

Tech in the Lab

Activity Guide

In this activity learners will explore how to write code through the use of coding blocks in MakeCode language, learn about micro:bit and understand its variety of sensors, using this knowledge to understand how coding and technology can help scientific laboratories.

Suitable for: age 7-14

Estimated duration: 10 - 30 minutes (per task)

You will need:

- Computer with an up-to-date web-browser
- BBC micro:bit cable (optional)
- BBC micro:bit (optional)
- A small box, like a shoebox (for Task 1 - Fridge Alert, optional)

Introduction

Technology can help scientists in many different ways. For example, software developers build lots of helpful tools, including things like a software called LIMS (Laboratory Information Systems) to track a sample from arriving in the lab through to the moment it is processed. Scientists also rely on equipment that has lots of sensors, often controlled by a computer, to help them with their research.

This activity contains two tasks (Fridge Alert and Flat Flask) which illustrate different ways sensors can help scientists run the labs. By combining science and coding, we can show how tech can support scientists in other creative ways.

We will be using the MakeCode website to build the code, and the micro:bit simulator on this website to test your code. You do not need a physical micro:bit to do these two tasks, but if you happen to have one you are welcome to use it!

Running the activity

Set up

1. Open the MakeCode editor, either online at makecode.microbit.org or download it from makecode.microbit.org/offline-app. Create a 'New Project' and enter the name of the task. Alternatively, if you would like a more step by step guide to the task, open the tutorial link on the instruction sheet.
2. Test the code on the micro:bit simulation.

If using a micro:bit, then also:

3. Plug in the micro:bit to the computer using the micro:bit usb cable.
4. Make sure the micro:bit is turned on.
5. Click on the 'Download' button, under the micro:bit simulation. This will download the code onto the micro:bit.
6. Test the code on the micro:bit

Practice

With all micro:bit activities, we highly recommend experimenting with the micro:bit and MakeCode editor before running the activity to become familiar with the different types of coding blocks.

Warm up

1. Discuss how technology currently helps scientists and how it is going to benefit them in the future.
2. Explain what coding is.

Coding is the process of using a programming language to control a computer by giving it instructions.

3. Explain what a micro:bit is, and discuss what the students think they can do with it.

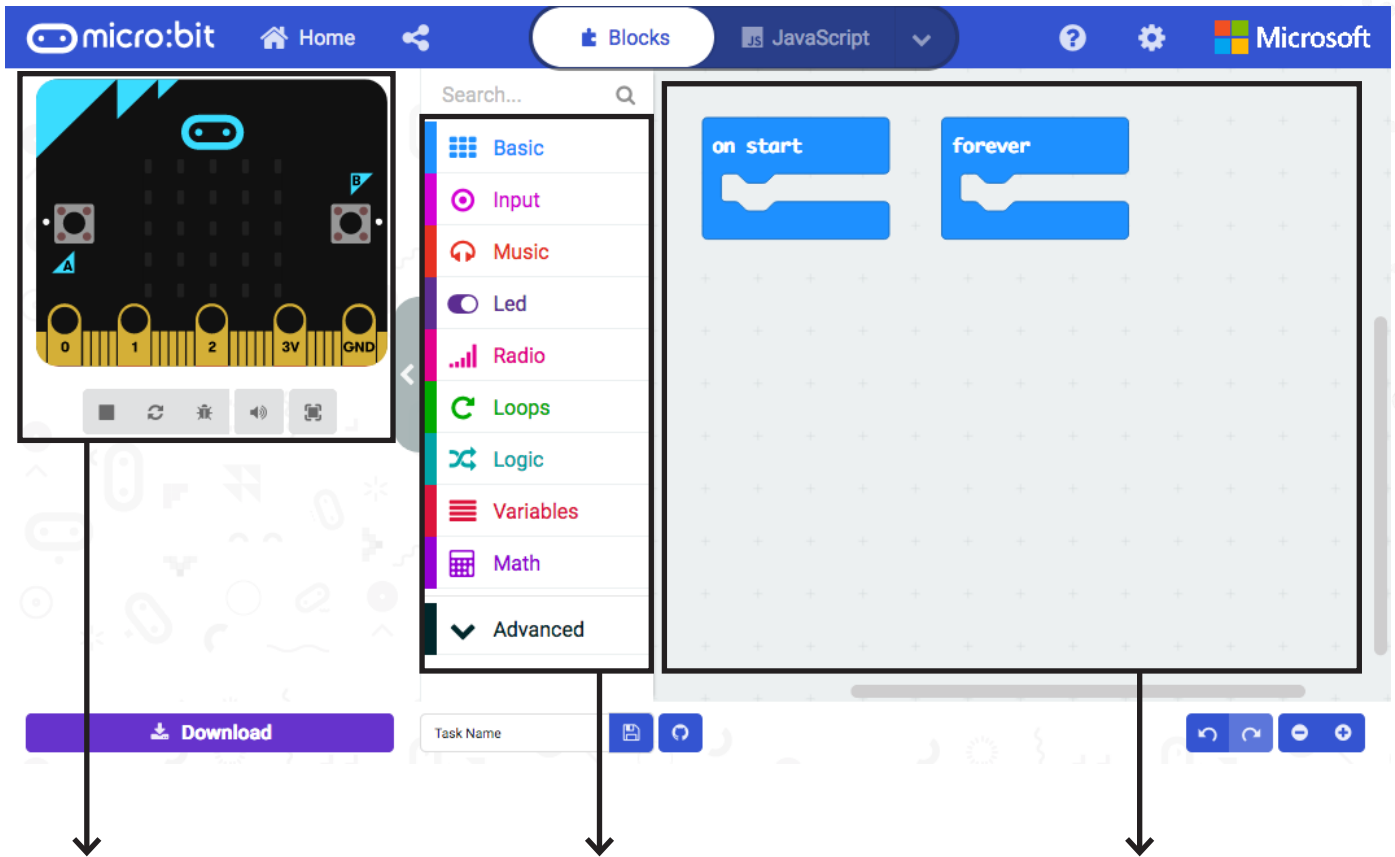
A **micro:bit** is a very small computer, created by the BBC for schools, with lots of sensors that can be coded through a block language called **MakeCode**. Make clear that this is not supposed to be a small scale full-featured computer like the Raspberry Pi.

4. Explain what sensors are and what sensors the micro:bit has. Also discuss what sensors the participants would like to use.

Sensors are devices that read information from the environment. Although the micro:bit is small, it has many sensors such as light, tilt and temperature.

5. Explain what MakeCode is and discuss the 3 sections of the platform.

MakeCode is the platform that we will use to code the micro:bit. The figure on the next page explains the different sections of MakeCode.



Micro:bit simulation

Here is where you can test your code, before downloading it onto the micro:bit. For example you can tilt the micro:bit, press buttons and control the light level.

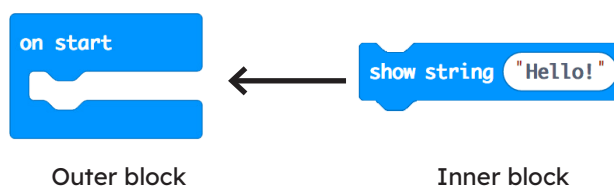
Code blocks

There are different colour blocks for different types of code, like input, music and image.

Outer blocks have flat tops and inner blocks have an indentation. Blocks with indentation go within outer blocks.

Coding panel

This is where you build your code. Drag and drop coding blocks onto the coding panel.



Run the activity

1. Give the participants the instructions sheet for the task.
2. Give them time to get familiar with the platform of the MakeCode editor.
3. Follow the instructions.
4. Encourage the participants to experiment with different coding blocks and be creative with the micro:bit as there is always more than one way to solve the problem!

Reflect on it

- Discuss any other micro:bit sensors the participants discovered.
- Discuss what coding blocks the participants used, and what they did.
- Discuss what other things micro:bit might be useful for, possibly within your household.

Take it further

If you enjoyed this activity, why not try some other micro:bit activities? The ones below are not science focused but can show different applications of the micro:bit.

Micro:bit projects: makecode.microbit.org/projects

Find out more

- What is the BBC micro:bit: microbit.org
- What is the Microsoft MakeCode: makecode.microbit.org
- What does a LIMS do: en.wikipedia.org/wiki/Laboratory_information_management_system
- Working in a lab: <https://www.yourgenome.org/theme/my-career-in-genomics-cancer-biology/>