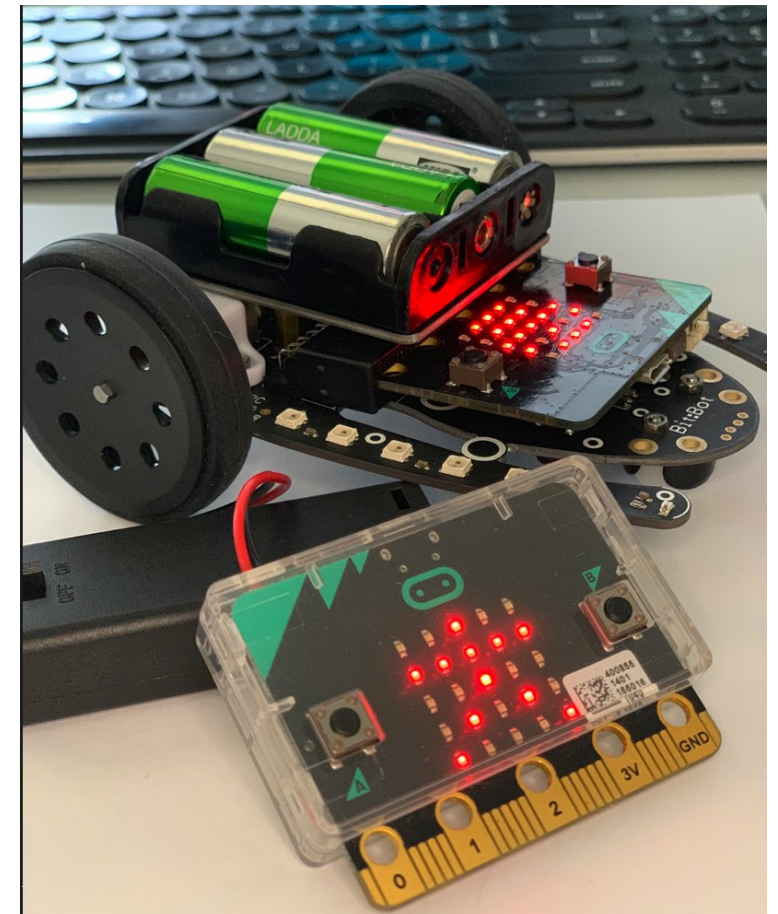
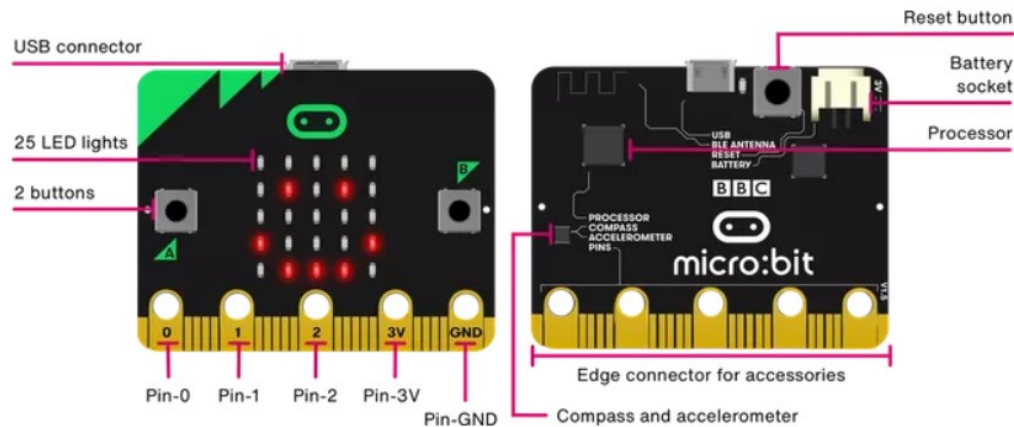


KS3 Physical Computing—Microbit

In this unit we apply our programming skills learnt in previous units to a physical computer, a microbit. We do the coding for this in makecode.



KS3 Physical Computing—Microbit

```
forever loop
  set inside to 0
  repeat n times
    do
      set x to pick random 0 to r + 1
      set y to pick random 0 to r + 1
      if (x^2 + y^2 < r^2) then
        change inside by 1
  set pi to (inside * 4) / n
  show leds
  show string join "" pi
```

The code is written in a Scratch-style block-based language. It starts with a 'forever' loop. Inside the loop, a variable 'inside' is set to 0. A 'repeat n times' block contains a 'do' block with three steps: 1) 'set x to pick random 0 to r + 1', 2) 'set y to pick random 0 to r + 1', and 3) an 'if' block. The 'if' block checks the condition $x^2 + y^2 < r^2$. If true, it executes 'change inside by 1'. After the 'do' block, the variable 'pi' is calculated as $(\text{inside} \times 4) / n$. The code then uses 'show leds' and 'show string join "" pi' to display the result.

Block Coding

We use the <https://makecode.microbit.org/> website to program our microbits.

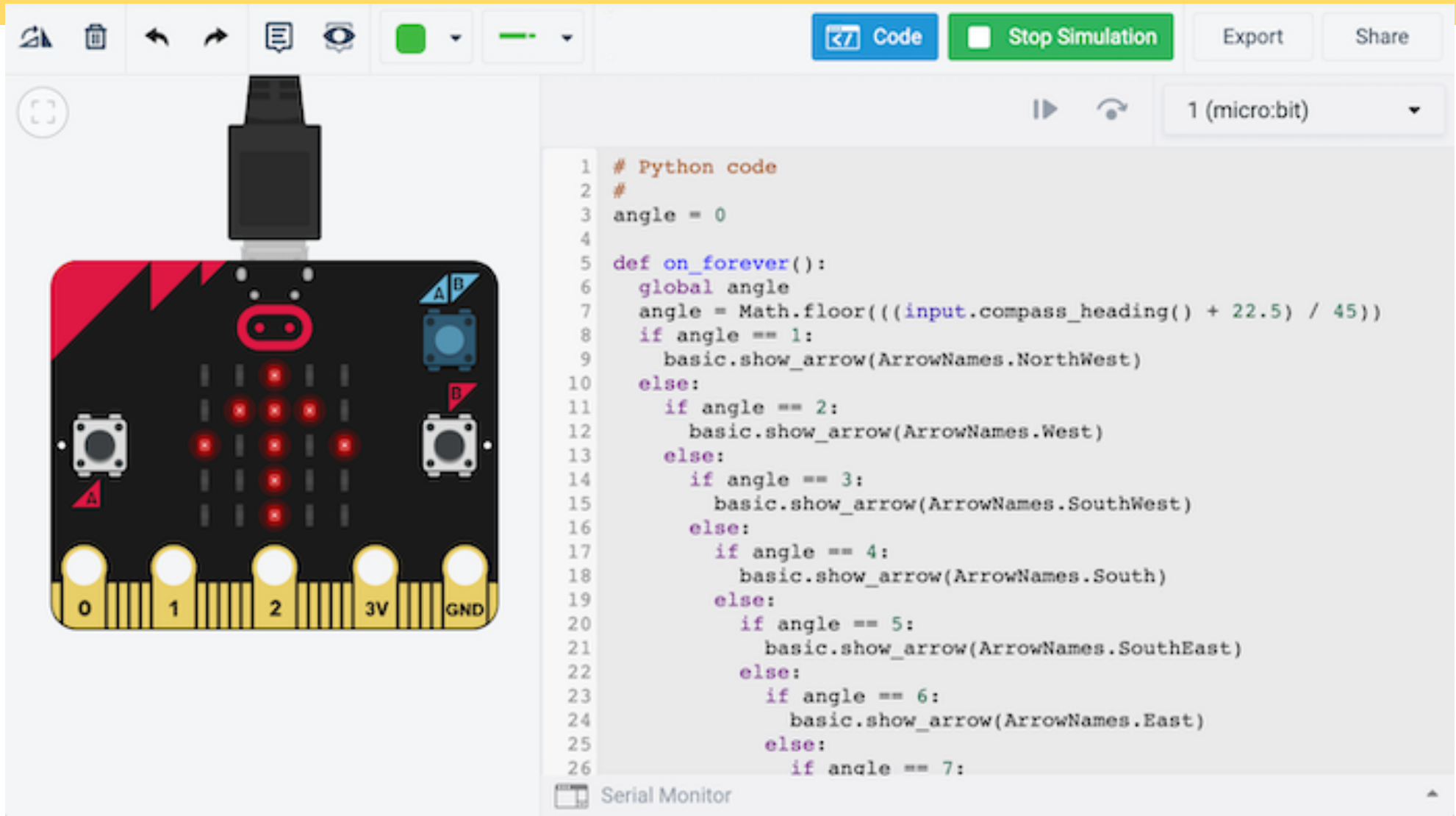
Many example programs and explanations can be found at

<https://makecode.microbit.org/examples>

```
on start
  set n to 1000000
  set r to 4000
  set r2 to r * r
```

The 'on start' block contains three initialization steps: 1) 'set n to 1000000', 2) 'set r to 4000', and 3) 'set r2 to r * r'.

KS3 Physical Computing—Microbit



The image shows the Microbit IDE interface. On the left is a virtual representation of the Microbit board with a USB cable connected. The board features a red LED matrix, two push buttons labeled 'A' and 'B', and a USB port. On the right, the code editor displays the following Python code:

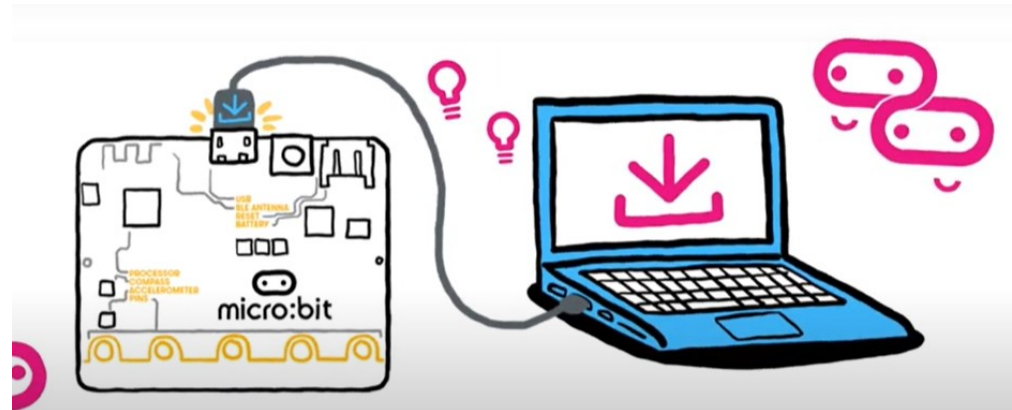
```
1 # Python code
2 #
3 angle = 0
4
5 def on_forever():
6     global angle
7     angle = Math.floor(((input.compass_heading() + 22.5) / 45))
8     if angle == 1:
9         basic.show_arrow(ArrowNames.NorthWest)
10    else:
11        if angle == 2:
12            basic.show_arrow(ArrowNames.West)
13        else:
14            if angle == 3:
15                basic.show_arrow(ArrowNames.SouthWest)
16            else:
17                if angle == 4:
18                    basic.show_arrow(ArrowNames.South)
19                else:
20                    if angle == 5:
21                        basic.show_arrow(ArrowNames.SouthEast)
22                    else:
23                        if angle == 6:
24                            basic.show_arrow(ArrowNames.East)
25                        else:
26                            if angle == 7:
```

Below the code editor is a 'Serial Monitor' tab.

We can also write the code for the microbit in Python

KS3 Physical Computing—Microbit

**Write the code in Makecode.
Flash it to the Micro:bit via USB**



**Connect a power supply to be
able to run the code**

