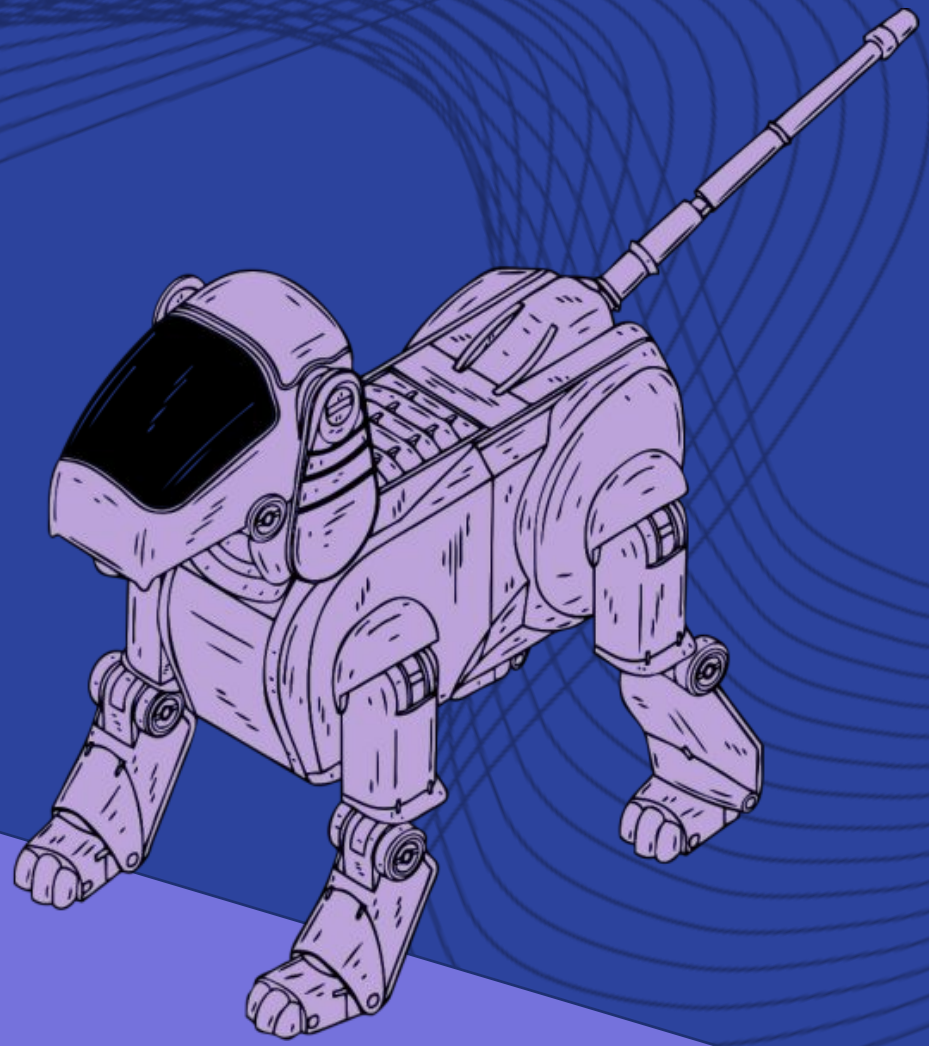
BBC Micro:Bit - MicroPython

Level 3 – Python

Robotics



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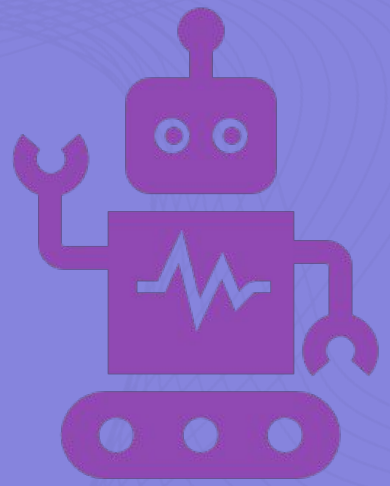
Introduction

Micro:Bits are pocket-sized computers with the potential to create whatever your imagination can code!

The Micro:Bit helps you to understand how computers work in this new tech-savvy world!



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Task

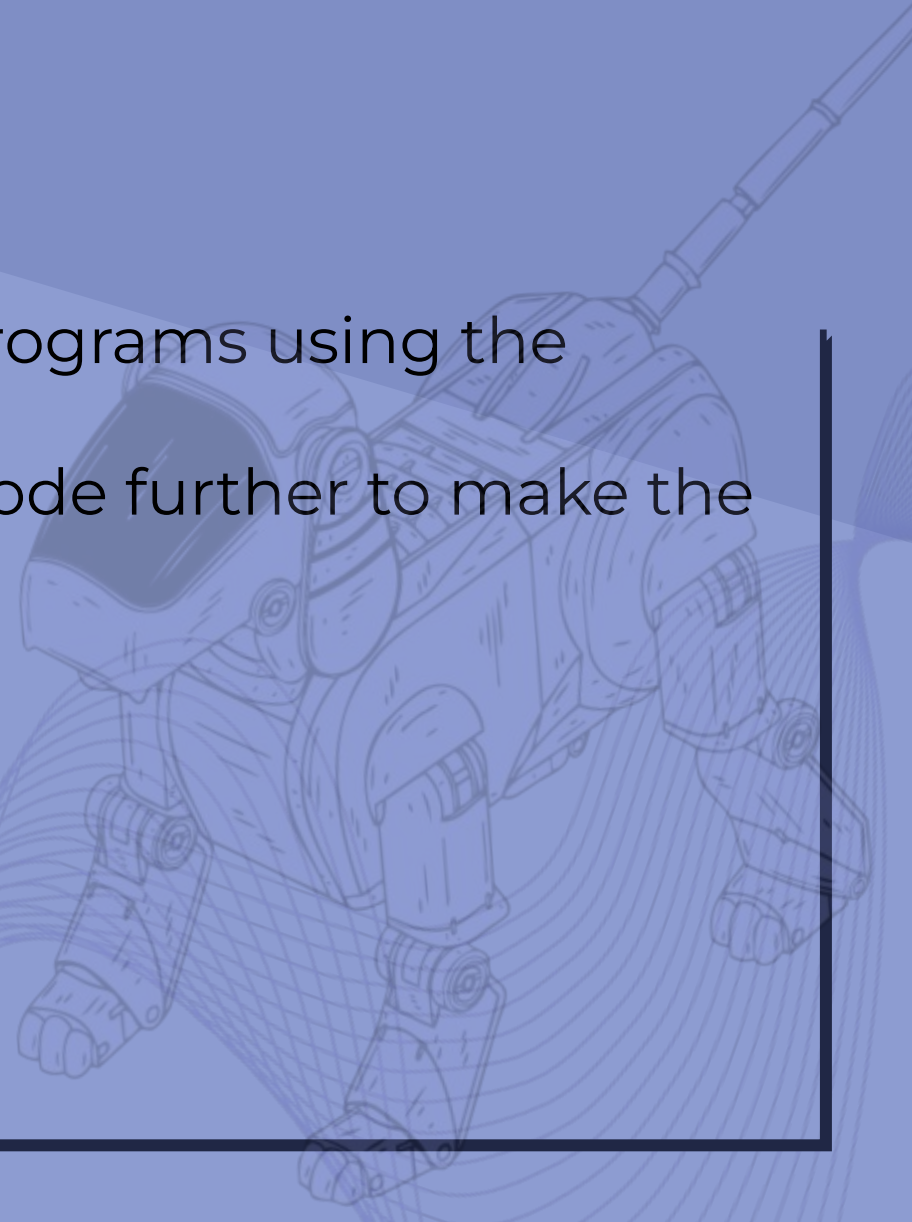
Lesson Objectives:

- To develop our skills in programming using the python programming language
- To understand some simple **Python** syntax
- To realise the similarities with the way we program in python compared to blocks.

Process

Success Criteria

- ✔ ALL: To develop some simple Micro:Bit programs using the python programming language.
- ✔ MOST/SOME: To be able to develop the code further to make the programmes more unique.



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Key words:

Syntax –
The set of rules and keywords that govern the structure of a programming language.

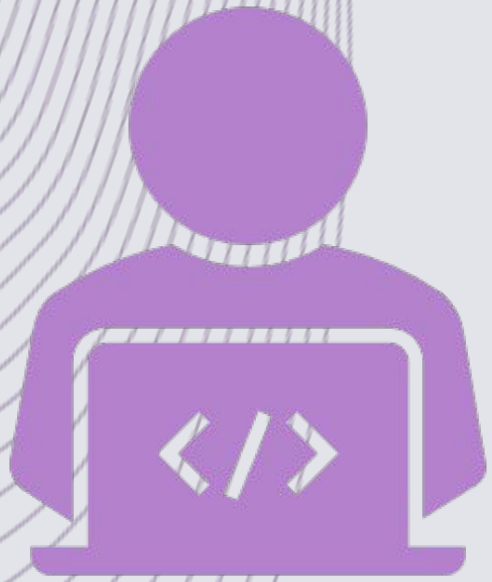
Variables –
A memory store in a programme (think of it as a box which stores a piece of data).

Advanced Programming

Programming with ‘Blocks’ is great!
But, there is a limit with what you can do. If you wish to get your Micro:Bit working with other components like motors and screens, we need to use a more advanced language.

Luckily, the Micro:Bit can be programming in Python.

The next few slides will introduce you to programming the Micro:Bit with python.

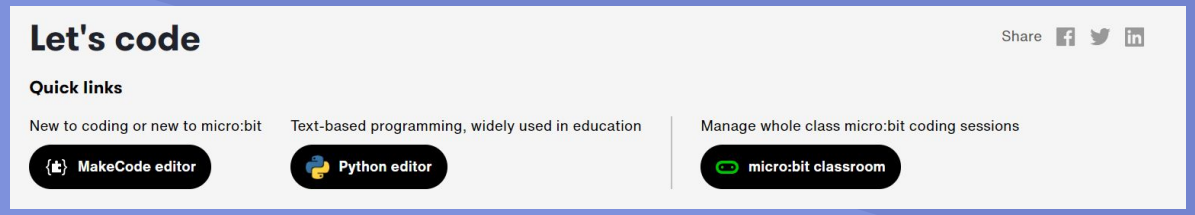


Step 1

An introduction to MicroPython

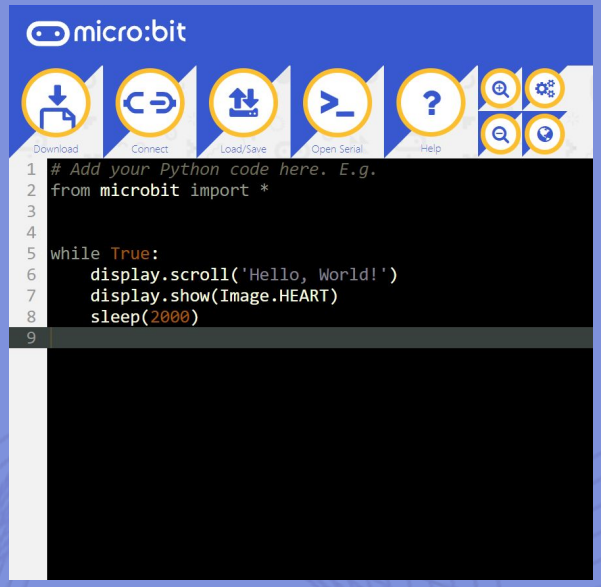
To get started, choose ‘Python’ from the ‘create code’ page.

You will be taken to the MicroPython IDE (programming environment).



Here you can write your code and download the compiled program ready to ‘drag and drop’ onto your device.

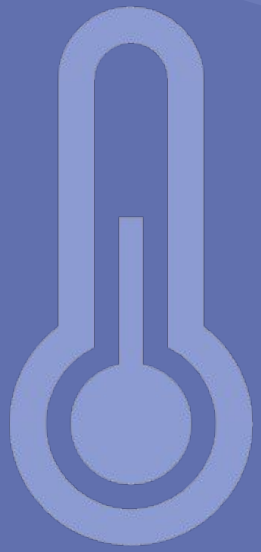
With this environment, there is no way to simulate your programme – the only way to test your code is to flash to your device and try it out!



Our First Project

Thermometer

The Micro:Bit has a built-in thermometer and in our first programme we will make use of it!



Step 2

How to build a thermometer

Whenever we code a programme for our Micro:Bit, in python, we first must import a library of code which will enable our code to work with the device's components.

Now that the library has been imported, this programme begins with the code "while True".

This line is effectively a forever loop. The code inside it (indented underneath) will run repeatedly.

The first line inside the loop will read the temperature of the thermometer and store it in a variable called 'current_temp'.

Then, the second line displays the contents of the variable on the screen.

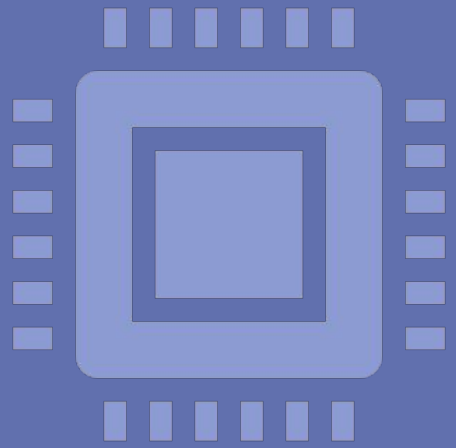
```
from microbit import *

while True:
    current_temp = temperature()
    display.scroll(str(current_temp))
```

Our Second Project

Testing the buttons of the Micro:Bit

As we already know, the Micro:Bit has two buttons, so let’s see how to program these in python.



Step 1

Creating a simple program using the buttons

To begin with, we create a variable called ‘counter’.

We then enter a ‘while True’ loop which will repeatedly display the contents of the variable ‘counter’.

If button A is pressed, the counter will have one added to it.

If button B is pressed, the counter will have one subtracted from it.

Simple!

```
from microbit import *

counter = 0
while True:
    display.scroll(str(counter))
    if button_a.is_pressed():
        counter = counter + 1
    if button_b.is_pressed():
        counter = counter - 1
```

Our Third Project

Using the random library

We will now use the random library to create a ‘magic 8 ball programme!

Step 1

Creating a magic 8 ball

To program our ‘magic 8 ball’ programme so that it picks a random message from the list when the device is shaken, we need to make use of the accelerometer – and not the button.

To do this we simply change
‘IF button_a.is_pressed’
to
‘IF accelerometer.was_gesture(“shake”)’.

```
from microbit import *
import random

magic_8_ball = [
    "Yes",
    "No",
    "Maybe",
    "Never",
    "Always",
    "???",
    ]

while True:
    if accelerometer.was_gesture("shake"):
        result = random.choice(magic_8_ball)
        display.scroll(result)
```

Further Tasks:

If you are confident about the previous tasks, try these and see how you get on!

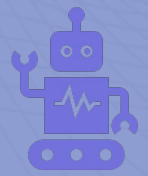
Challenge 2:

Develop the thermometer programme so that it displays:
‘COOL’ if the device is under 20 degrees
‘WARM’ if the device is between 20-22 degrees
‘HOT’ if the device is over 22 degrees
Test it out by placing it under the air-con (cool) and inside your hands (hot)

Challenge 3:

Create your own programme using ideas from today’s lesson and develop your own python powered Micro:Bit device.

Links to everyday life



Robotics

The coding of the Micro:Bit itself is classed as robotics since you are coding a device that interacts with its surroundings and even other people.

Creativity

This project makes you think deeply about just how much art can be incorporated into technology which we see all around us every single day

Wider World

As a society in the 21st century, we are surrounded by technology everywhere, sometimes even to the point, it can be intimidating. Starting with projects like this is a great way to start learning about technology.

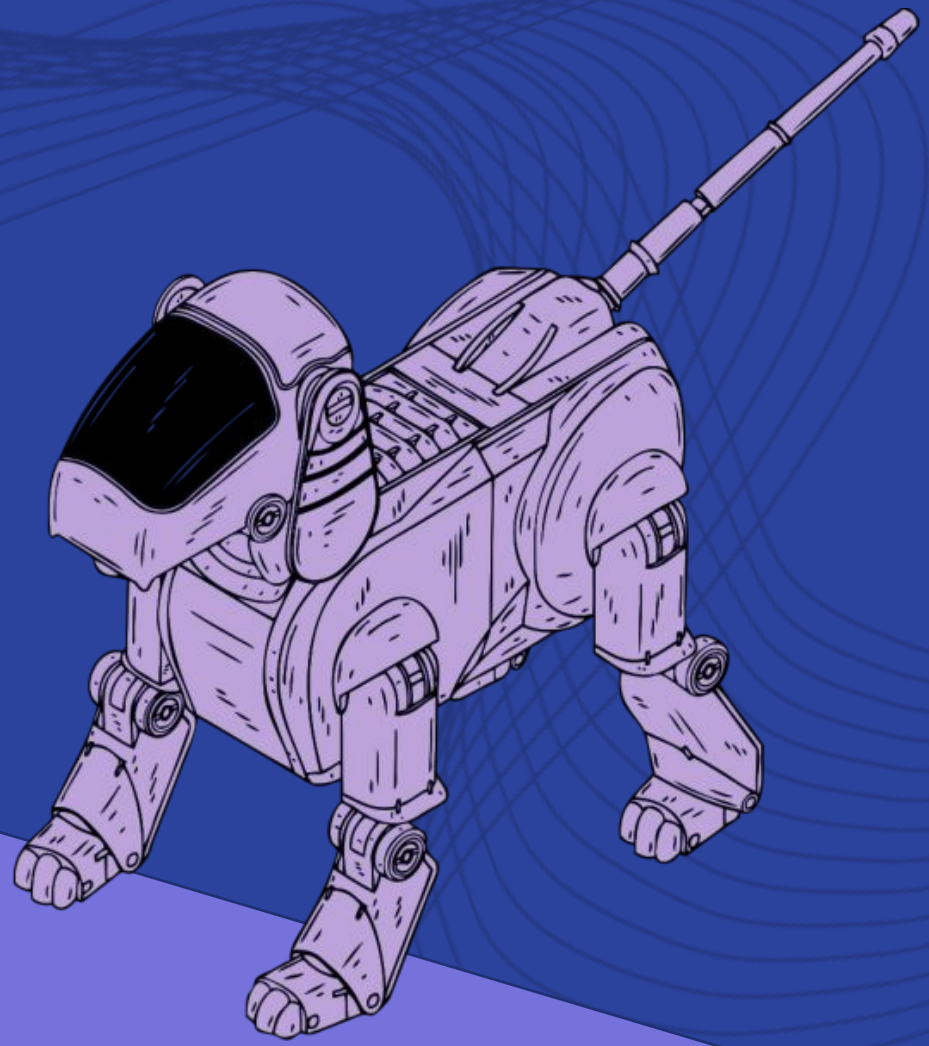
Conclusion

Learning outcomes

- ✔ I can develop skills in programming using the python programming language,
- ✔ I understand some simple python syntax,
- ✔ I realise the similarities with the way we program in python compared to blocks.

Congratulations!

You have completed the project



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