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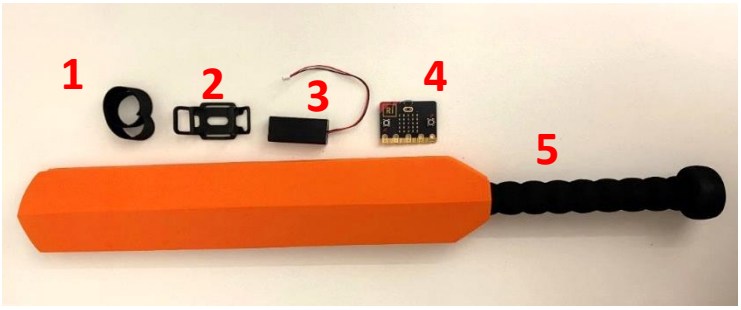
Ri Off the Shelf Masterclass: Bats to Bytes

Guide to setting up the micro:bit

Setting up the micro:bit

You will need the following equipment:

1. Micro:bit wearable Velcro
2. Micro:bit wearable holder
3. Micro:bit Battery pack
4. Micro:bit v2
5. Cricket bat



Follow the instructions below to place the micro:bit inside the micro:bit wearable:

1. Place the battery pack inside the micro:bit wearable holder.

2. Thread the micro:bit wearable Velcro through the holder and secure around a wrist. Place the micro:bit into the holder and connect the battery pack to the micro:bit.

3. The micro:bit should be attached in the correct orientation, to ensure the accelerometer readings match those used in the workshop material. For right-handed students, the micro:bit logo should be closer to the little finger on the right hand. For left-handed students, the micro:bit should be rotated 180 degrees from the image below, so that the logo is closest to the little finger on the left hand.

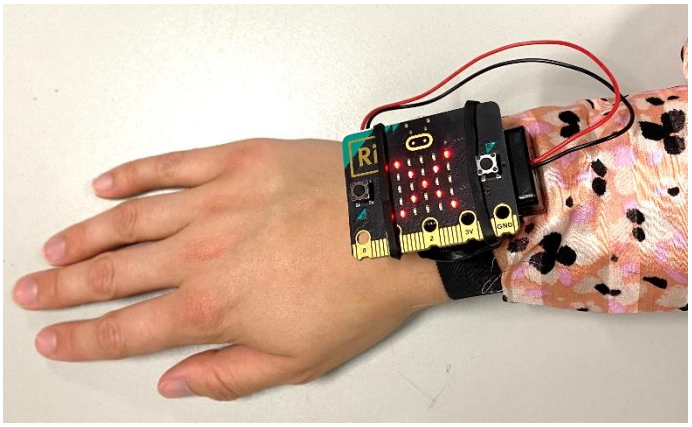


Image Credits: The Royal Institution, Micro:bit Educational Foundation, CreateAI, Makecode

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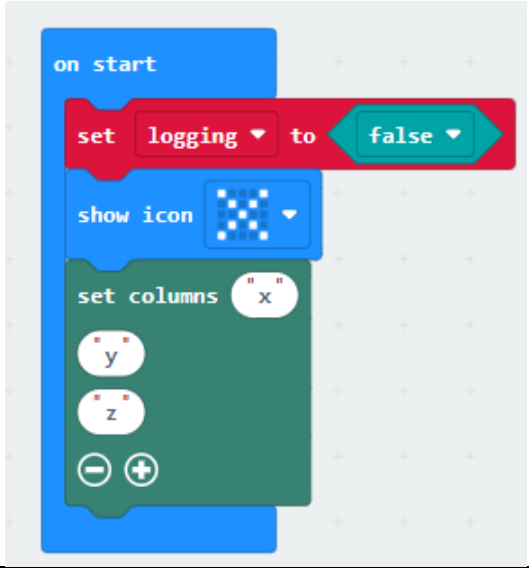
Using the micro:bit cricket bat – Batting Challenge Activity

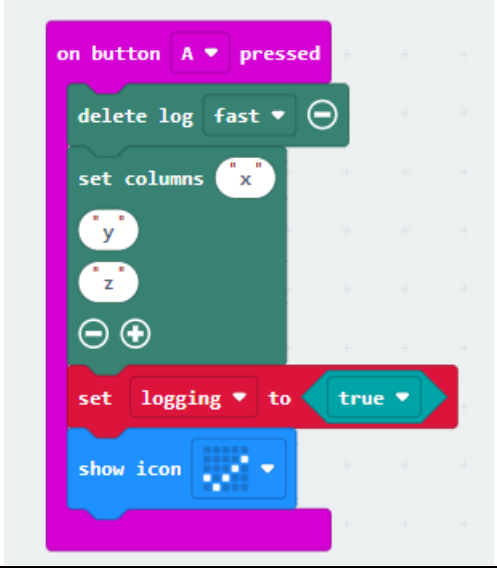
The Microsoft Makecode programme provided for this workshop should be downloaded onto each micro:bit attached to a cricket bat. You can access this programme here: https://makecode.microbit.org/84451-94146-43619-00943.

For an additional challenge, you may wish to guide the students to create the programme themselves, or edit it to suit your workshop needs.

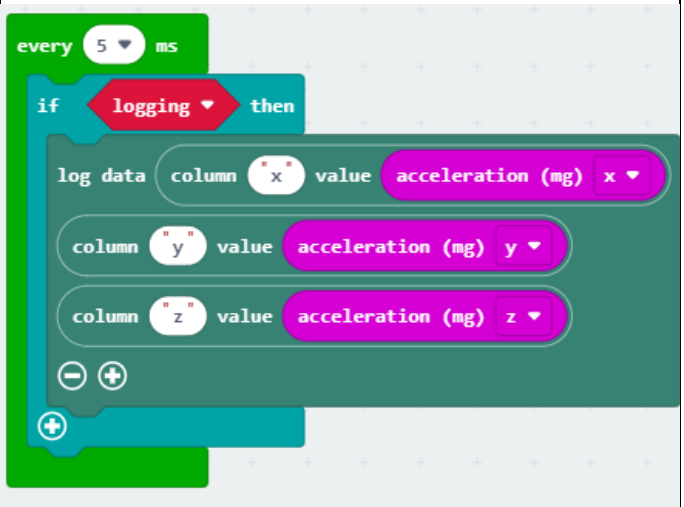
The first part of the programme says that when the micro:bit is turned on, the micro:bit is prevented from logging any data, and displays a cross on the LED display of the micro:bit, to signify that no logging is taking place. The three axes of movement are noted, so that when logging takes place, data from the x, y, and z axes will be stored.



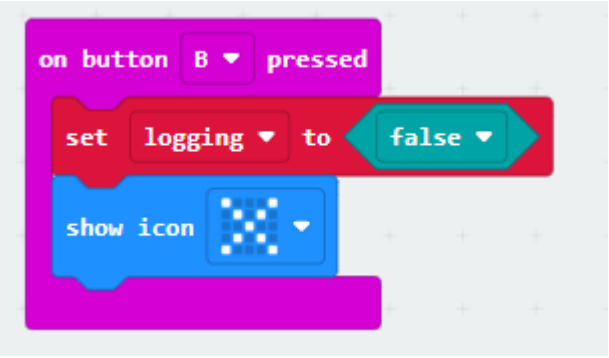
The second part of the programme says that when button A on the micro:bit is pressed, any previously logged data is deleted. After this has been deleted, the axes of movement are noted and logging is set to true, so that data can be collected. A tick icon is displayed to show that the micro:bit is ready to collect data. At this point, the students will begin their bat swing.



The next part of the programme says that, when logging is set to true (after button A has been pressed) then acceleration data in the x, y, and z axes are logged and stored every 5 milliseconds during the student's bat swing.



Once the student has finished swinging the bat, they should stop the micro:bit from logging any more data. To do that they can press the B button on the micro:bit, which stops any more data from being logged, and displays a cross on the micro:bit LED screen.

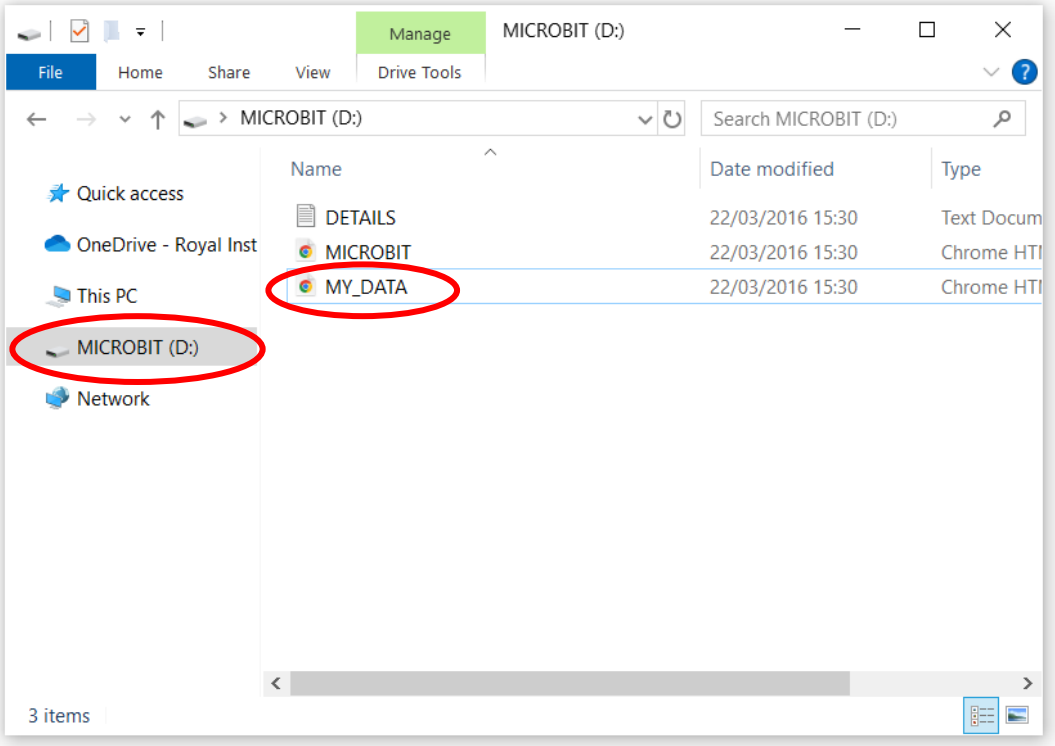


It is important that the micro:bit is connected to the laptop after each swing to view the data, and that button A is not pressed before the data has been viewed, otherwise it will be deleted. When the next batter is ready, button A can be pressed and the process repeated.

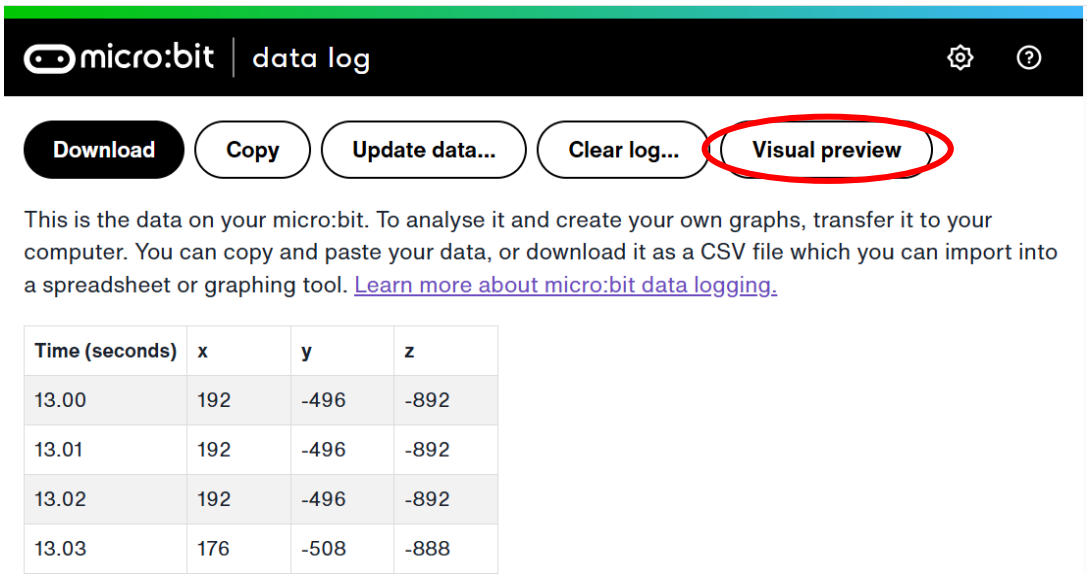
Image Credits: The Royal Institution, Micro:bit Educational Foundation, CreateAI, Makecode

1. To review the data on the micro:bit once collected, connect the micro:bit to the laptop or tablet using the usb cable. Then, select the file explorer or finder.

2. Select the micro:bit drive, then double click '**MY_DATA**' to access the data most recently logged by the micro:bit. This should open a new tab in your default browser.



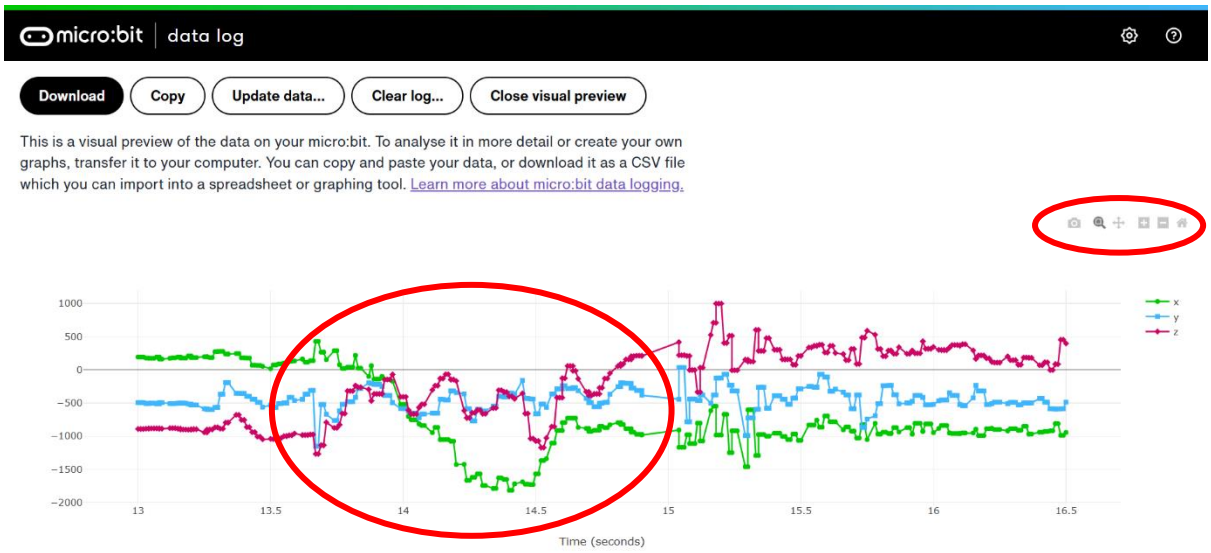
3. When this browser tab opens, it will display the data in a table. To view the data in a graph, click '**Visual preview'**.



Time (seconds)	x	y	z
13.00	192	-496	-892
13.01	192	-496	-892
13.02	192	-496	-892
13.03	176	-508	-888

4. When the graph loads, you will be able to visualise the data most recently logged by the micro:bit. There are controls in the top tight corner, that allow you to zoom in or out of the graph, pan across the graph, and download the data as a .png.

   For the batting challenge activity, students will be asked to identify similarities in the graphs they produce, and the graphs provided. It is important to note the different features in the graph, for example that the x, y, and z data is signified by different colours, and that we can tell where the swing begins by where the data starts to dramatically change, as seen in the example below.

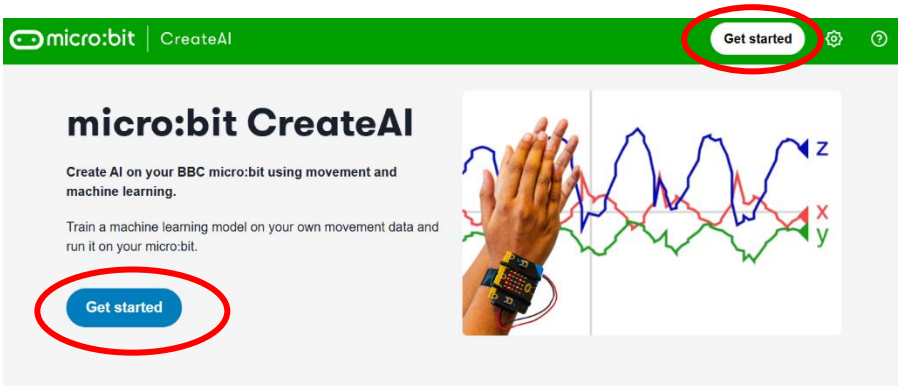


Using the micro:bit cricket bat – CreateAI activity

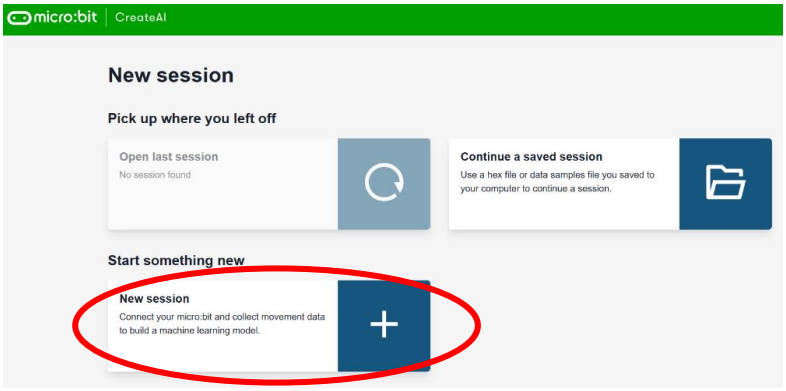
For the second half of the workshop, the micro:bit cricket bat can be used with CreateAI to develop a machine learning model. This model can be trained to learn the difference between different batting shots, such as the pull shot, the defensive block, and the straight drive. CreateAI is available here: https://createai.microbit.org/.

CreateAI recommends using Google Chrome or Microsoft Edge browsers when creating your machine learning model. Safari is currently unsupported, so mac or iPad users will need to ensure an alternative browser is available.

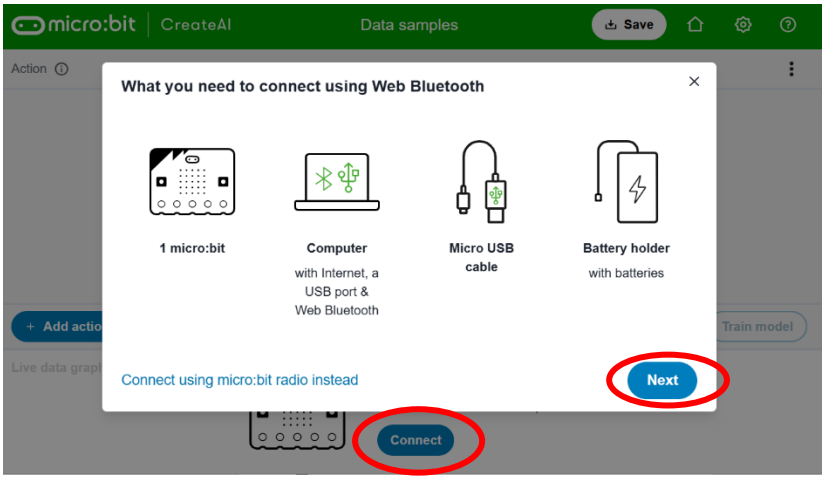
1. To access the CreateAI software, first click either of the '**Get started**' buttons.



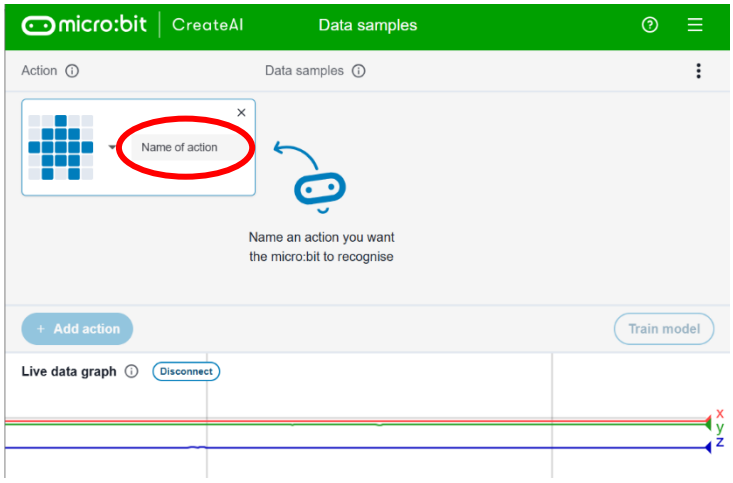
2. Then click on the button to open a '**New session**'.

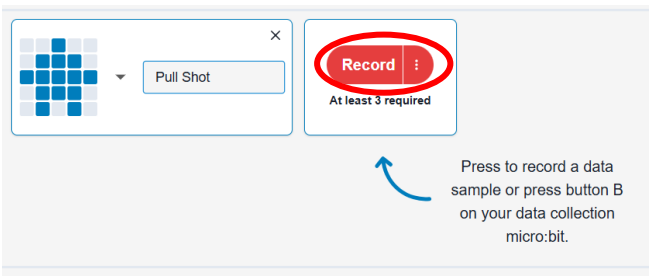


3. You will now need to connect to your micro:bit. Click the '**Connect**' button, then follow the instructions on screen to connect using Web Bluetooth. Alternatively, select the text in the bottom left corner to '*connect using micro:bit radio instead*'.

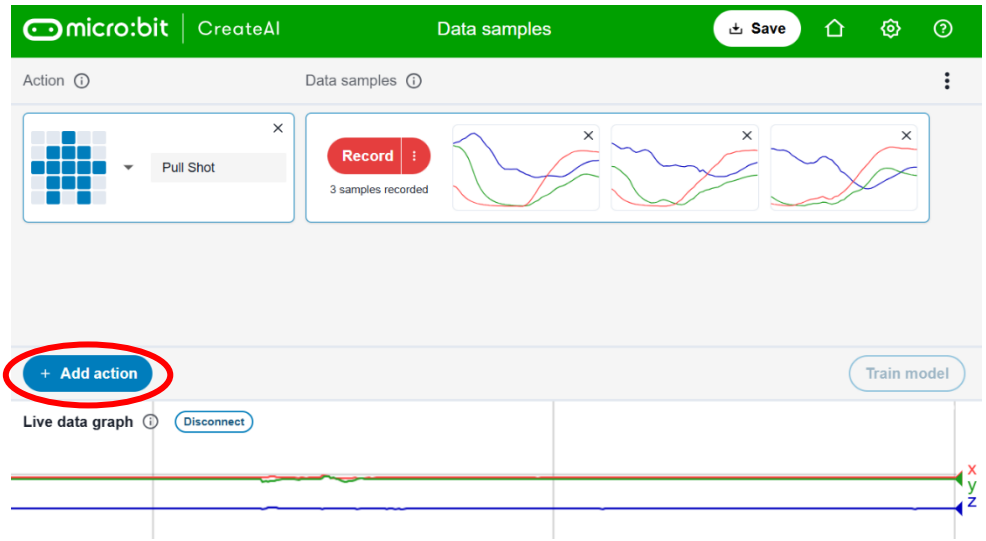


4. Once your micro:bit is connected, and the data collection programme has been downloaded, you can start to train the machine learning model. To start, you will need to provide data samples to train the model. Follow the instructions to begin training the first action – the pull shot. Click record, then complete the action after the countdown.

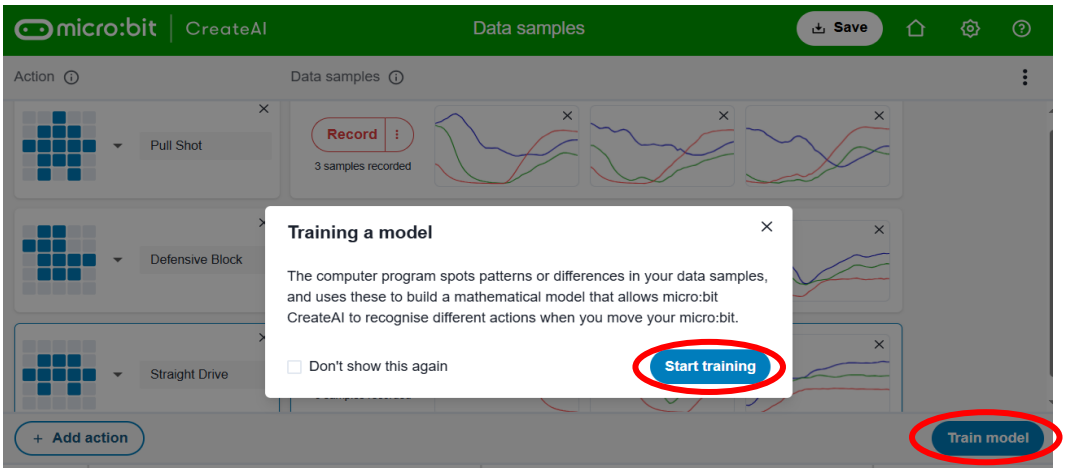




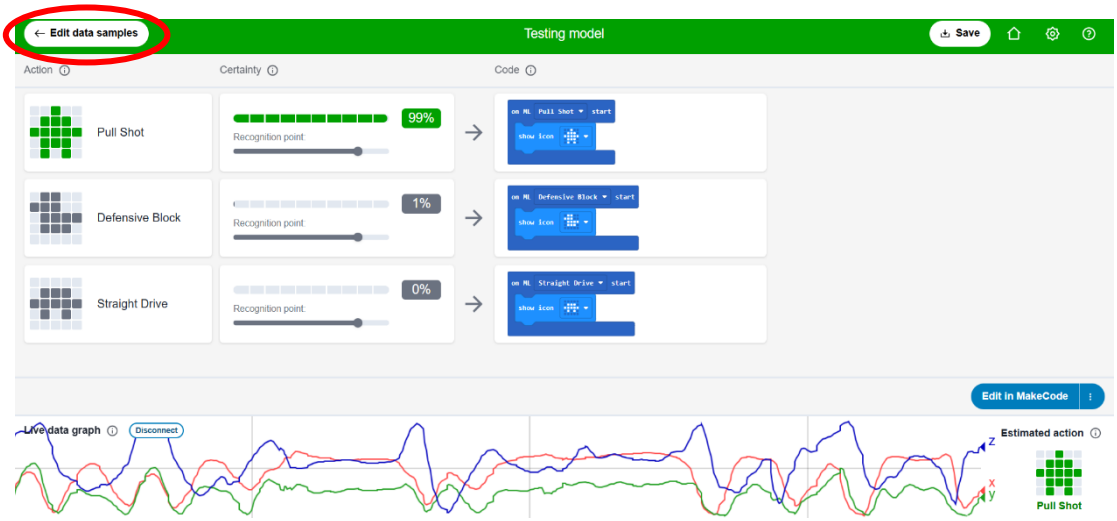
5. You will need to give at least three recordings for each action, in order to be able to train the model. It is advisable that each of the students in a group provide at least one data sample for each type of shot. Once you have completed three recordings of the pull shot, click on 'Add action' and repeat this for the defensive block and the straight drive.



6. Once all three types of shot have been recorded, click **'Train model'**, then click **'Start training'** on the popup that appears.



7. You now have a fully trained machine learning model. To go back and edit or add more data samples, click **'Edit data samples'** in the top left corner.



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