Project 3 - Step Counter

For this project, we're going to write some code that interacts with some things on the micro:bit - buttons and the *accelerometer*. You know what buttons are - you press them and they do something. But do you know what an accelerometer is?

An accelerometer is a device that measures movement. A lot of smart phones have accelerometers that can tell if the phone is moving up or down, or side to side. The accelerometer in the micro:bit isn't as powerful as that, but it can detect movement, especially if you shake the micro:bit.

First let's write some code. In your Mu editor, type or copy this code and then flash it to the micro:bit by clicking on the 'Flash' button:

```
from microbit import *

# Define a variable to record steps
steps = 0

while True:
    # Check to see if a step has been taken.
    # If so, display a smile and increase the number of steps by 1
    if accelerometer.was_gesture('shake'):
        steps += 1
        display.show(Image.HAPPY)
        sleep(500)
        display.clear()

    # Check to see if button A has been pressed.
    # If so, display the number of steps taken
    if button_a.is_pressed():
        string_steps = str(steps)
        display.show(string_steps)
        sleep(500)
        display.clear()
```

Let's see if we can tell what this code is doing.

First we create a variable called steps with a value of zero.

The part that says "**`while True:`**" is important. This puts the micro:bit into an *infinite loop*. Remember when we talked about **`while`** loops and how it's bad to get stuck in an infinite loop? Well this is a case where it's actually useful - the micro:bit is constantly checking to see if it's been moved, forever, until you unplug it or change the code.

Inside that **`while`** loop, we check to see if the micro:bit has moved, or if it has been shaken. That indicates that we have taken a step, so the code adds 1 to the **`steps`** variable. We also display a smiley face, then pause for a few seconds and clear the display.

After that, we check to see if a button has been pressed. **`button_a.was_pressed()`** is a function that comes with the microbit library - we get to use it because we wrote **`from microbit import *`** at the top of our code.

If the ‘A’ button is pressed, we take the number of steps that have been added to our **`steps`** variable so far and convert that number into a string. This is just because **`display.show()`** can only show strings. Instead of this:

```
>>> 5
```

We now have a **`string_steps`** that looks like this:

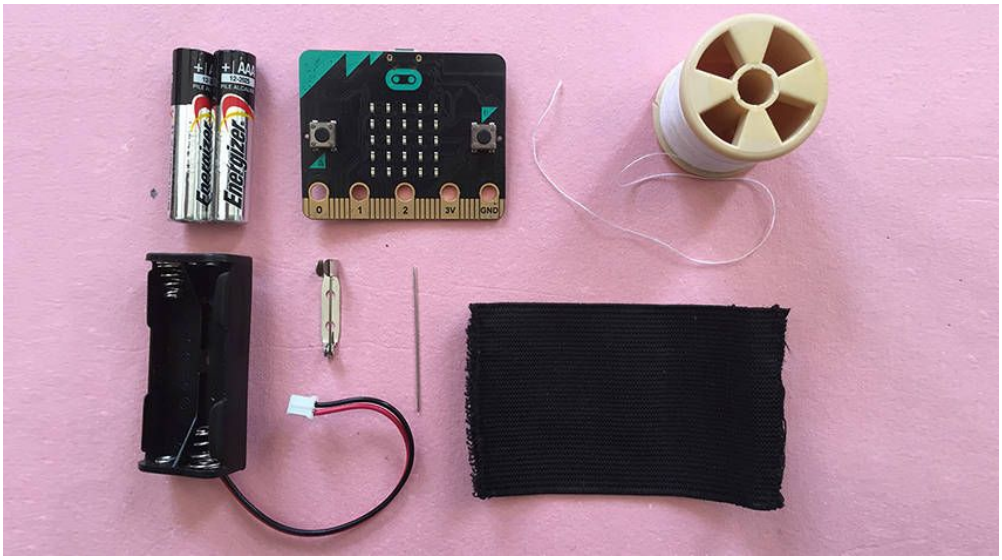
```
>>> ‘5’
```

We send that number to the display, leave it there by pausing for a few seconds, then clear the display and start all over.

Now comes the fun part! Let’s make a wearable badge so that we can walk around and count our steps!

Supplies you should have:

1 micro:bit
1 battery holder
2 AAA batteries
thread
1 needle
a piece of elastic
1 safety pin



Step 1: Stitch the elastic

Thread your needle, knot the thread, then stitch along the cut edge of the elastic to close it up.

Step 2: Roll the elastic to hide edges.

Roll the top edge over the shorter edge and tuck in so no raw edges are showing.

Step 3: Stitch the edge down.

Step 4: Checkpoint!

It should now look like a tube.

Step 5: Turn whole tube inside out.

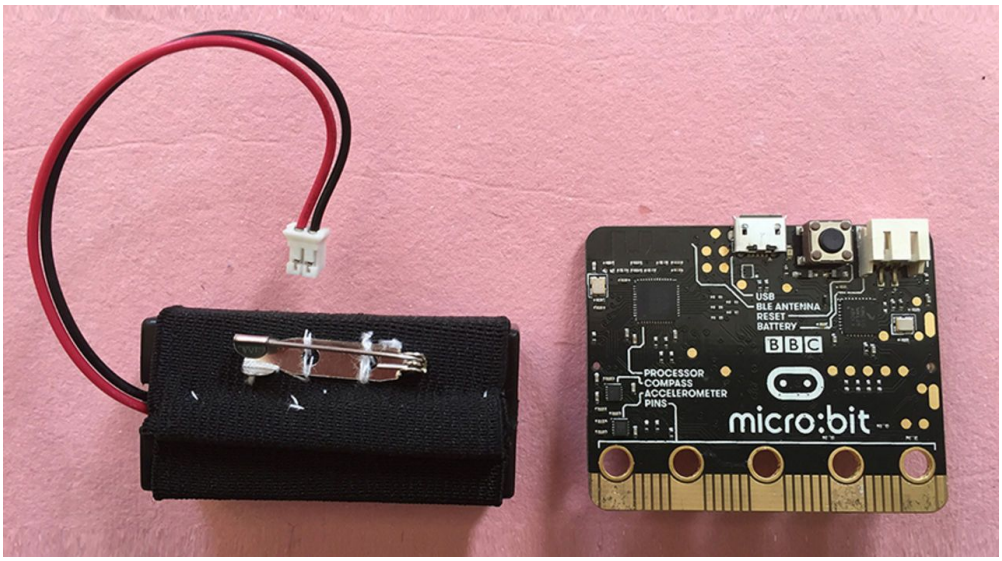
This will neaten it up and hide stitches.

Step 6: Stitch the pin.

Stitch the safety pin securely to one side of the tube, preferable with the seam just below the badge pin, so that when it's worn, it hangs well.

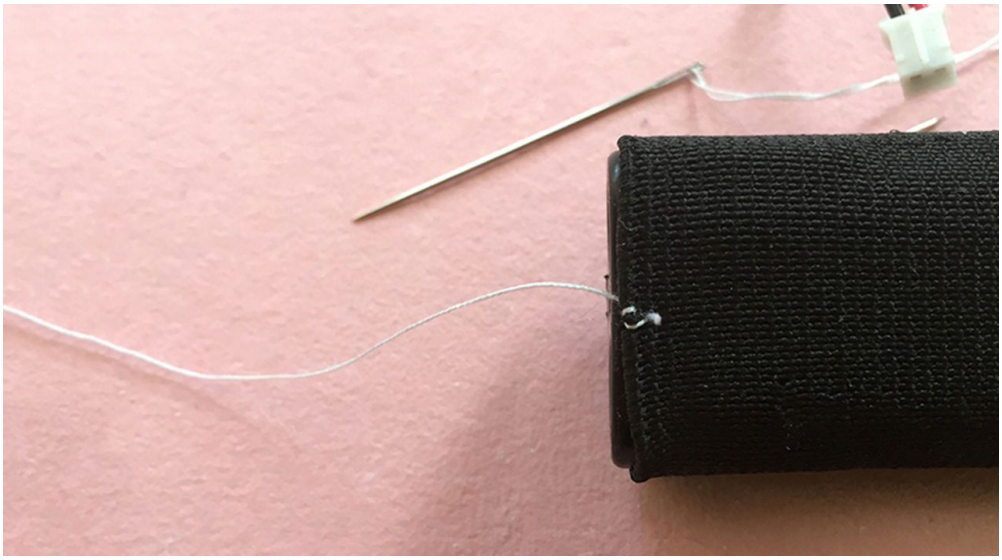
Step 7: Insert the battery holder into the elastic tube.

After inserting 2 AAA batteries, squeeze the battery holder into the tube. It should be a snug fit.



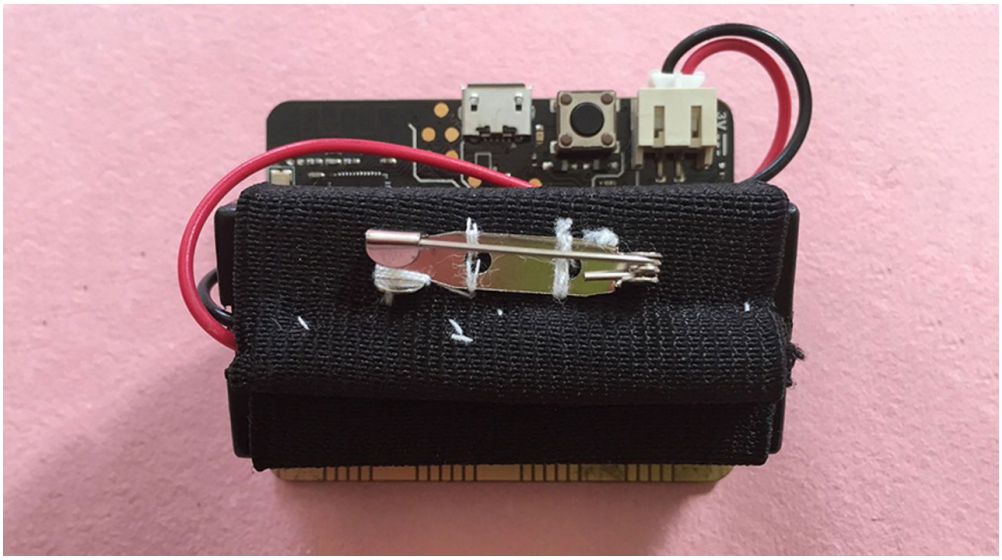
Step 8: Sew a holding stitch.

Knot your thread again and place a stitch on the opposite side to the badge pin in the center edge of the elastic.



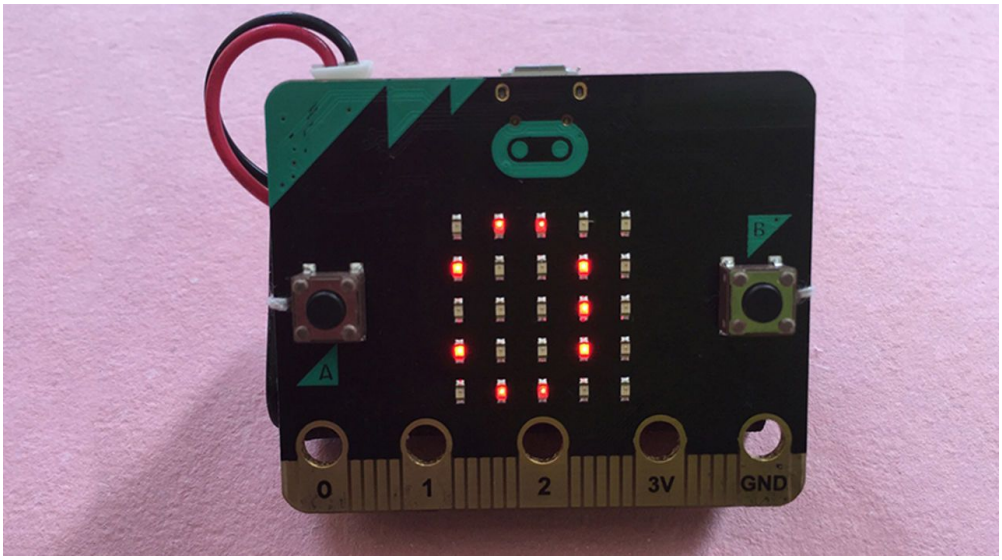
Step 9: Sew elastic to the micro:bit.

Place the tube onto the back of the micro:bit and sew through the holes located on both sides of the micro:bit, right next to the buttons.



Step 10: Plug in the power.

Your micro:bit is now ready to wear. Pin it to your shoe, or perhaps the leg of your pants, and walk around to see how many steps you can measure.



For more projects you can do with your micro:bit, check out these resources:

- **The MicroPython guide to BBC micro:bit**

  https://www.microbit.co.uk/python-guide

- **MicroPython/micro:bit documentation:**

  http://microbit-micropython.readthedocs.io/en/latest/

- **Micro:bit projects on Instructables:**

  http://www.instructables.com/howto/microbit/