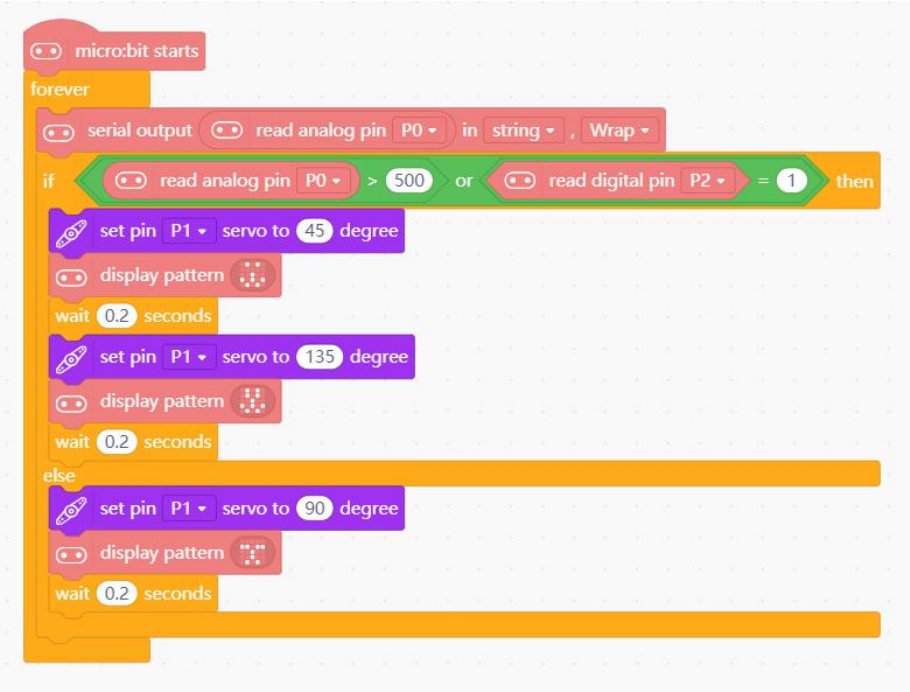


Figure 3.3.6 Run the Program

7. Creation of Cat

Micko

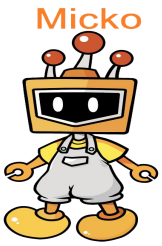
Sweetie, design an interesting shape for your pocket pet! What else can we do with a servo except simulating puppy's tail? Think it over.

My Design

My Program

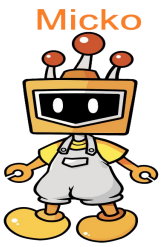
Project 2: Lighting Show

1. Story of Cat and Micko



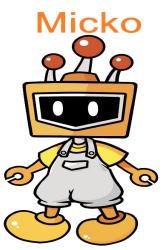
My friend, Christmas is coming, what kind of program will you perform?

Mr. Micko, I want to play a new trick this year. I want to act as a lighting engineer to present a dazzling light show.



Wow! Sounds cool!

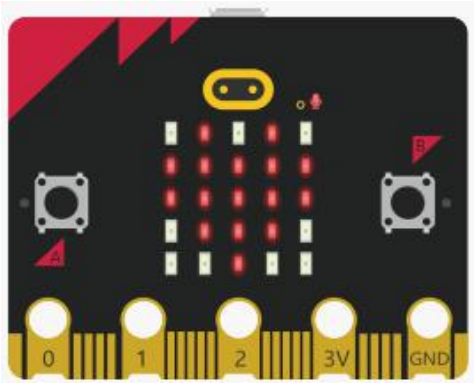
Yes! I want to make a smart lighting console with micro:bit. Mr. Micko, would you do me a



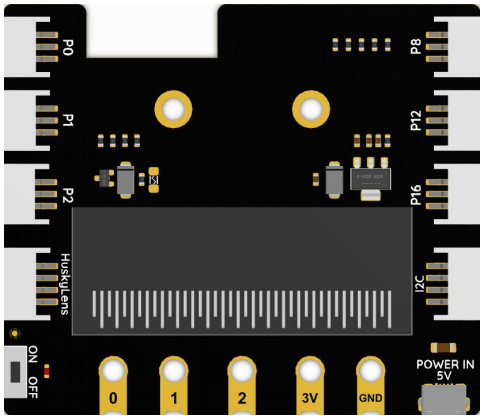
No problem, I am so glad to lend you a hand.

Wonderful! Let's begin the work!

2. Micko's Pocket

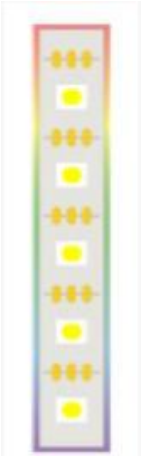


1× micro: bit



1× Boson Expansion Board

1× Knob Module



1× Colorful LED Strip

1× micro USB Cable

3. Dream of Cat

I want the LED strip to flash various colors by adjusting the rotation angle of the

When switching the knob, the analog value of the pin connected to the knob changes from 0~1023. We can divide them into 8 small ranges, corresponding to the color change of LEDs. As shown in Table 5.2.1.

The input value of Knob (P1)	The LED strip
0~128	Red
128~256	Orange
256~384	Yellow
384~512	Green
512~640	Cyan
640~768	Blue
768~896	Purple
896~1023	Pink

Table 5.2.1

4. Micko's Blackboard

STEP1: Connect the knob module to Pin P1 of the expansion board, the LED strip to P2

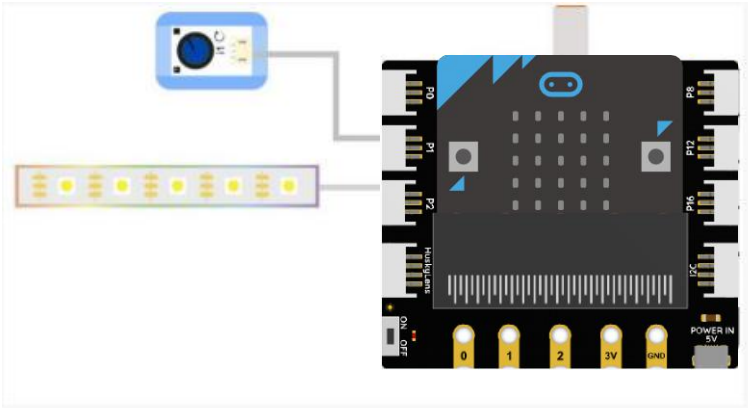


Figure 4.2.1 Connection Diagram

STEP2: The following logic diagram will help you to build a general idea about how to realize a light show.

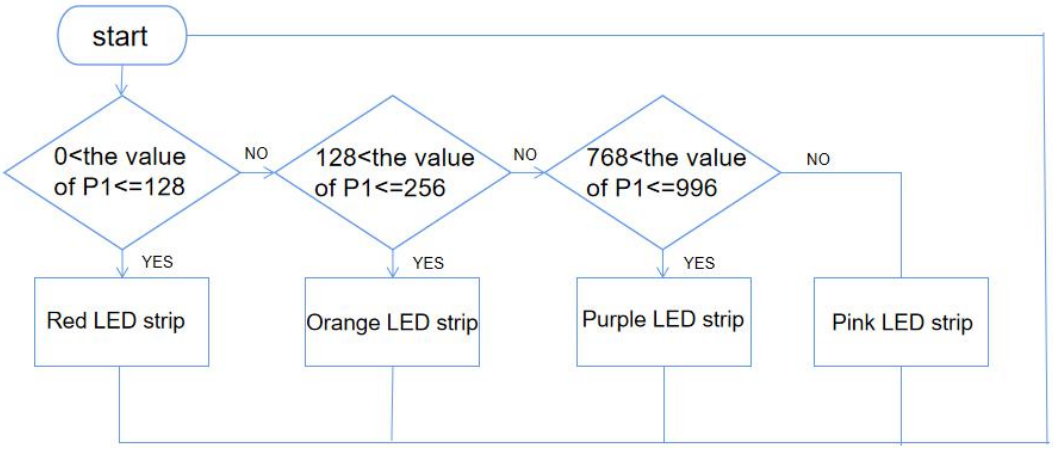


Figure 4.2.2 Flow Chart

STEP3: Programming

1. Take programming "0<knob P1<128" as an example, set the range of Knob P1 through the "and" function in the "Operators" module, then put the set range into the condition of "if...then...else" block, nest the LED strip effect blocks inside the "...then..." function, if the condition is not met, the LED strip turns off.

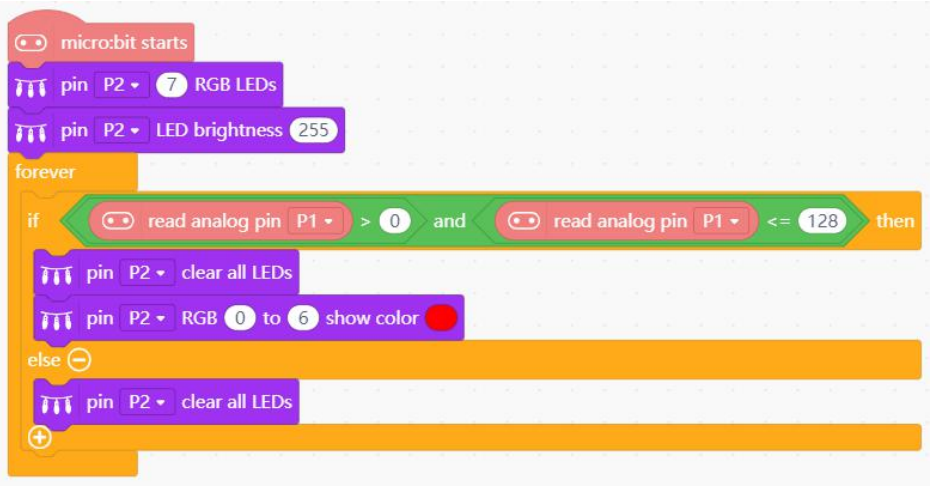


Figure 4.2.3 Sample Program 1

2. Click "+" below the "else" block, and the "else if... then" function will be added to the "if...then...else" function. Determine whether the knob <= 256

when the last condition is not met, if the knob <= 256, the LED strip displays orange. Use the same way to determine the remaining 5 "if...then...else" conditions. When all the conditions are not met, the pink color is displayed.

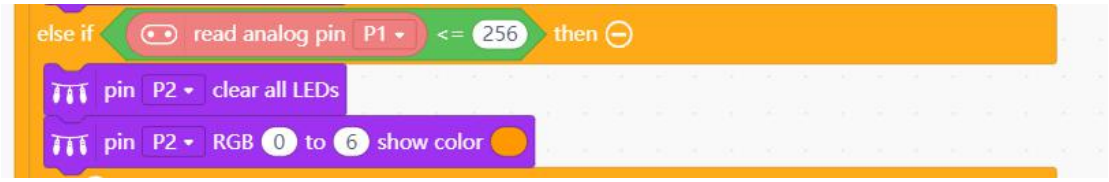
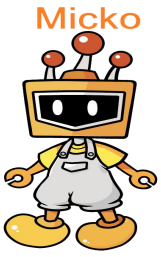


Figure 4.2.4 Sample Program 2

Mr. Micko, this program is not too hard. It is just a little tedious.

Micko



Yes, here we can use the copy function in coding

Right click the mouse on the module and select Copy to copy the code.

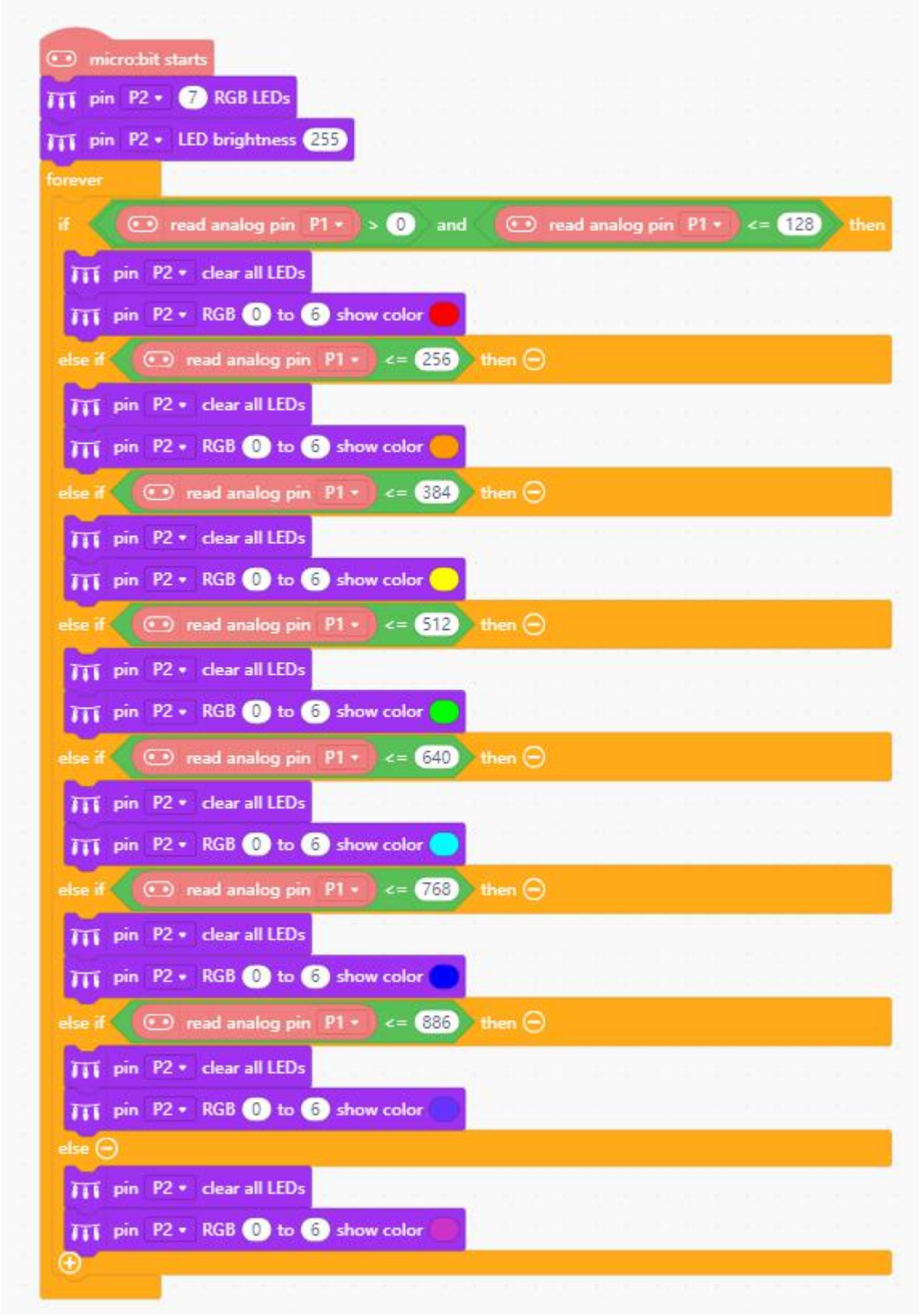


Figure 4.2.5 Run the Program

3. To facilitate operation, we can make a little bit improvement in the appearance of the light console, such as adding a handle for the knob, or marking the range of each color.

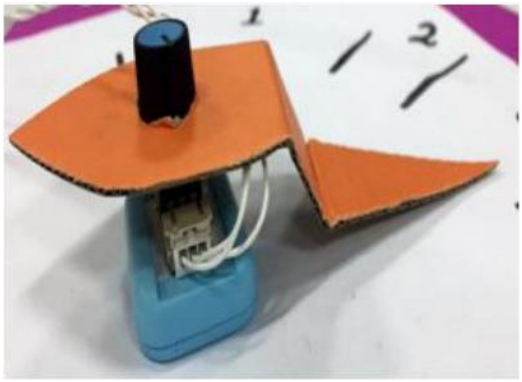


Figure 4.2.7 Improvement 1

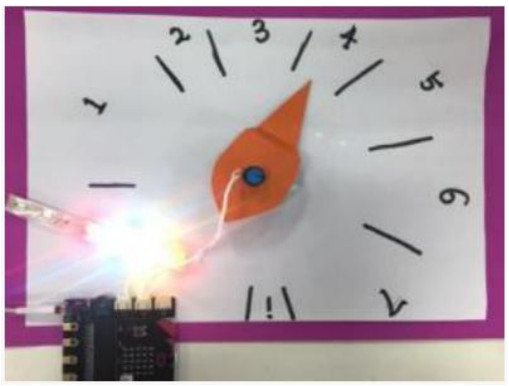
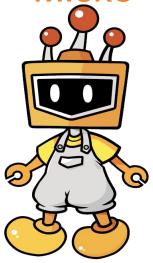


Figure 4.2.8 Improvement 2

5. Invention of Cat

Mr. Micko, I am so exciting to make my own light console.

Micko



My dear, do you want to improve your performance stage? Combine with the content of "Colorful LED Strip", and try using a sound sensor to control the number of blinking LEDs.

My Design

My Program