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micro:bit Data Logging

What is Data Logging?

Data logging is the process of automatically recording information over a period of time.

We often use data loggers in science classrooms, to perform experiments and investigate how measures such as temperature, force, light, or sound change over time.

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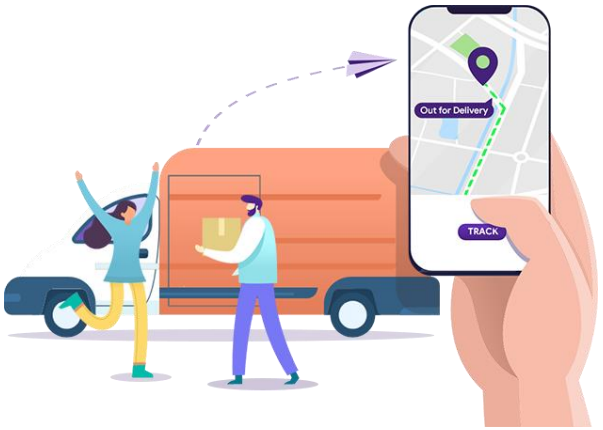
We often use data loggers in science classrooms, to perform experiments and investigate how measures such as temperature, force, light, or sound change over time.

We also all use data loggers in our daily lives:



What is Data Logging?

Data loggers allow us to record the results of our experiments without having to manually record each data point on paper.

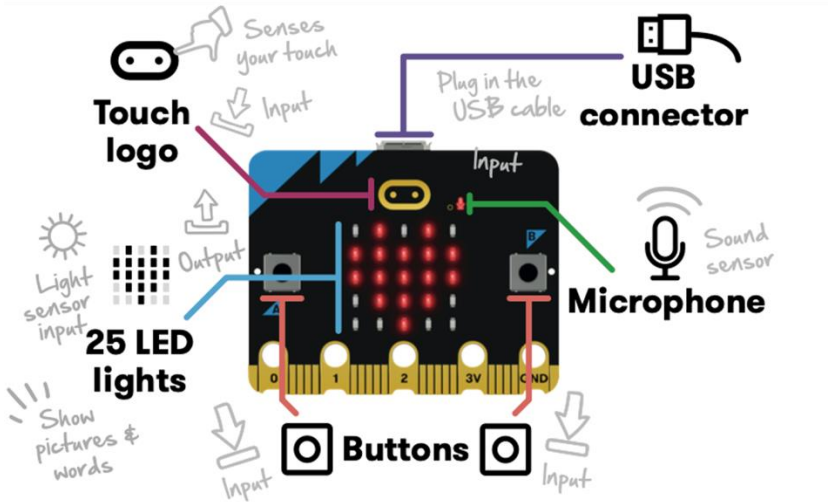
For example, we might want to measure how quickly something falls, or we could check how loud it is in the classroom throughout the day. Sometimes, we may even want to watch how the temperature changes over a whole week!

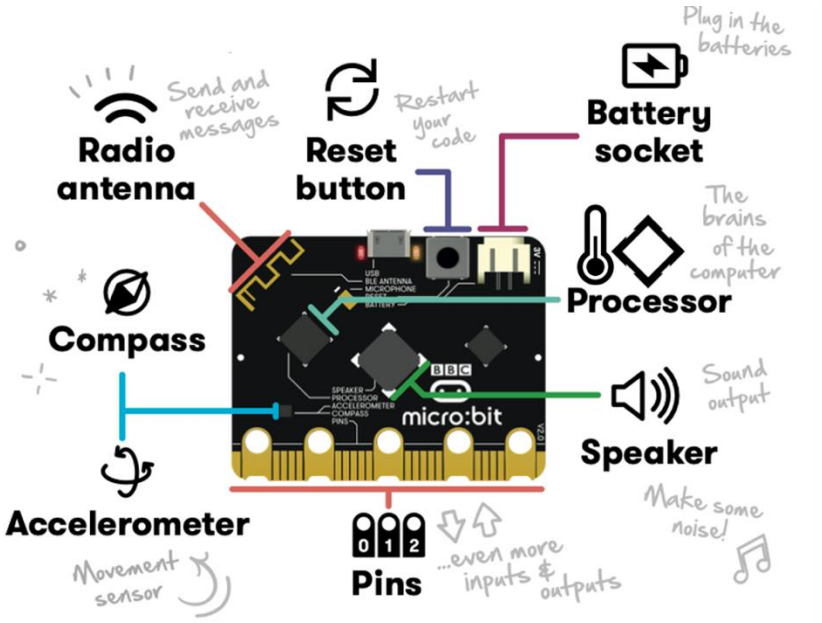
Data logging helps you and your learners collect data and analyse the results, which will help them understand the world.

Why Use a micro:bit?

The **micro:bit (V2)** is packed with sensors for measuring light, temperature, magnetism, acceleration and sound.

The micro:bit can record and store the data from these sensors in its internal memory, where it can be retrieved later for study.





Why Use a micro:bit?

This data will stay on your micro:bit even when the power is disconnected, and no special software is required to read it.

The data can be examined in tables, with a visual graph preview, straight from the micro:bit and only using a web browser!

Alternatively, the data can be downloaded to a spreadsheet, so your students can analyse the data statistically, visualise it and interpret it.

Planning the Experiment

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- How often is it collected?
- When should the data logging start and stop?
- How will this be controlled?

Planning the Experiment

Before starting an experiment, it's a good idea to plan:

- Should there be a visual indication on the LED display of when data is being collected? How about a sound?

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- Should there be a visual indication on the LED display of when data is being collected? How about a sound?
- What should happen if the data log is full (the micro:bit can only collect so many data points!)?

Planning the Experiment

Before starting an experiment, it's a good idea to plan:

- Should there be a visual indication on the LED display of when data is being collected? How about a sound?
- What should happen if the data log is full (the micro:bit can only collect so many data points!)?
- When should the data be erased from the micro:bit? This can be done within the program, or just by re-flashing the micro:bit.

Our Experiment

There are countless experiments you could plan for your classroom using these micro:bit Data Loggers - and we will provide some suggestions on these.

However, we are going to need a way of generating some interesting data quickly! Therefor…

DISCO TIME

DISCO TIME

What data will be collected?

We will log the sound level for each song that plays, and as we dance to the songs, the micro:bit will log our movement along each axis.

How often is it collected?

The micro:bit will log these measurements every 0.1s, so that our movements are accurately represented in the data.

DISCO TIME

When should the data logging start and stop? How will this be controlled?

- The data logging will **start** when we press both the A + B buttons of the micro:bit – this will avoid us accidentally pressing them.
- The data logging will **stop** either when the A + B buttons are pressed again, or when the log is full.

What should happen if the data log is full (the micro:bit can only collect so many data points!)?

When the log is **full**, the logging will stop.

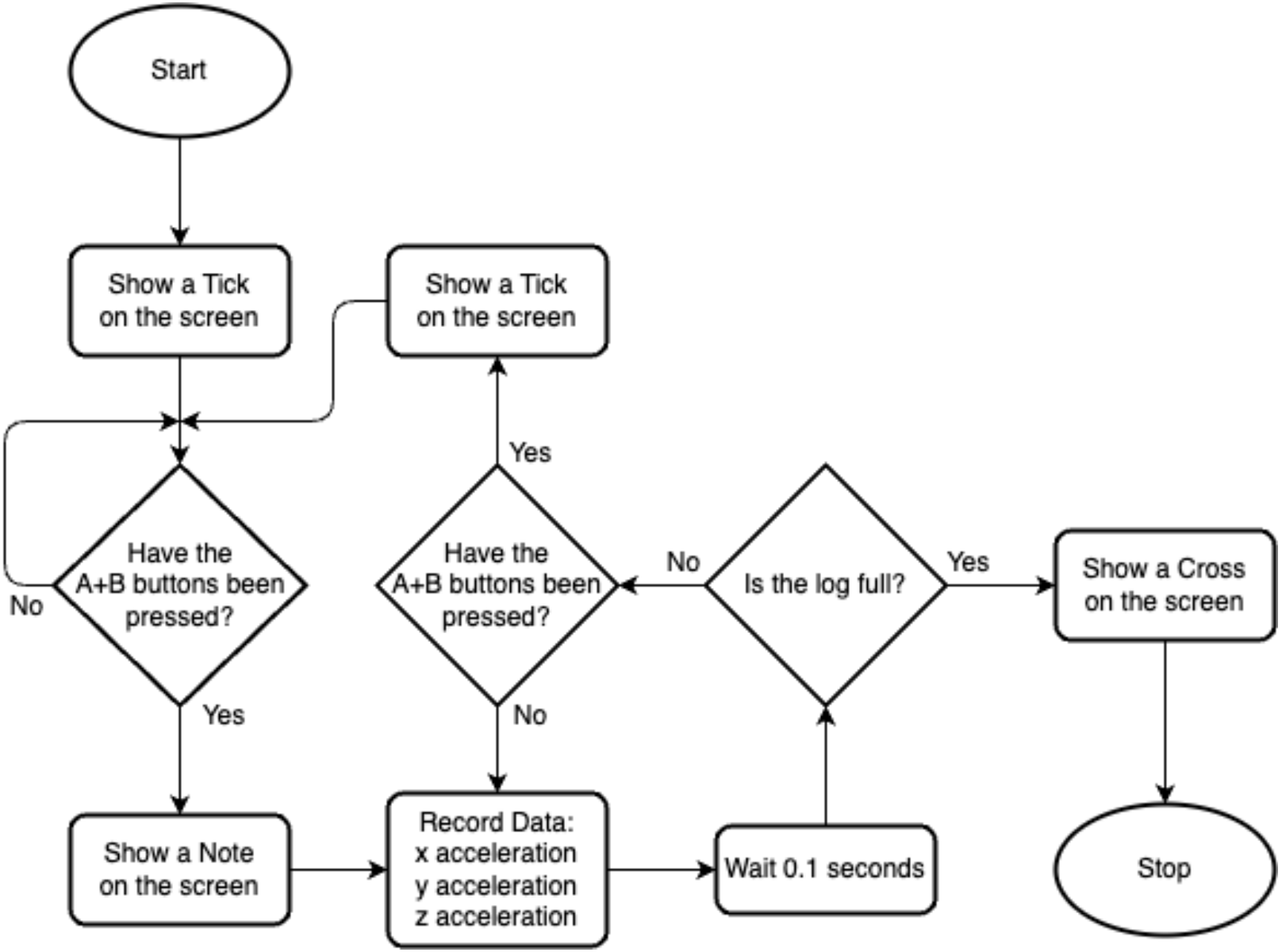
DISCO TIME

Should there be a visual indication on the LED display of when data is being collected? How about a sound?

- We will display a tick icon when the data can be logged, a musical note when it is being logged, and a cross when it is not being logged.
- It is pointless playing a sound when the experiment involves loud music.

When should the data be erased from the micro:bit? This can be done within the program, or just by re-flashing the micro:bit.

The only method of clearing the log will be to re-flash the micro:bit.



Create a Flowchart of the program

Programming the micro:bit

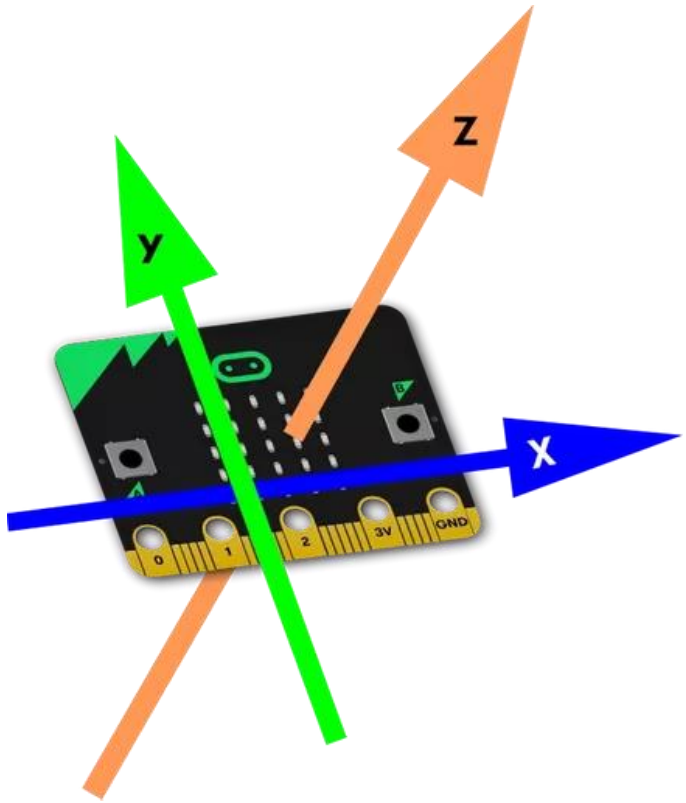
The Experiment (DISCO TIME)

The Experiment

Hold your micro:bit in your hand as demonstrated so that our axes make sense.

Press **A+B** at the start and end of every track, hold your micro:bit still for a second so that the pause appears in the data!

We will play 20s of each song, Mark will guide you with some remarkable dance moves!

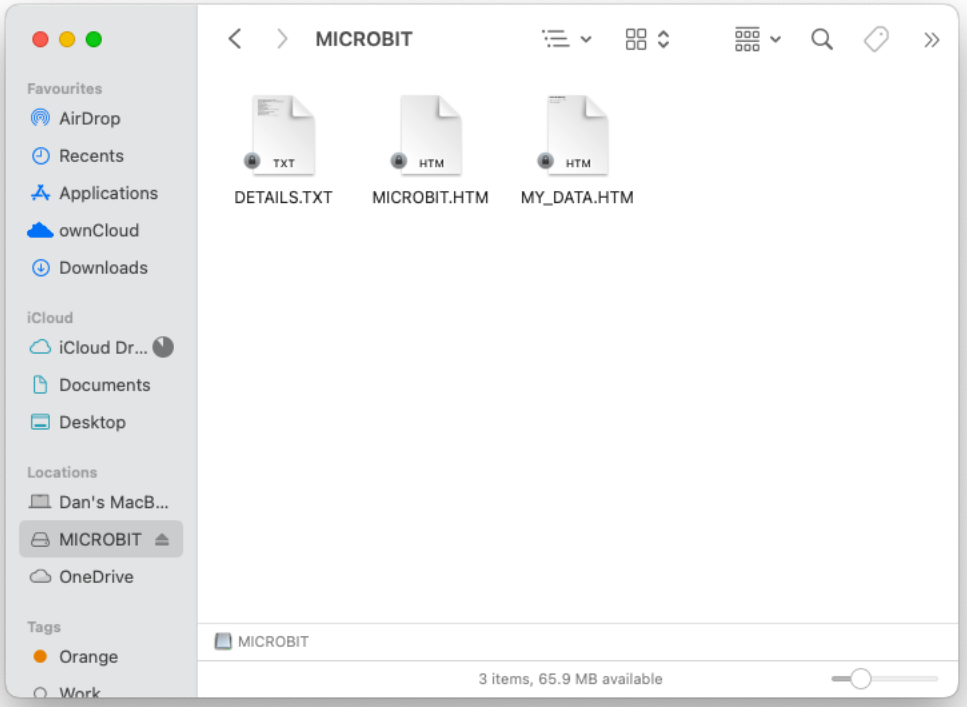


Opening The Data

After connecting your micro:bit open it within file explorer.

Double click on the file MY_DATA.HTM

This will open your data in the browser.

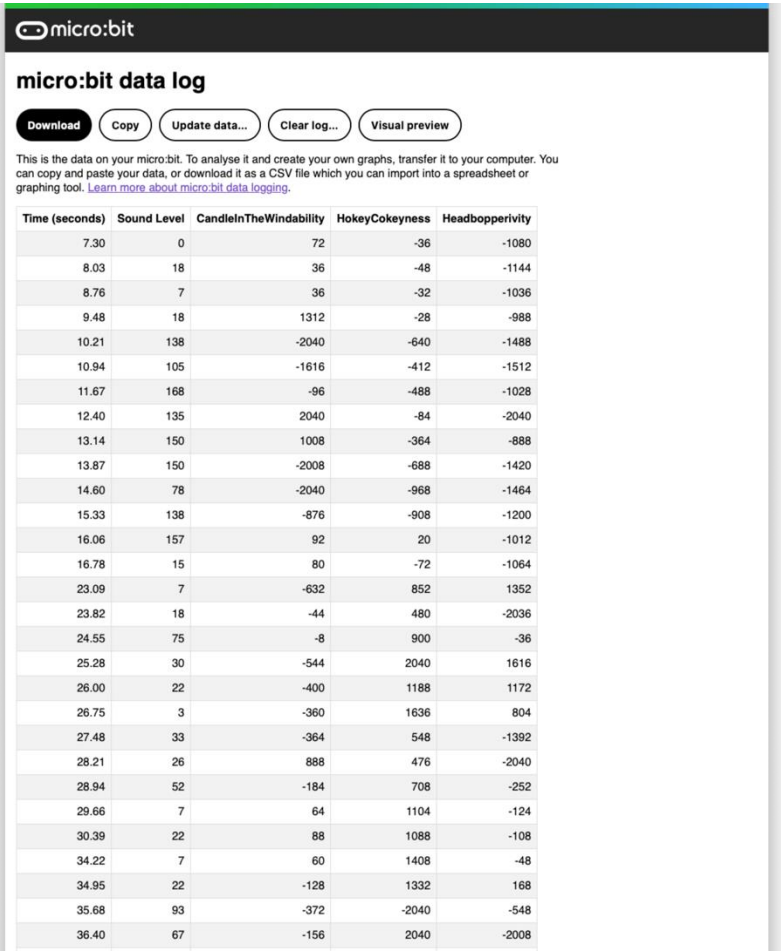


Your Data

Your data should open and look something like this.

In this window you can:

- Download your data
- Update the data (if you've taken new readings)
- Clear the log (from the micro:bit)
- Open a graph of the data (**Visual Preview**)



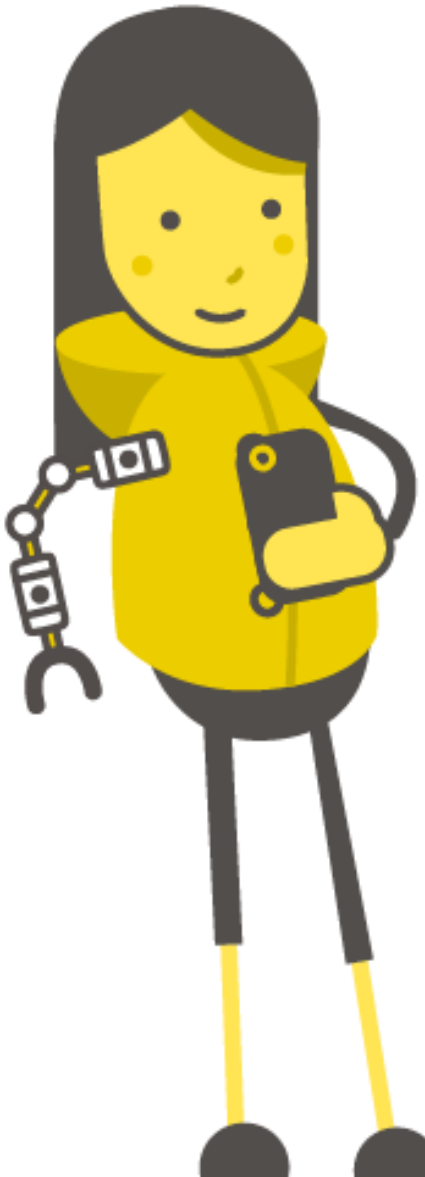
micro:bit

micro:bit data log

Download | Copy | Update data... | Clear log... | Visual preview

This is the data on your micro:bit. To analyse it and create your own graphs, transfer it to your computer. You can copy and paste your data, or download it as a CSV file which you can import into a spreadsheet or graphing tool. Learn more about micro:bit data logging.

Time (seconds)	Sound Level	CandleInTheWindability	HokeyCokeyness	Headbopperivity
7.30	0	72	-36	-1080
8.03	18	36	-48	-1144
8.76	7	36	-32	-1036
9.48	18	1312	-28	-988
10.21	138	-2040	-640	-1488
10.94	105	-1616	-412	-1512
11.67	168	-96	-488	-1028
12.40	135	2040	-84	-2040
13.14	150	1008	-364	-888
13.87	150	-2008	-688	-1420
14.60	78	-2040	-968	-1464
15.33	138	-876	-908	-1200
16.06	157	92	20	-1012
16.78	15	80	-72	-1064
23.09	7	-632	852	1352
23.82	18	-44	480	-2036
24.55	75	-8	900	-36
25.28	30	-544	2040	1616
26.00	22	-400	1188	1172
26.75	3	-360	1636	804
27.48	33	-364	548	-1392
28.21	26	888	476	-2040
28.94	52	-184	708	-252
29.66	7	64	1104	-124
30.39	22	88	1088	-108
34.22	7	60	1408	-48
34.95	22	-128	1332	168
35.68	93	-372	-2040	-548
36.40	67	-156	2040	-2008



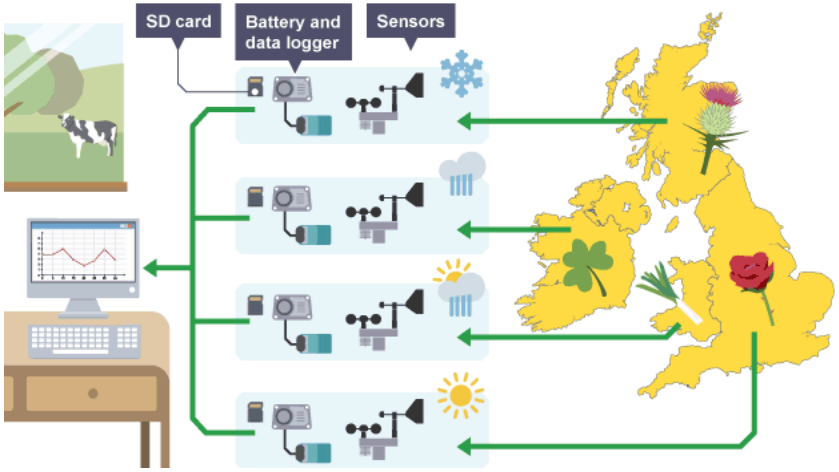
Investigating Our Data

Ideas for Data Logging

Ideas for Data Logging

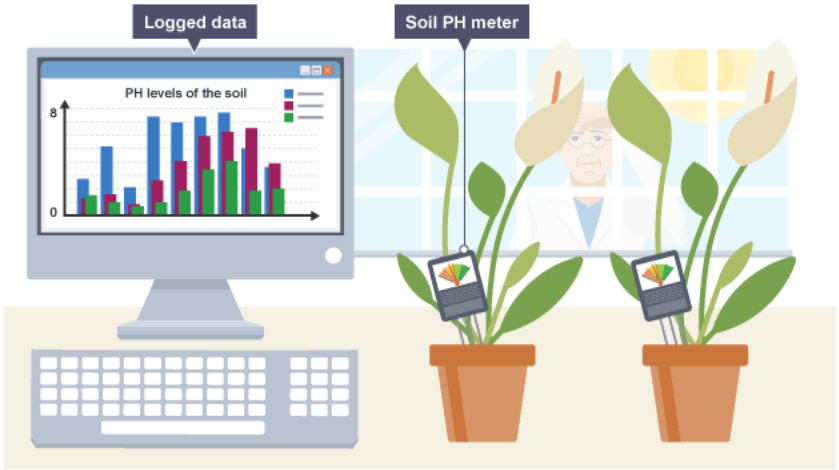
Logging Temperature at various locations (either around the school or on school trips!)

You could hang (or attach a parachute to…) the micro:bit and log wind data with acceleration!



Logging Temperature and Light Level within a greenhouse.

There are numerous extension kits for the micro:bit that allow you to log other factors (humidity, pH…)



Ideas for Data Logging

Similarly, you could have a school wellbeing monitor! Hot, loud and dark environments negatively impact our ability to learn.

Set up a micro:bit in every classroom to record the Temperature, Sound Level and Light Level.

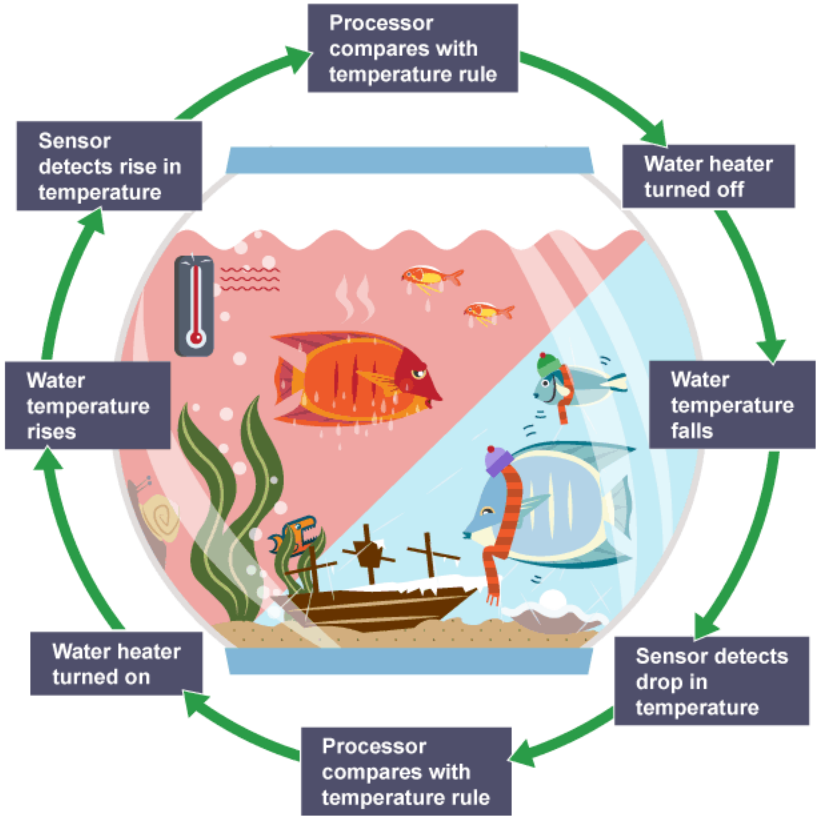
Have a group of students that collect the data every lunchtime and investigate it regularly.

Ideas for Data Logging

Or, if you're very taken by this idea, and want a more complex project…

Using the available extensions for the micro:bit and some electronic components, you could automate some process with the micro:bit…

Such as a micro:bit controlled fishtank!



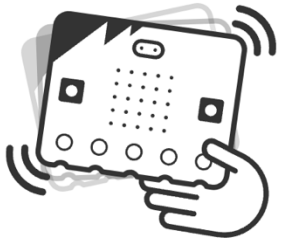
micro:bit Machine Learning

Starting with Machine Learning

ml.microbit.org

How this tool works

Add data

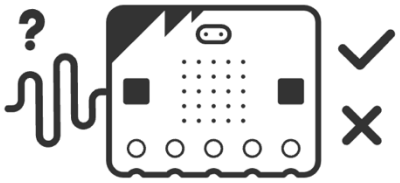


Add samples of the actions you would like your model to recognise (e.g. waving and clapping).

Train model

Ask the computer to use your training samples to train the machine learning model to recognise different actions.

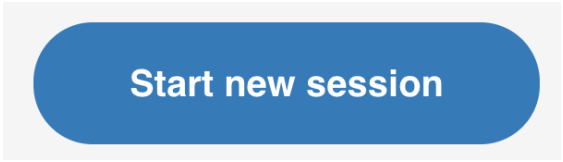
Test model



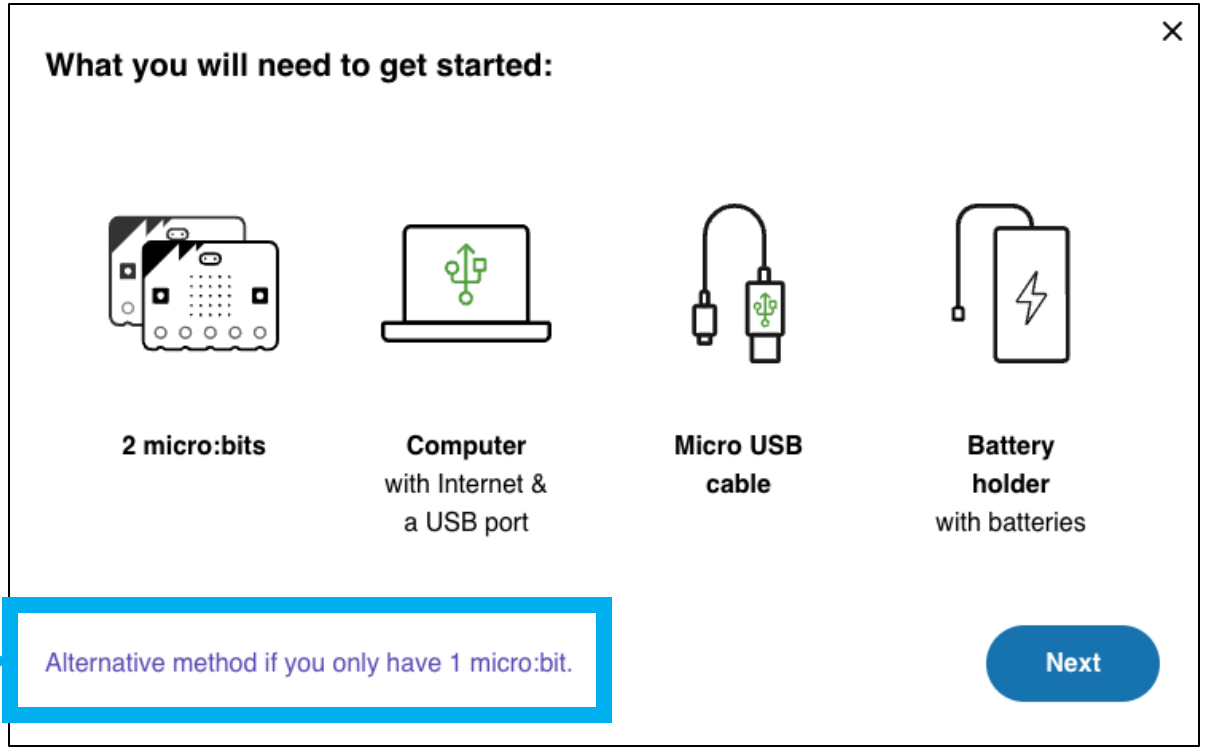
Find out if it correctly recognises each action. Add more data to improve the model.

Start new session

Getting Connected

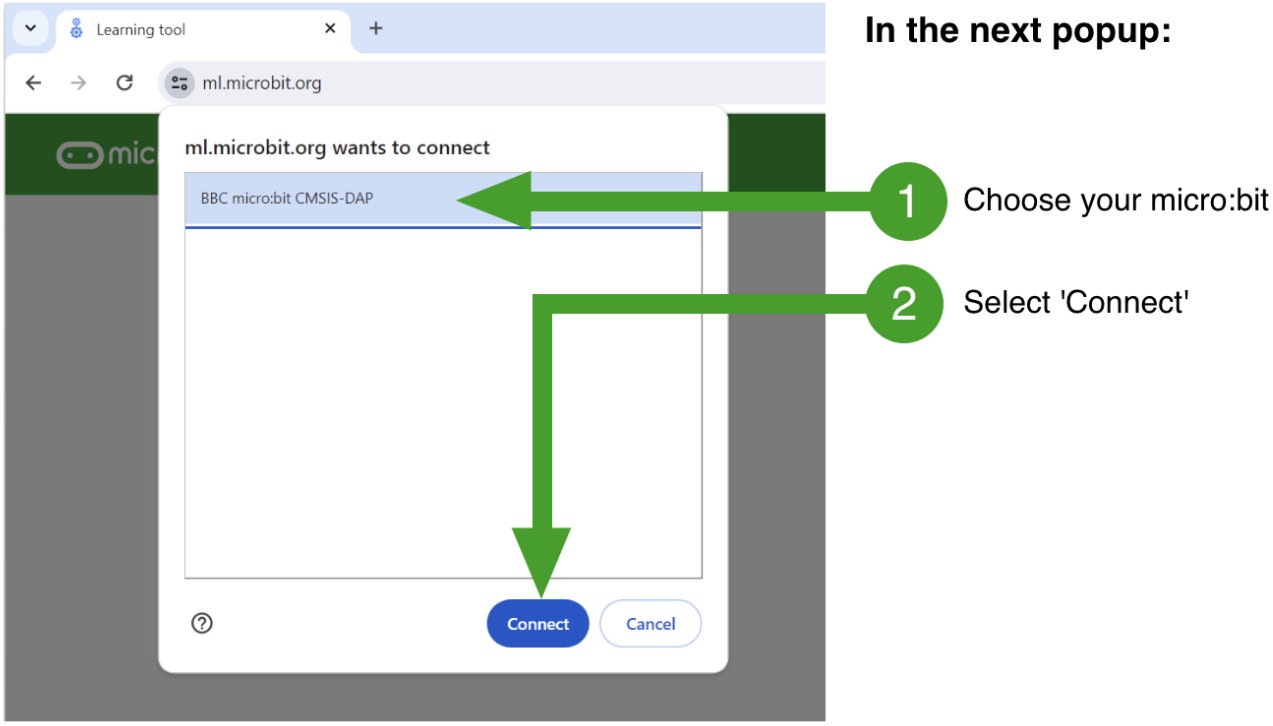


- Click start new session
- Select the option for 1 micro:bit



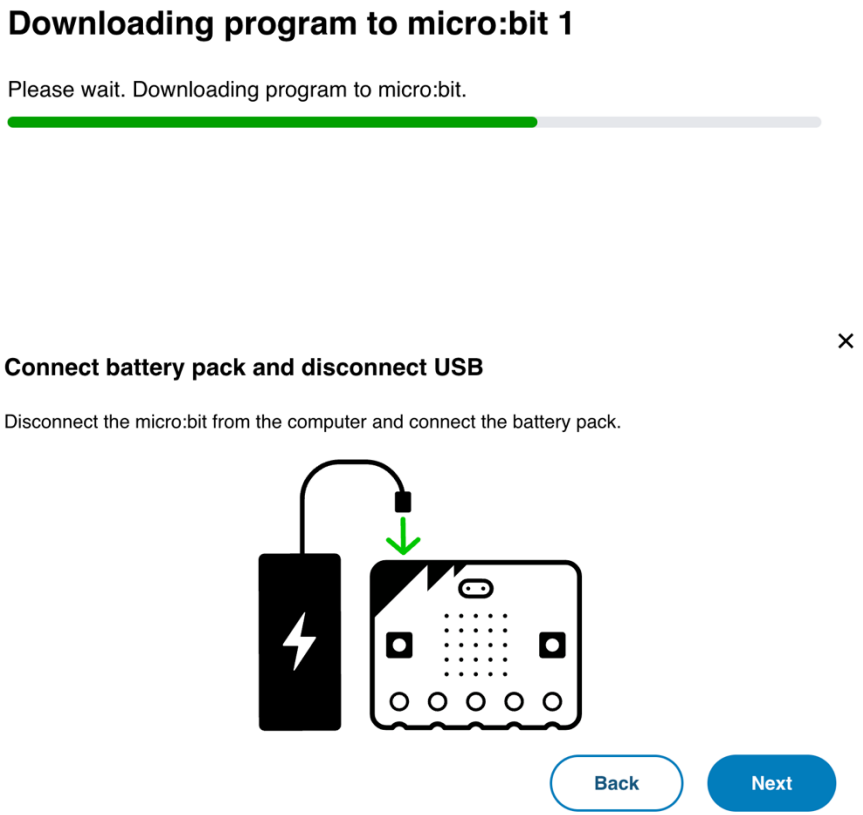
Getting Connected

- Click **Next** to continue
- Follow the instructions for connecting your micro:bit via USB



Getting Connected

- Your micro:bit will download the machine learning program
- When this is done you can disconnect your micro:bit and plug in the battery pack
- We must now connect our micro:bits to our computers wirelessly so they can send data back and forth

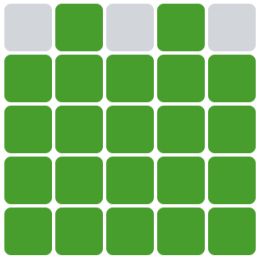


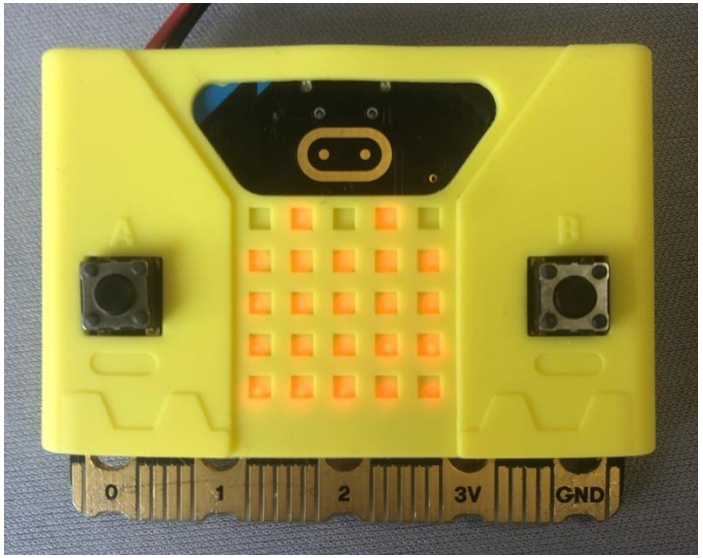
Getting Connected

- Make sure the pattern on the computer screen matches the pattern on your micro:bit

Copy pattern

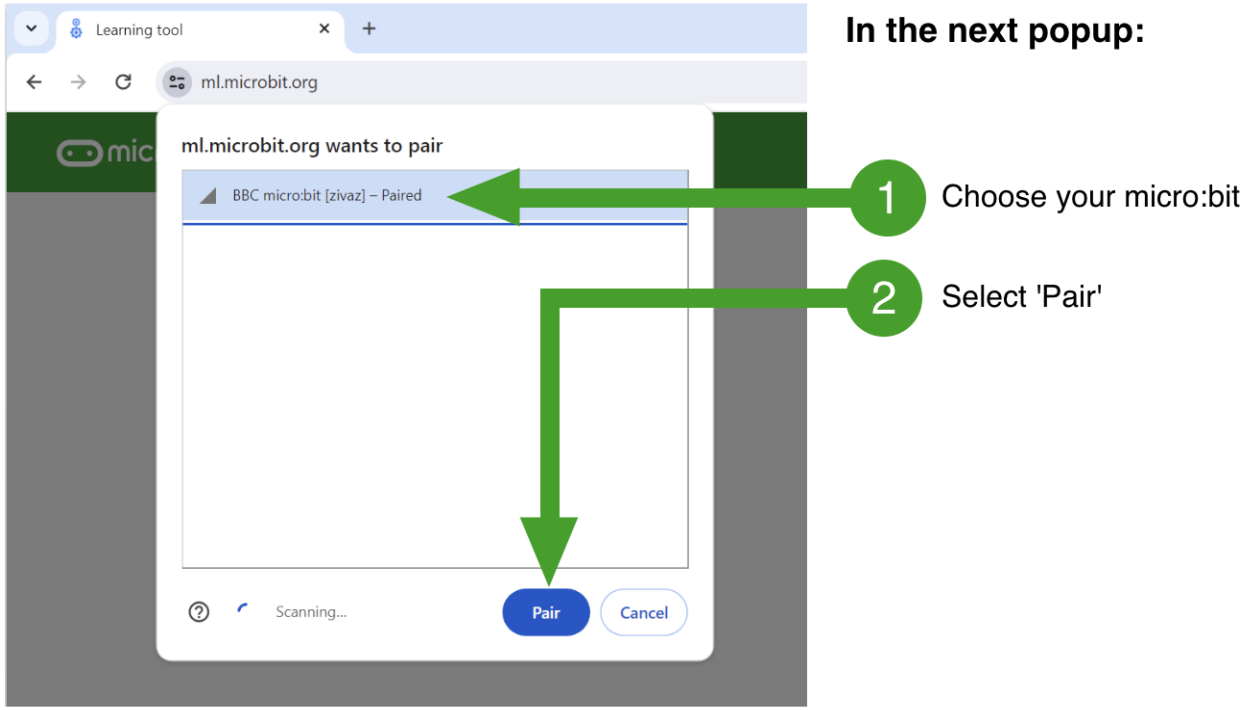
Copy the pattern displayed on the micro:bit.

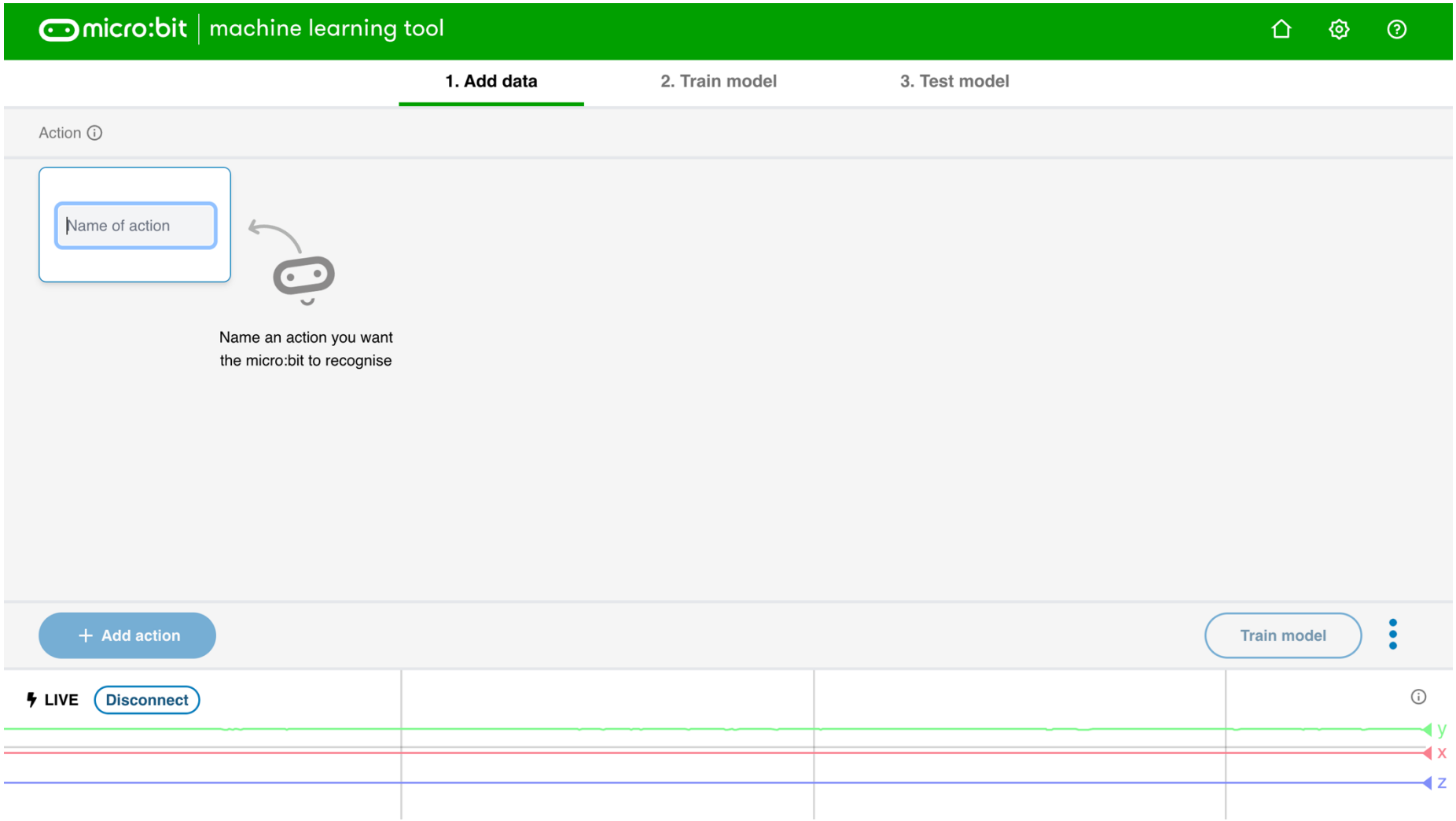




Getting Connected

- Click Next to continue
- Follow the instructions for connecting with Bluetooth (this will look almost the same as when we connected with USB!)





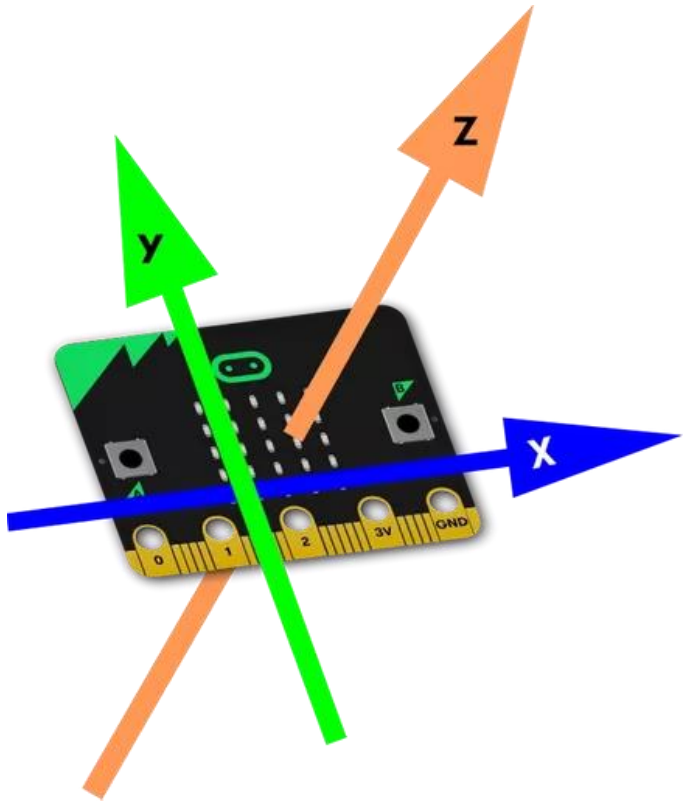
Micro:Bit Machine Learning Tool

The Axes

Hold your micro:bit in your hand as demonstrated so that our axes make sense.

You can move the micro:bit back and forth on each axis to test the functionality.

This is displayed on the bottom of the screen.



Training the model: Disco Dancing

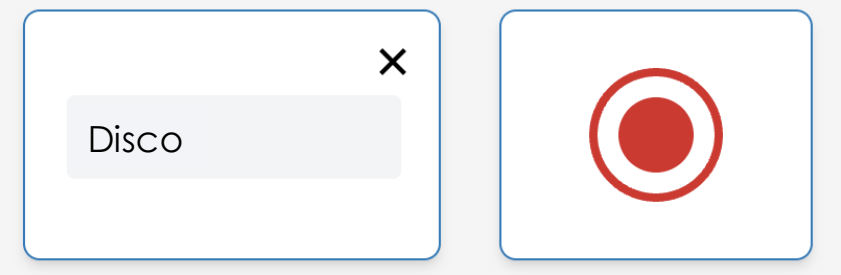
Training the model: Disco Dancing

A disco dance is:

- Point to the sky.
- Using the same arm…
- Point at the floor in the opposite direction

Let's try a few practise dance moves

Training the model: Disco Dancing



Let's teach our micro:bits what a Disco Dance looks like

Type the name of the dance you are teaching the micro:bit into the box

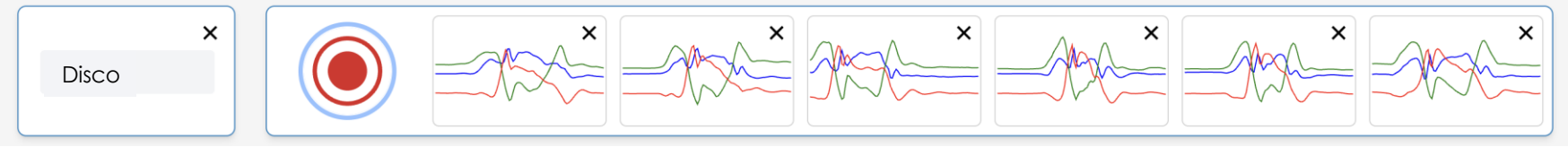
Then click the red button (or press 'b' on your micro:bit) to start recording our movements

Wait for the countdown to finish and then dance!

Training the model: Disco Dancing

When we were learning the disco dancing, we did a lot of practise dancing.

Machine learning is the same – we need to provide lots of examples for our micro:bits to learn what disco ***feels*** like



Record a few more moves for your micro:bit – at least 3 but the more the better!

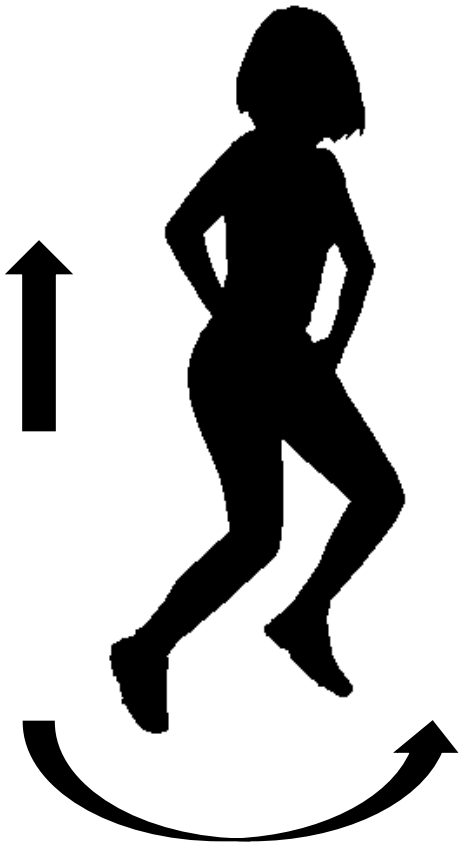
Training the model: Macarena

Training the model: Macarena

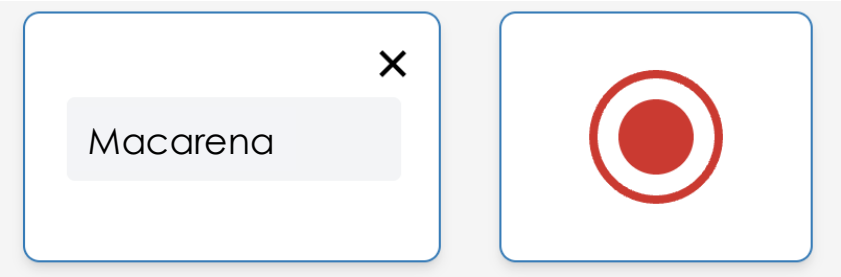
The Macarena is:

- Too long to explain…

Let's try a few practise Macarenas



Training the model: Macarena



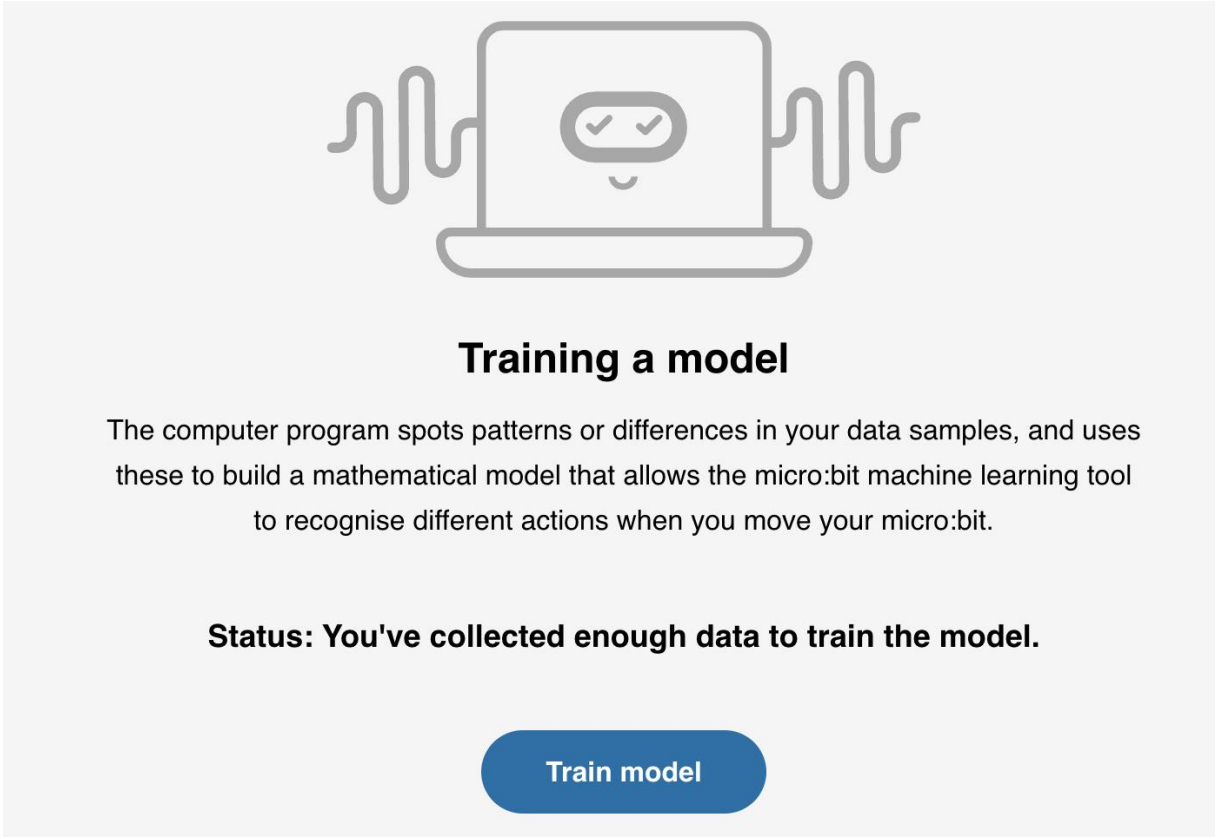
Begin by pressing **Add Action**

As before, enter the name of the dance you are teaching the micro:bit into the box

Then click the red button (or press 'b' on your micro:bit) to start recording our movements

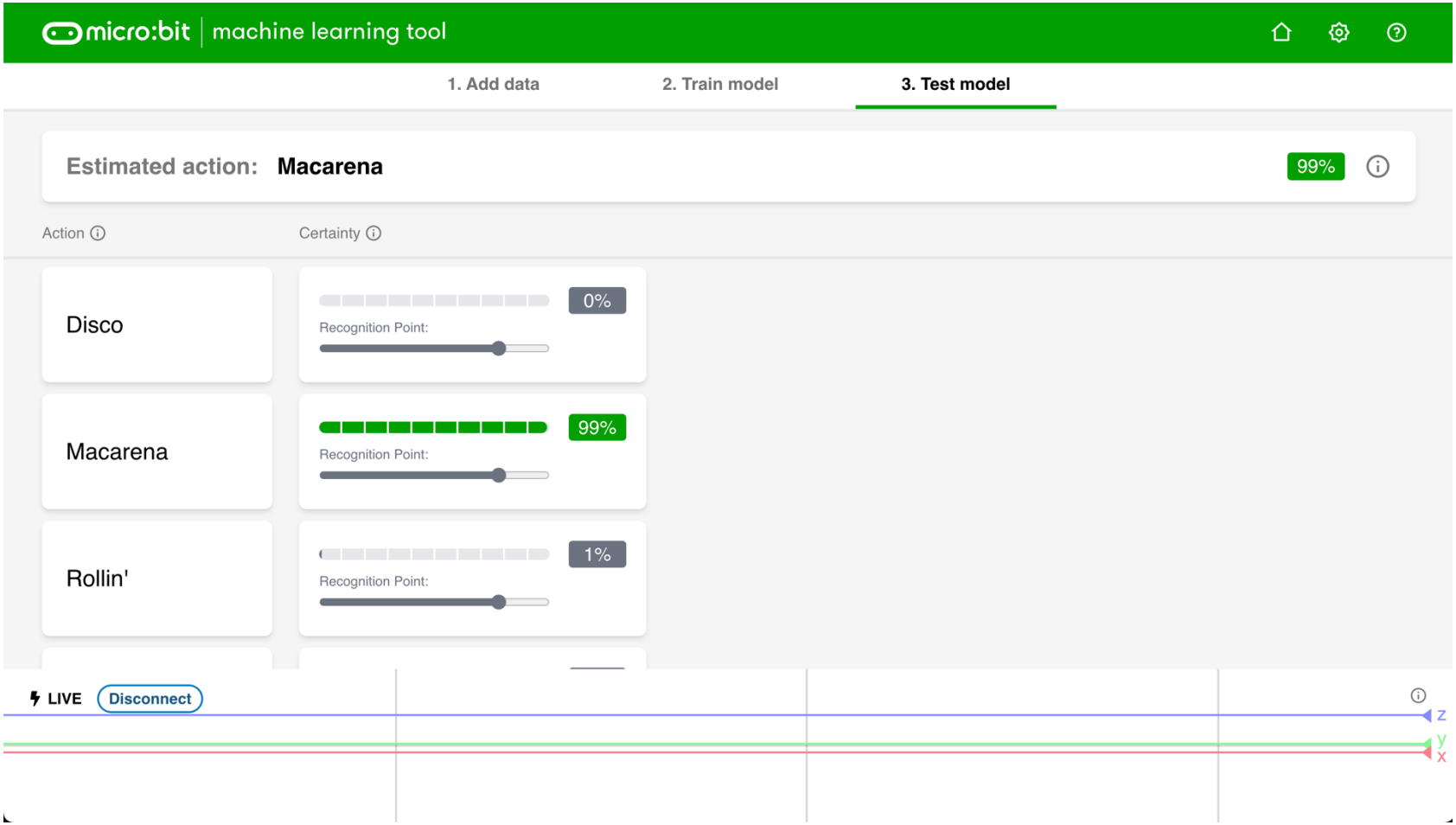
Wait for the countdown to finish and then dance!

micro:bits Learning & Testing



Click Train model to begin training your machine learning model

micro:bits Learning & Testing



Proud Mary (Rollin')
&
Ketchup Song

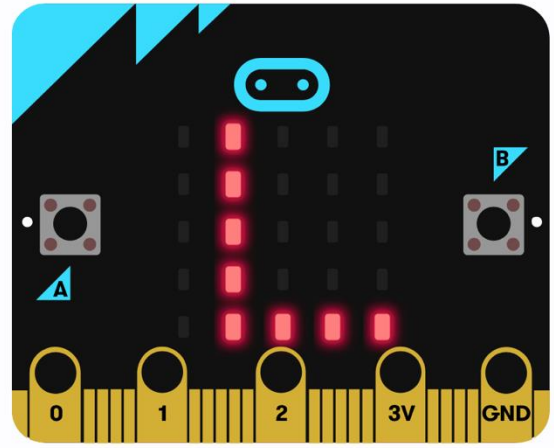
Technology & Inclusion

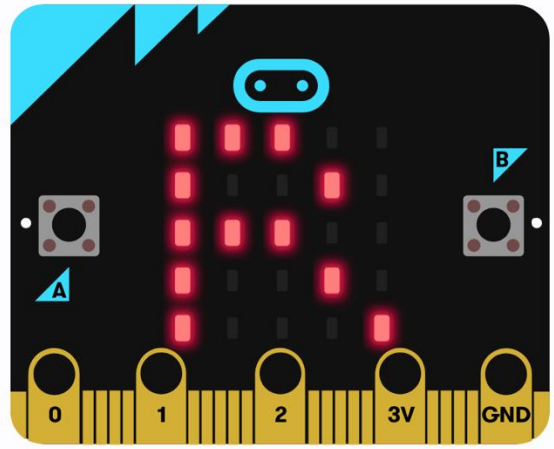
Technology and Inclusion

Your micro:bits have been trained to recognise dance moves on your dominant hand

How well would it work if you swap to your other hand?

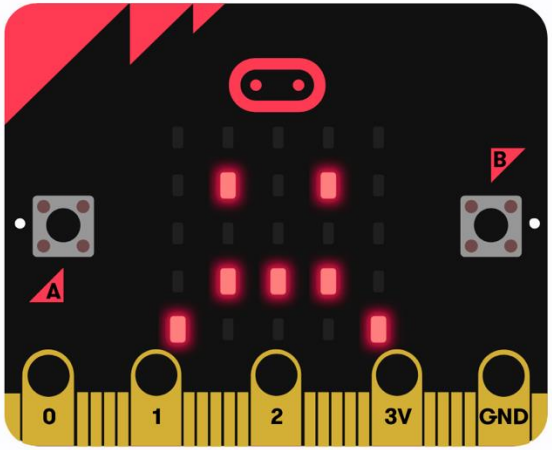
What if we gave the micro:bit to a completely different person?

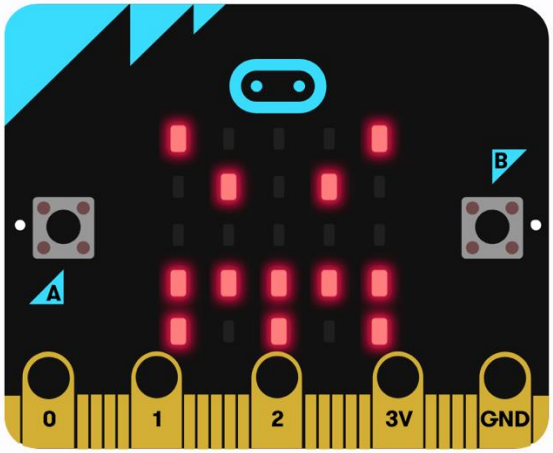




Give the micro:bit to your partner

Technology and Inclusion





How well does your micro:bit work when used by someone else?

When using machine learning we need to use large, even datasets with no gaps or the model may develop bias

These biases lead to exclusion and can even create racist computers and technology

Racial Biases in Technology

When snapchat filters were first released, some would lighten the skin of global majority people

Fitbit Activity Monitors would give inaccurate readings to people of colour

Uber drivers were dismissed from their job because Uber's facial verification system didn't work with darker skin

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Inclusive Machine Learning

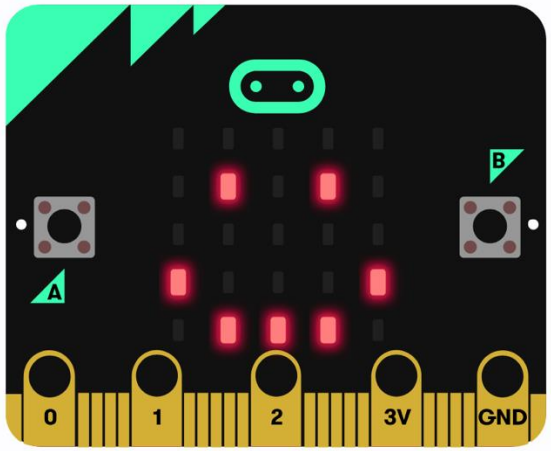
Inclusive Machine Learning

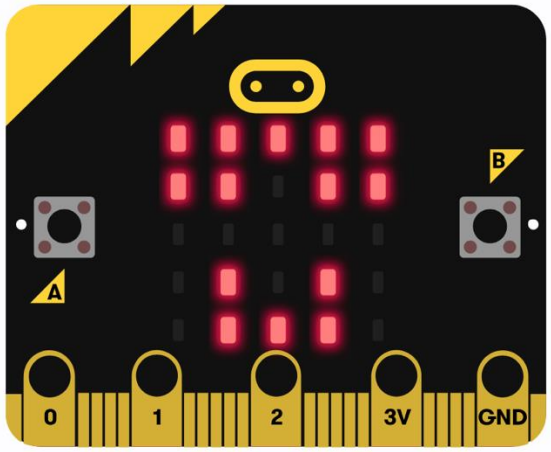
Making any machine learning system more inclusive is simple – give it more data!

Add new data to each of the dance movements for your partner

Test again – does it work?

Try adding new categories for your off-hand movements too.





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ROYAL AIR FORCE

Technocamps Robotics Competition 2025

INTO THE WILD

JUNE - JULY 2025

Tackle conservation challenges to protect and preserve wildlife!

tc1.me/robot-comp