Section 1 Hello, world!

What is the BBC micro:bit?

The **BBC micro:bit (https://www.microbit.co.uk/device)** is a programmable circuit board with two push-to-make buttons, a grid of 5x5 LEDs, an accelerometer, compass, and GPIO expansion - and so much can be done with it. From digital dice to playable games, this tiny chip packs enough power for anyone to learn programming and then test their code on actual hardware.
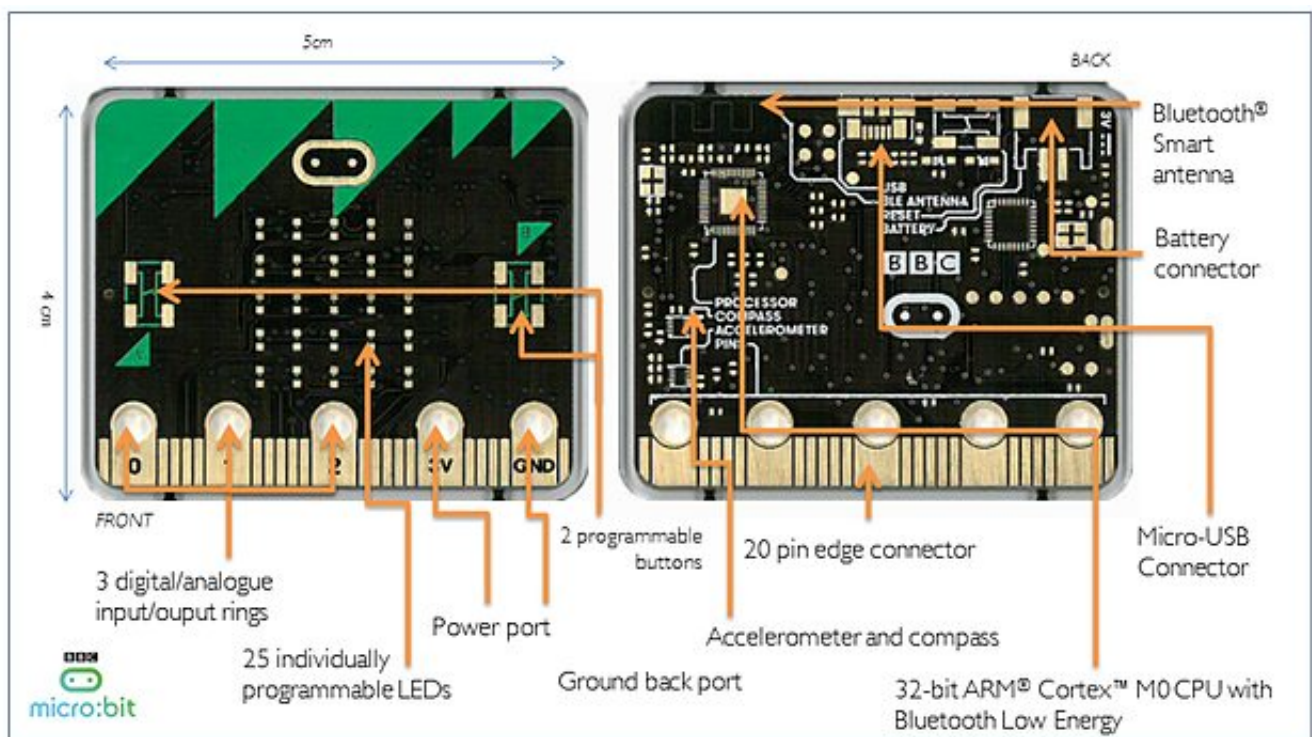
What can be done?

The **BBC micro:bit (https://www.microbit.co.uk/device)** has the following hardware features:

- Accelerometer – used to detect the degree of tilt on the BBC micro:bit
- Compass – with calibration, this can detect the heading of the device
- Two push-to-make buttons – you can detect when these buttons are pressed
- 25 LEDs – you can turn each of these LEDs on and off, allowing you to draw patterns, images, and display text.
- GPIO pins – General Purpose Input/Output pins, they allow you to connect additional components to the BBC micro:bit, for example more buttons, LEDs, or other electrical components

In addition to this, the **BBC micro:bit (https://www.microbit.co.uk/device)** has some more key features:

- Reset button on the underside of the unit – this button must be pressed to allow code to run
- Micro-USB port – this allows you to connect the BBC micro:bit to a device to program it
- Battery socket – you can attach a battery unit to the BBC micro:bit to carry your creations around with you

The BBC micro:bit may seem simplistic at first but with some creativity and imagination it allows you to create and code many things. For example, you could create a digital smartwatch, using the buttons to activate a chronograph feature, or even add games to your smartwatch. You can use the compass function to create a digital compass, or the accelerometer to create a game where the BBC micro:bit is used a steering wheel. You could make a digital spirit level, or a rock-paper-scissors game that detects when the device is shaken. These are just some examples!

What is a computer program?

Everything runs on code.

You can turn on your computer because code was written (programmed) to let you, code runs your mobile phone, and is the reason why your flashy coffee machine actually makes something when you press a button.

These tutorials will introduce core concepts of coding and show the interaction between hardware and software. By the end of these tutorials you will be able to program your BBC micro:bit to do lots of things: from calculators to games to a digital dice. You can then use this knowledge and the BBC micro:bit hardware to create anything you want – once you can code, you can create anything.

Once you have worked through the tutorials and tasks of this book you will be able to program a million and one things for your BBC Micro:bit and beyond. If you can come up with the idea then you can construct it from code.

This guide will leave you with enough knowledge to right your own programs, and with a level of understanding that allows you to go on to create anything.

"Give a man a fish and he will eat for a day. Teach him how to fish and he will eat for a lifetime" -Chinese Proverb

Welcome to the Block Editor

Getting Started

Go to **https://www.microbit.co.uk (https://www.microbit.co.uk)** and click **Create Code (https://www.microbit.co.uk/create-code)** in the bar at the top of the website. Click *New Project* below the *Microsoft Block Editor* heading. You can write code for the BBC micro:bit using multiple editors; this documentation runs you through using **Microsoft Block Editor (https://www.microbit.co.uk/blocks/contents)** .

Click *Create Code* then select Microsoft Block Editor *New Project* Finally, type in "Hello, world!" for your script name. A screen like the one below should appear:

BBC micro:bit simulator
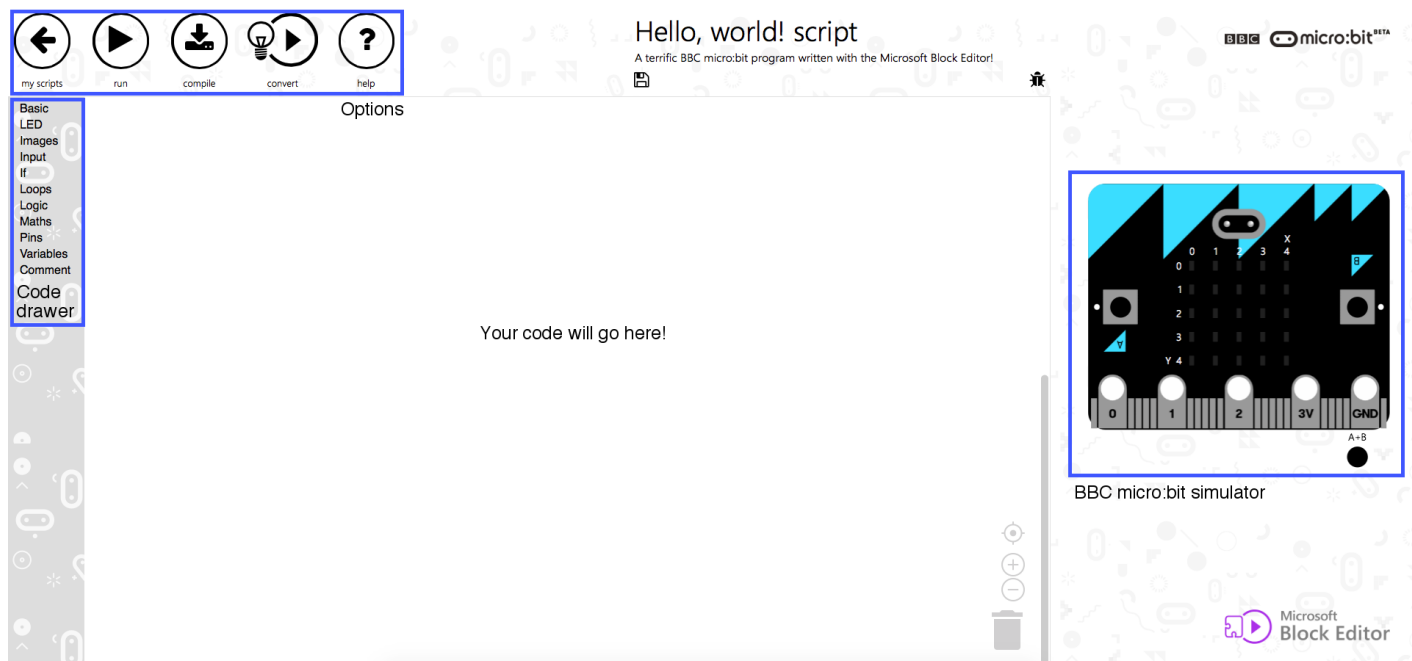
The simulator window

You don't need a BBC micro:bit to test code. When you click the *run* button, the **simulator (https://www.microbit.co.uk/td/simulator)** window to the right of the code view displays the result of your code. The LEDs will glow and you can click the buttons to emulate actions on a physical device.

Adding code

To make our BBC micro:bit do anything we have to code it; we write code by dragging in blocks. These blocks form a jigsaw structure, which makes our BBC micro:bit do things. These blocks fit into categories in different drawers.

We want to write a program that will make the BBC micro:bit's LEDs glow to say 'Hello, world!' so we start by clicking on the 'Basic' tab in the code drawer to the left of the view. Click and drag a **show string (https://www.microbit.co.uk/functions/show-string)** block from the drawer.

Click the *run* button – the LEDs on the virtual **BBC micro:bit (https://www.microbit.co.uk/td/simulator)** should glow to show the message!

Understanding the code

The code above is quite easily understandable; it simply displays the message (or string, which is what words or sentences are known as in programming) "Hello world!", with an interval of 100 ms between each letter. Try changing the number 100 to another number and clicking *run* to see the change of speed, or change the text. These are known as parameters or arguments – changing these changes the way our code runs, but no matter what we input the BBC micro:bit knows to display a scrolling message on the LEDs.

You've now written your first line of code using **Microsoft Block Editor (https://www.microbit.co.uk/blocks/contents)** ! Read on to see how to create more complex programs and how to test your code on an actual **BBC micro:bit (https://www.microbit.co.uk/device)** .
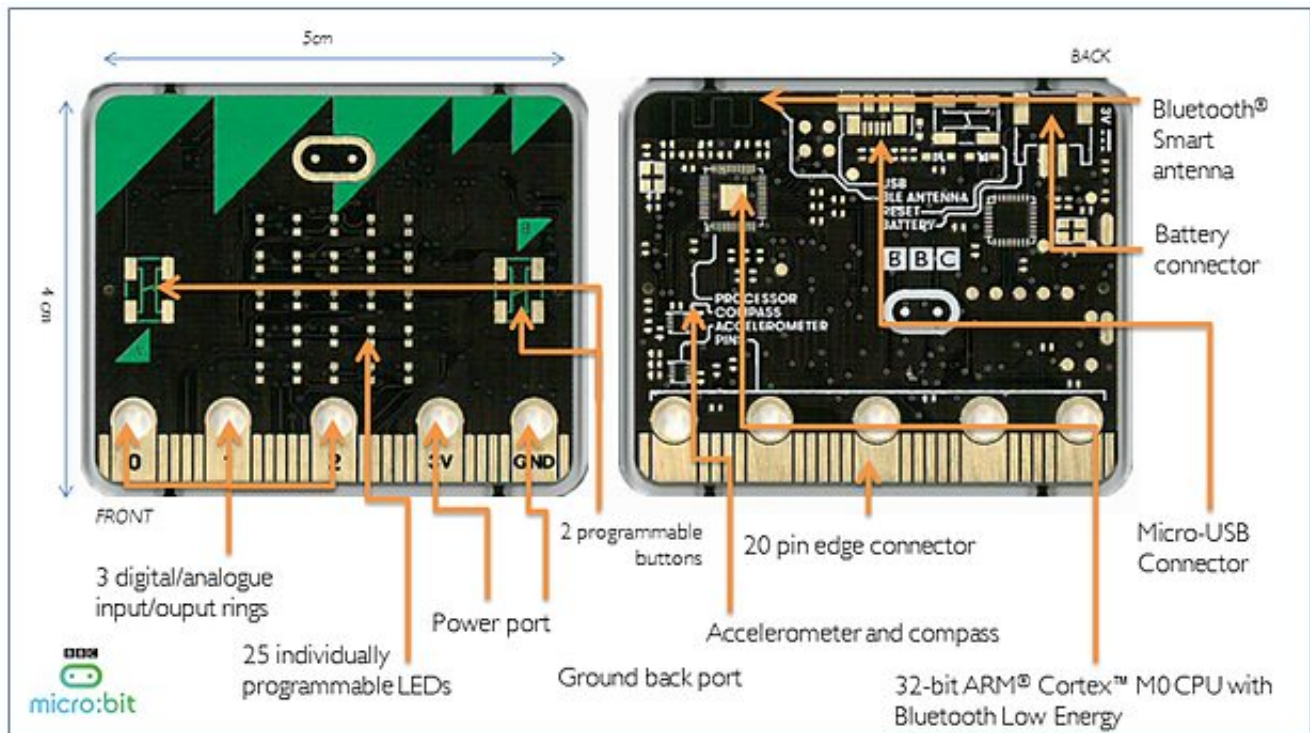

What is code?

Code is what makes up a program, which is essentially a set of instructions, which tells a computer or hardware what to do. Our code tells the BBC micro:bit to say, "Hello, world!"

Connecting the hardware

To test your code on an actual BBC micro:bit, you will need a BBC micro:bit and a Micro-USB to USB cable (computer/laptop) or Micro-USB to Micro-USB (Samsung Device). The Micro-USB to USB cable will come with your BBC micro:bit. For the Micro-USB to USB cable, connect the smaller end of the cable into the small port and plug the other end into the USB port of your computer.

The computer should recognize the BBC micro:bit as a driver. Go to your browser window and click the *compile* button to get Microsoft Block Editor to convert your code into code understood by the BBC micro:bit. This code will then be downloaded to your computer. Finally, click and drag the .hex file generated by the Microsoft Block Editor on to the BBC micro:bit drive. The status LED on the

underside of the BBC micro:bit will flash as the code is written to the BBC micro:bit.

Where next?

Section 2 - If statements (https://www.microbit.co.uk/blocks/book/if-statements)

Table of Contents (https://www.microbit.co.uk/blocks/book)