Microbit | Beginner | 10 Mins

1 Overview

Ever wondered how a smartwatch or fitness band counts your steps? In this project, you're going to build your very own step counter using a micro:bit!

Inside your micro:bit is a clever little sensor called an accelerometer. It can feel when the micro:bit moves. We'll use it to spot every step you take, add them up, and show the total on the LED matrix (the grid of lights on the front).

The best bit? When you're done, you'll have a real working fitness tracker you can pop on and take outside. Don't worry if something doesn't work first time, that's all part of coding. Let's give it a go!

🎯 What you'll learn

- Make and use your own variable
- Use the micro:bit's shake sensor to spot movement
- Show a number on the grid of lights
- Use the buttons to control your project
- Use a while loop
- Make decisions with if statements

2 What you'll need

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- The micro:bit EduBlocks editor
- micro:bit
- micro USB cable
- battery pack for the micro:bit (optional)

3 Key words

💡 Key words

Variable

A variable is something that can change. Think of it like a labelled box: you pop something inside, and the label tells you what it is. You can swap what's inside whenever you like.

A variable called score might start at 0, then change to 1, 2 and 3 as you collect points in a game.

While loop

A while loop keeps repeating its instructions for as long as something stays true. The moment that thing stops being true, the loop stops.

"While it's still raining, keep the umbrella up." As soon as the rain stops, you put the umbrella down, and the loop ends.

If statement

An if statement checks whether something is true, and only runs its instructions when it is. It's how code makes decisions.

"If it's cold, put on a coat." If it's warm, you skip the coat, the action only happens when the check is true.

Accelerometer

An accelerometer is a tiny part inside the micro:bit that senses movement, like tilting, shaking or being turned over. It turns that movement into numbers your code can react to.

A bit like the sensor in a games controller that knows when you tilt it to steer, the accelerometer notices when the micro:bit moves.

LED Matrix

The LED matrix is the grid of little red lights on the front of the micro:bit. By switching them on and off in patterns, your code can show numbers, letters and tiny pictures.

Like a mini scoreboard made of dots, the LED matrix lights up to spell out your step count.

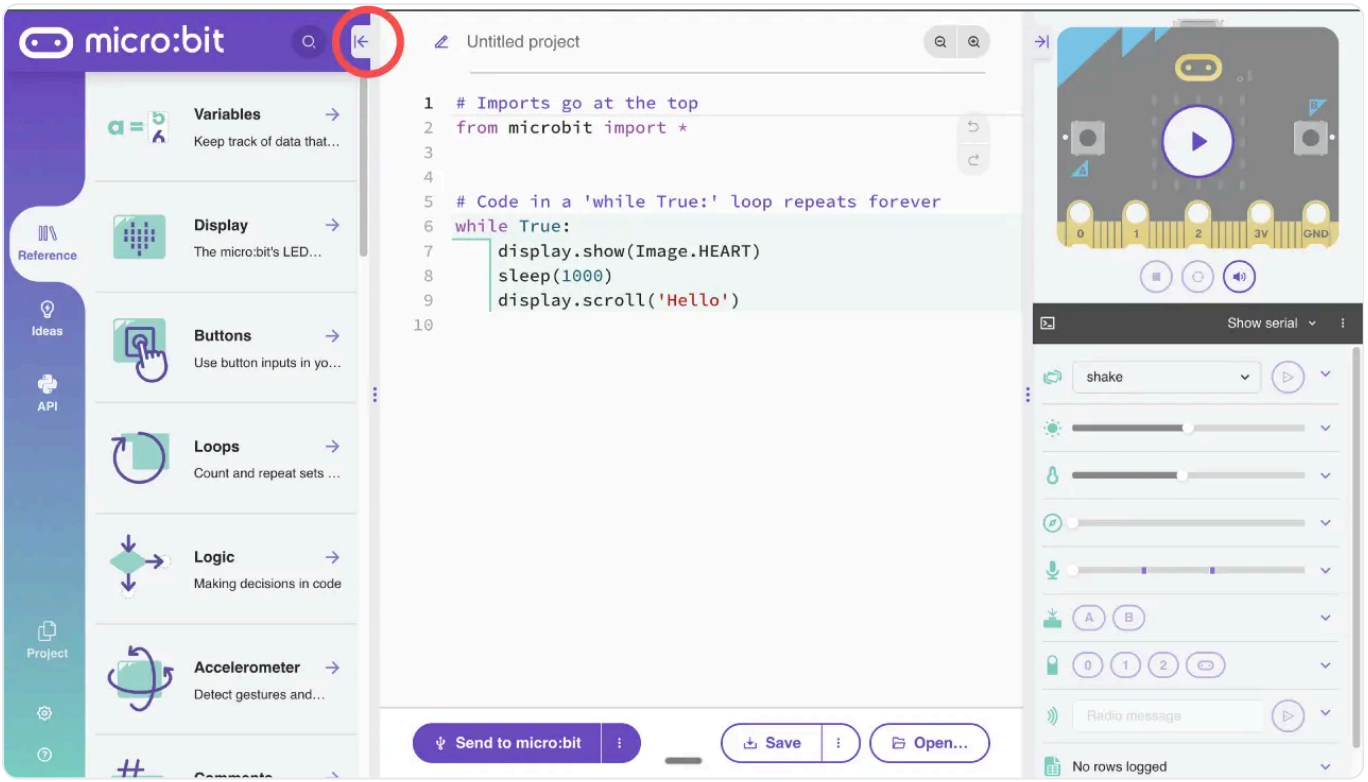
Button

A button is a switch you press to tell your project to do something. The code can check whether it's being pressed or not.

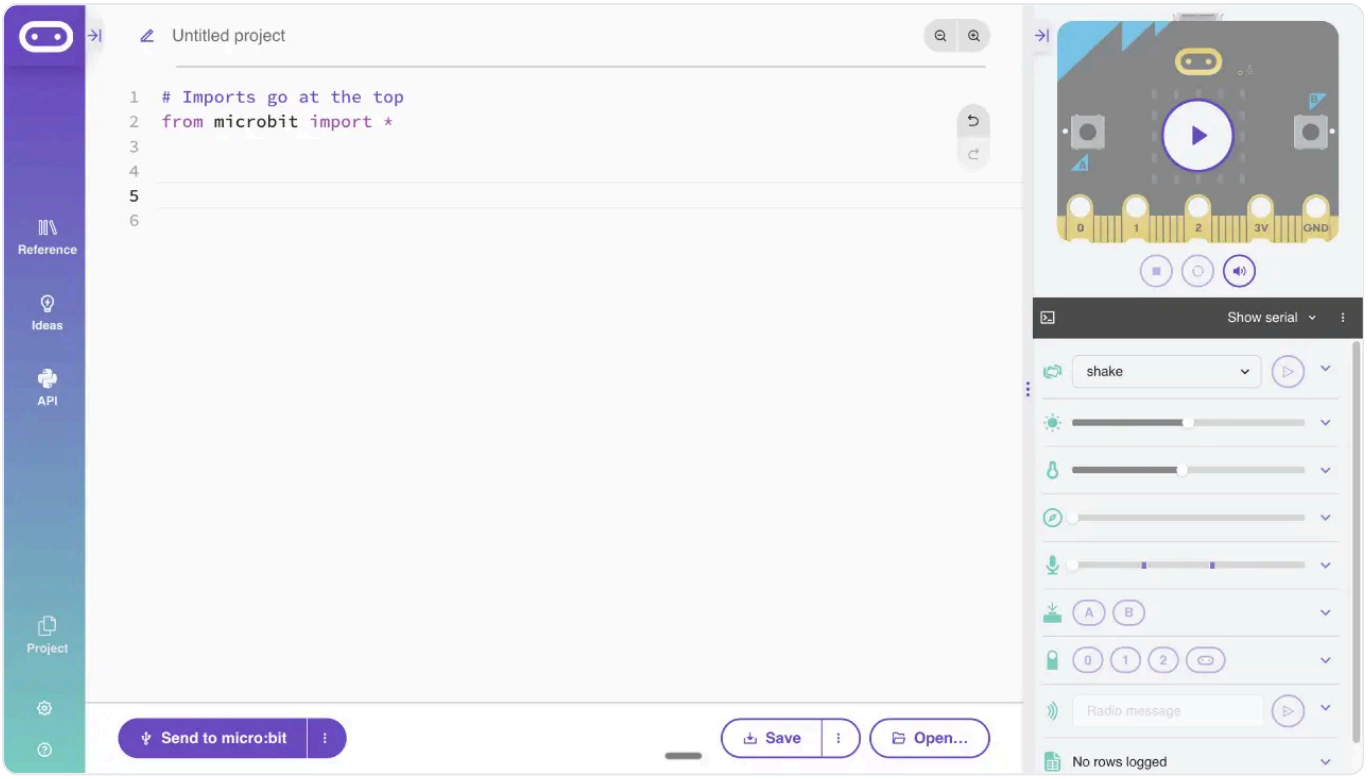
Pressing a doorbell is just like pressing a button, one press sends a signal that makes something happen.

4 Set up your micro:bit Python Editor

1. Open your web browser. We recommend Google Chrome or Microsoft Edge.
2. In the address bar type **python.microbit.org**.
3. Give your project a name: select the project name box at the top of the editor and type **MicroFit**.
4. Close the left-hand panel by selecting the **arrow** pointing to the left.

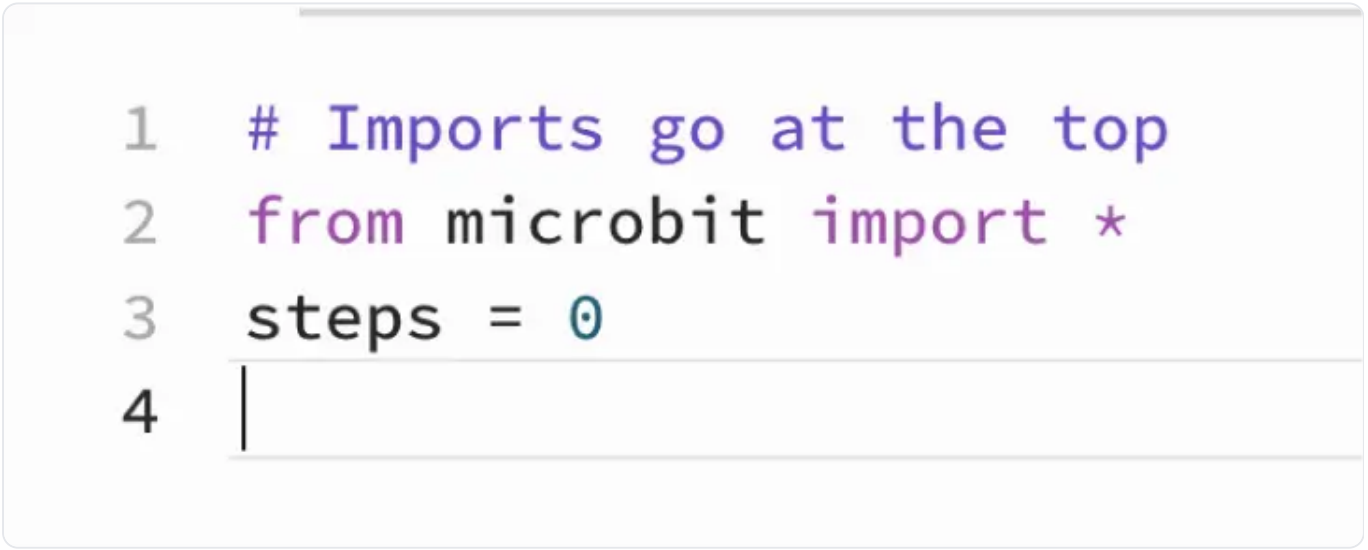


5. Delete the code on lines **5 to 9** in the main code area.



5 Create a variable

On line 3, type `steps = 0` to create a variable called **steps**, set to **0** for when the code starts. Press **Enter** to make a new line.



6 Create a while True loop

Type `while True:` and press **Enter**. This creates a while loop, so anything inside it runs while the condition stays true. Notice your cursor automatically indents, that's how Python shows what's inside the loop.

```
1  # Imports go at the top
2  from microbit import *
3  steps = 0
4  while True:
5
```

7 Detect a shake

1. Type `if accelerometer.was_gesture('shake'):` and press **Enter**. The cursor indents again.
2. Type `steps += 1`.

This if statement adds **1** to your **steps** variable every time the micro:bit detects a shake.

```
1  # Imports go at the top
2  from microbit import *
3  steps = 0
4  while True:
5      if accelerometer.was_gesture('shake'):
6          steps += 1
7
```

8 Pause the code

Type `sleep(500)`. This pauses the code for half a second, giving the micro:bit time to do other things, like check for the button press we'll add next. Press **Enter**, then delete the indent so the cursor lines back up with the `if accelerometer.was_gesture('shake'):` line.

```
1  # Imports go at the top
2  from microbit import *
3  steps = 0
4  while True:
5      if accelerometer.was_gesture('shake'):
6          steps += 1
7          sleep(500)
8
```

9 Reset the steps with button A

1. Type `if button_a.was_pressed():` and press **Enter**. This detects a button press, and the cursor indents.
2. Type `steps = 0` to reset the **steps** variable back to **0** when button **A** is pressed.
3. Press **Enter**, then delete the indent so the cursor lines back up with the `if button_a.was_pressed():` line.

```
1  # Imports go at the top
2  from microbit import *
3  steps = 0
4  while True:
5      if accelerometer.was_gesture('shake'):
6          steps += 1
7          sleep(500)
8      if button_a.was_pressed():
9          steps = 0
10
```

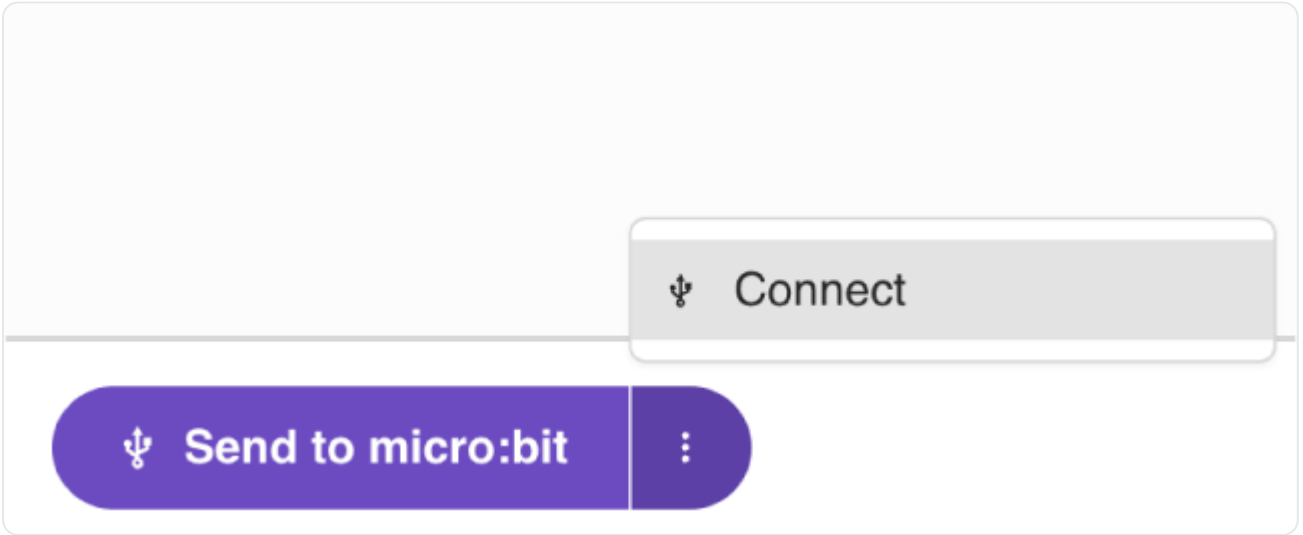
10 Show the number of steps

Type `display.scroll(steps)`. This scrolls the number of steps across the LED matrix on the front of the micro:bit.

```
# Imports go at the top
from microbit import *
steps = 0
while True:
    if accelerometer.was_gesture('shake'):
        steps += 1
        sleep(500)
    if button_a.was_pressed():
        steps = 0
    display.scroll(steps)
```

11 Downloading Your Code

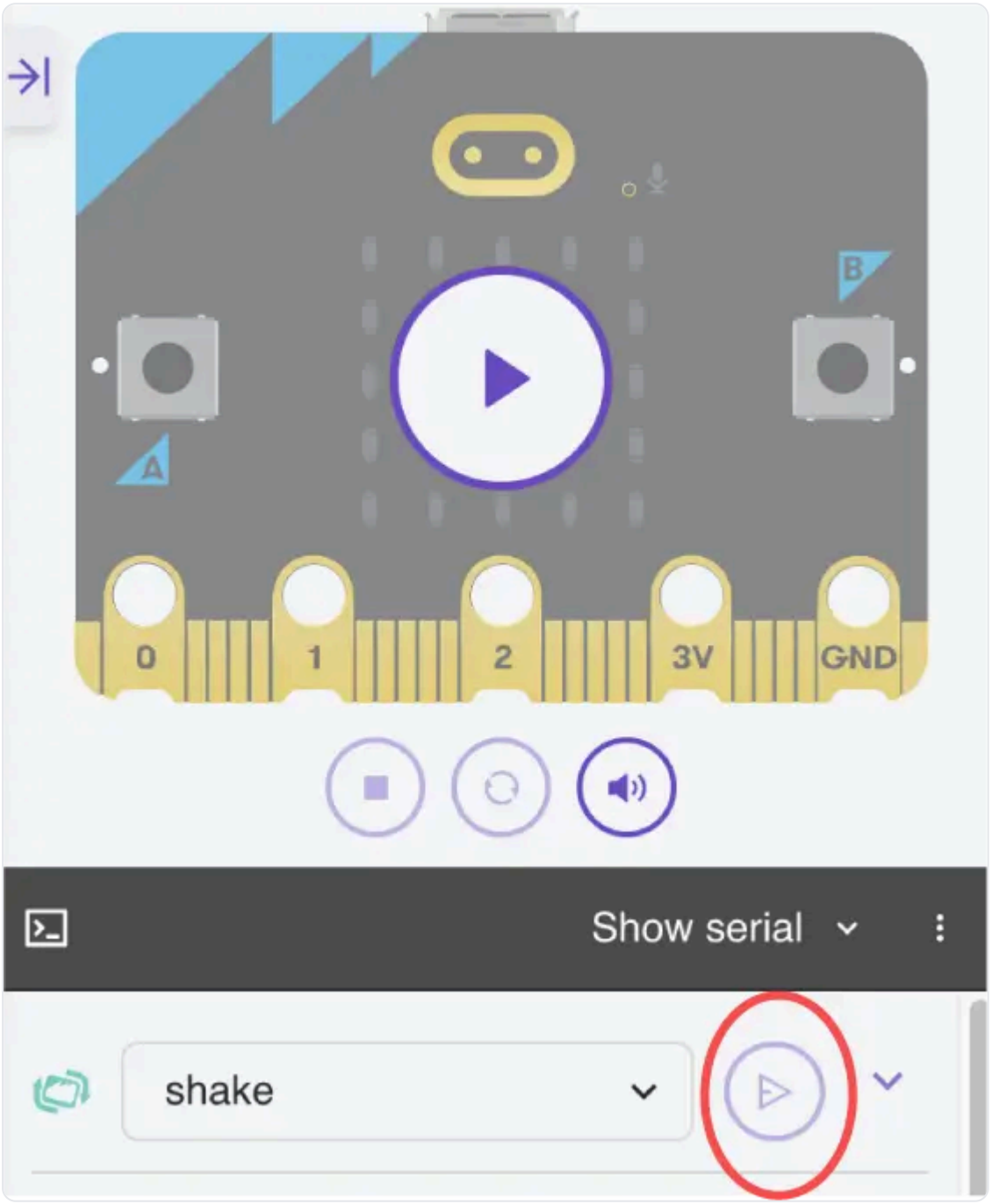
1. Connect the micro:bit to the computer with the micro USB cable.
2. Select the **three dots** next to **Send to micro:bit**.
3. Select **Connect** and follow the on-screen prompts.
4. Select **Send to micro:bit** to download the code.



12 Run it and Watch

In the web browser

The Python editor has a built-in micro:bit simulator, handy if you haven't got a micro:bit to hand. Below the simulator you'll see the **shake** function is already selected. Select the **play** button next to it to simulate a shake and show your step count on the LED matrix.



On a real micro:bit

Once your code's downloaded, give the micro:bit a shake and watch the step counter climb. Why not go further? Attach a battery pack, strap the micro:bit to you or pop it in your pocket, and head outside to see how many steps you can rack up.

13 Try it yourself

🚀 Try it yourself

Challenge: Set yourself a step goal! Add another `if` statement inside your `while True:` loop that checks `if steps >= 20:`. When you hit it, type `display.show(Image.HAPPY)` to show a happy face and celebrate, then press button A to reset and go again.

14 Stuck? Quick fixes

Problem	Try this
The number doesn't go up when I shake it	Check your `steps += 1` line is indented inside the `if accelerometer.was_gesture('shake'):` statement. Give the micro:bit one firm, clear shake.
The count jumps up by lots at once	A big wobble can look like several shakes. Try one single, definite shake, and check the `sleep(500)` line is inside your `while True:` loop so each shake has time to register.
Nothing shows on the LED matrix	Make sure you've typed `display.scroll(steps)` with `steps` inside the brackets, and that the line is indented inside your `while True:` loop.
The number doesn't change straight away when I shake fast	That's okay, it's still counting! The micro:bit can't show the new number while the last one is still scrolling. Stop shaking for a moment and your latest total will pop up.
Button A won't reset the steps	Check the `steps = 0` line is indented inside the `if button_a.was_pressed():` statement.
My code won't download to the micro:bit	Use a data USB cable (not a charge-only one), make sure the micro:bit is paired, and try a different USB port.