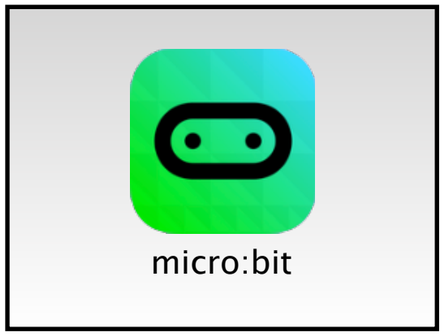
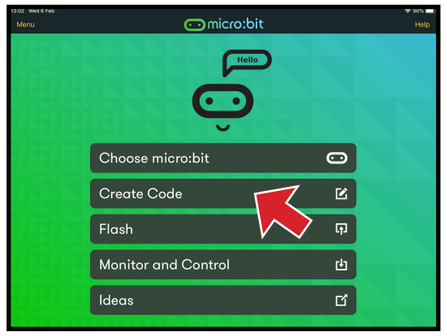
# BUZZING BOTS

## Programming worksheet

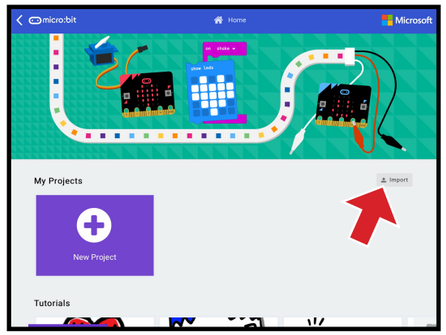
REUSE, RECYCLE... ROBOTS!



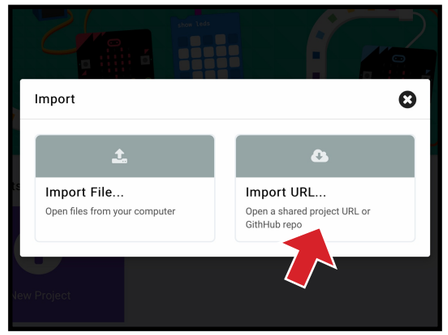

From the iPad home screen, open the **micro:bit** app.



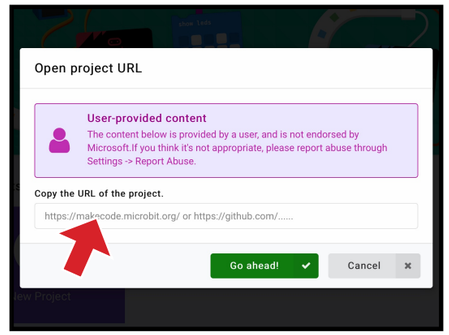

Tap the **Create Code** button from the main menu.




Tap the **Import** button.




Tap the **Import URL...** box.



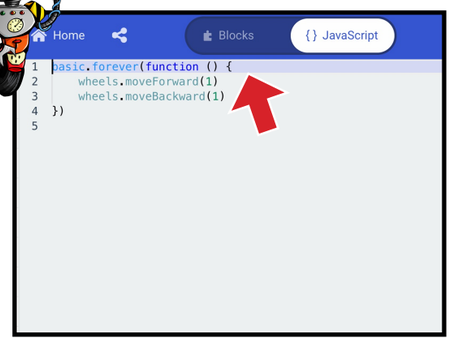

Tap inside the text entry box and type:

**github:LabCentral/buzzing-bots**

Then tap the **Go ahead!** button.

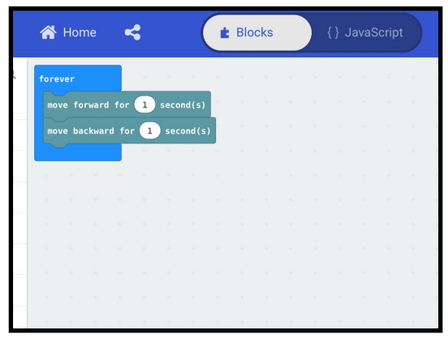
This will import an example project to get you started.

**JavaScript** is a language that is used to write all sorts of programs, particularly on the web.




You will see a short computer program written in a programming language called **JavaScript**.

We won't be using this language directly. Instead, tap the **Blocks** slider at the top of the screen.

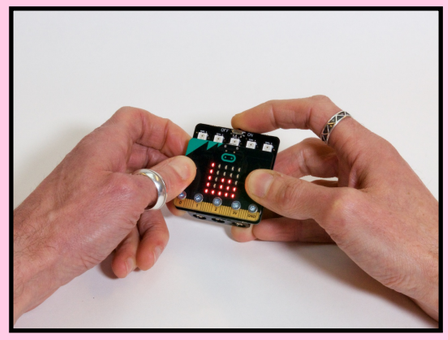



The screen now shows the same program in a simple visual language called **Blocks**.

Each horizontal block is an instruction to do something. Instructions that are joined together are run one after the other; the surrounding boxes say *when* to run them.

Before we look closely at this program, let's try it out!

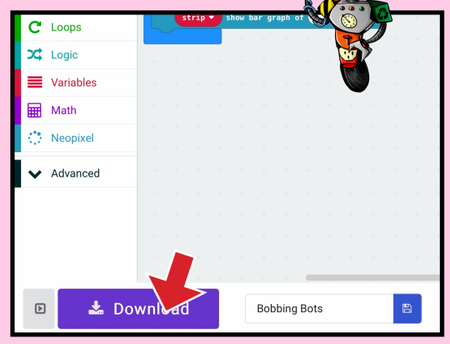
The program is copied to a part of the micro:bit called **flash memory** – this is remembered when the micro:bit is switched off. Writing a program to this memory is called **flashing**.



To copy a program onto the micro:bit, first make sure that it is switched OFF with the tiny black switch on the top.

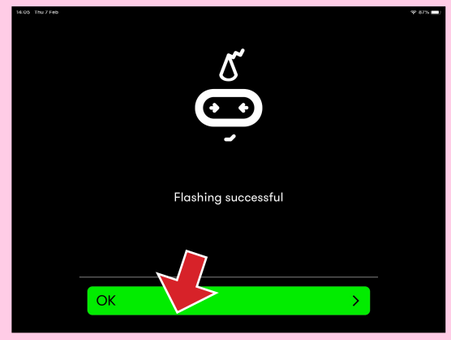
Now hold down both the **A** and **B** buttons on the front and switch it on – *keep holding the buttons* until the red LEDs show a pattern of columns. You can then let go of the buttons, but leave the micro:bit switched on.

Your micro:bit is now in Bluetooth programming mode.




Tap the **Download** button on the iPad.

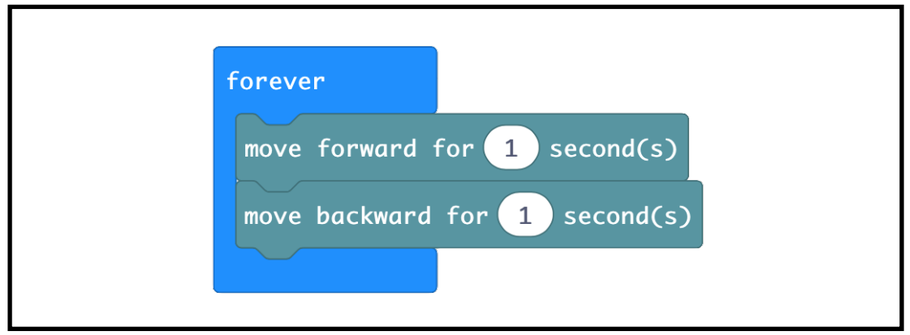
The iPad will connect to the micro:bit wirelessly and copy the program to it. This will take a few seconds.




When you see **Flashing successful**, the micro:bit is ready. Tap **OK** on the iPad to go back to the code screen.

The micro:bit will immediately begin to run the new program.

Repeat these three steps whenever you want to download a new program!




Let's look at the program in more detail.

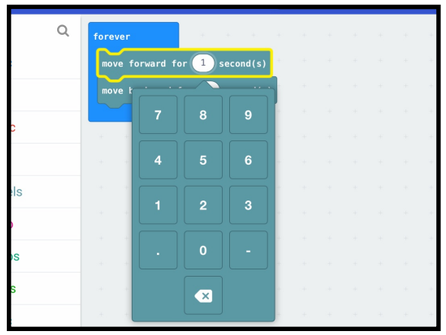
Instructions in the **forever** box are run *repeatedly* until the micro:bit is switched off.

The first instruction in this box tells the micro:bit to drive forwards for 1 second. The second instruction tells the micro:bit to drive backwards for 1 second. Because they are in the **forever** box, the bee will continue to drive forwards and backwards until switched off.

Your micro:bit should already be attached to the servo motors. If not, refer to the first side of the **Making Worksheet** to see how this is done.

You might want to hold the micro:bit above the servo motors while testing programs so that you can easily switch it on and off.

Switch the micro:bit off to save battery and to make sure it doesn't drive off the table!

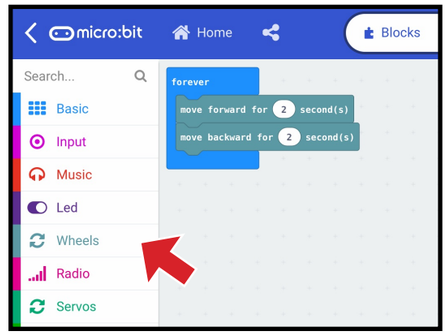



Let's try making a change.

☞ Tap on the **1** in the **move forward** block. Type **2** on the keypad then tap on the grey background to dismiss it.

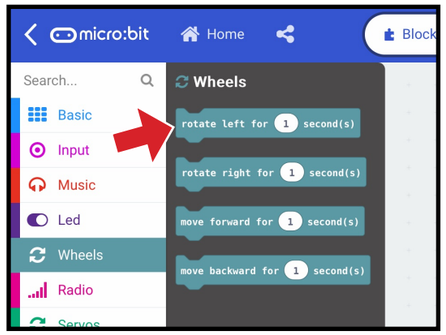
☞ Do the same for the **move backward** block.

Now download the new program to your micro:bit (repeat the steps in the pink box on the other side). You may need to clear more space on the table to test.




Moving backwards and forwards isn't all that interesting. To make our bee dance properly it will need to be able to turn around.

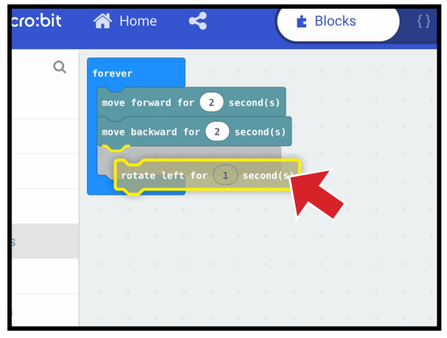
☞ Tap on the **Wheels** button on the left of the screen.




You will see four different blocks for controlling the movement of the bee.

☞ Tap on the **rotate left** block to add it to your program.

You can drag this new block around with your finger.

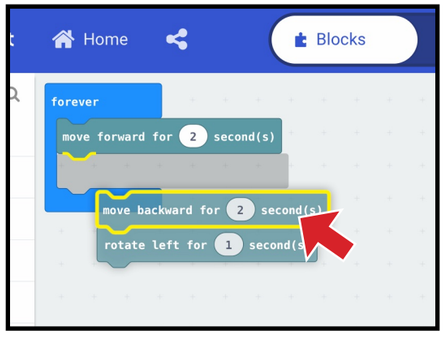



Let's add this new block to the bee's instructions.

☞ Drag the **rotate left** block into the bottom of the **forever** box. The box will expand to make a space for it.

You will hear a click and the new block will snap into the box.

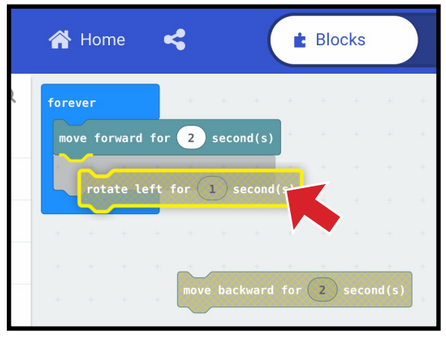
Download this program to try it out. If you're short on space, change the forward and backward times back to 1 again.




Let's try re-arranging the order of the instructions.

☞ Drag the middle **move backward** block out of the **forever** box onto the grey background. The **rotate left** block below comes with it.

When you drag a block, all of the blocks attached below will come too.

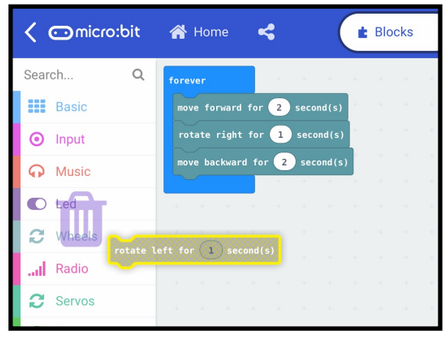



☞ Drag the **rotate left** block back into the **forever** box at the bottom.

☞ Now drag the **move backward** block into the **forever** box after it.

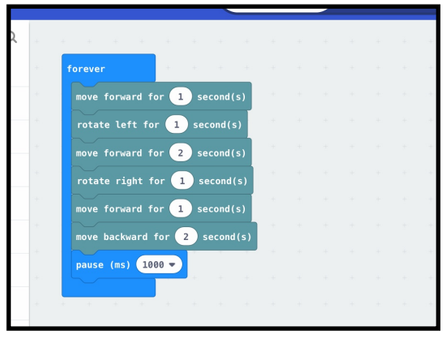
The order of your blocks should now be changed.

Now try adding some more blocks from the **Wheels** section to your list of instructions.




To remove a block from the list, drag it out and then drag back any blocks that were stuck to it.

To delete a block drag it back to the left side of the screen until you see a wastebasket icon appear.




Now think about what dance your bee will do. Maybe it will draw a shape, like the first letter of your name. Draw the shape on a piece of paper and consider what movements the bee will need to make to copy it.

The **Basic** section contains a **pause** block that you can use if you want the bee to stay still for a period of time.

Drag these blocks into your program and download it to try it out.

Developed by
Output Arts

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