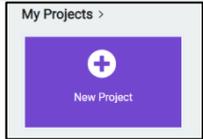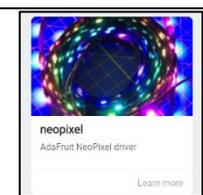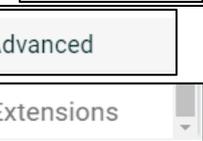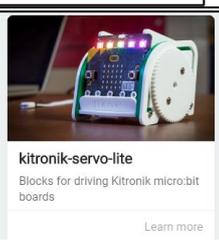## fernDOWNLOAD ROBOTICS: roboREACH Workshop 1

Welcome to our fantastic roboREACH workshop. Today you are going to complete a few challenges with our micro:bit robots.

To get started you need to make sure you have:

- USB to microUSB cable
- micro:bit robot with 3 x AAA batteries
- A test track sheet

Got all those things? Good! Let's start.

Setting up the Programme with *code libraries*

1. Load up https://makecode.microbit.org/ and select:	My Projects › ⊕ New Project
2. Before we begin coding we need to download a few code libraries to makecode to make it work with our robot. Click Advanced and then Extensions:	∨ Advanced ⊕ Extensions
3. In the search bar type 'Neopixels' and then select this image:	neopixel AdaFruit NeoPixel driver Learn more
4. Once again repeat step 2. And click advanced and extension.	∨ Advanced ⊕ Extensions
5. Now in the search bar type 'servo:lite' and then select this image:	kitronik-servo-lite Blocks for driving Kitronik micro:bit boards Learn more
You are now ready to program your robot!	

Setting up the Pins and LED strip
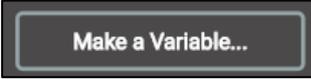
6. Select **Variables**., in the **Make a Variable...** box, type: **Pixel Array**
This creates a new variable called 'Pixel Array'.

New variable name:

Pixel Array

Ok ✓   Cancel ✗

7. Create your first block by copying the diagram below in to the *on start* block:

```
on start
    set  Pixel Array ▼  to  NeoPixel at pin  P0 ▼  with  5  leds as  RGB (GRB format) ▼
    set pull pin  P15 ▼  to  up ▼
    set pull pin  P16 ▼  to  up ▼
```

8. You will find the 'set pull pin' blocks in ADVANCED at the bottom under:

◎ Pins

9. The cyan NeoPixel block is found under: ⠇Neopixel

Setting the Line Follower

10. You need to create two new variables like in Step 6 called: **Left_Detector** and
Right_Detector. Now using these variables copy the code below in the *forever* block:

```
forever
    set  Left_Detector ▼   to  digital read pin  P15 ▼
    set  Right_Detector ▼  to  digital read pin  P16 ▼
```

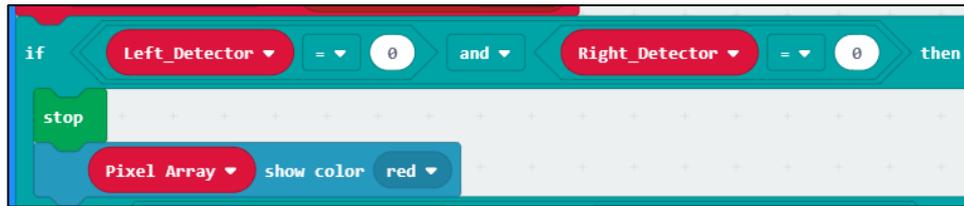This sets the Left Sensor to pin P15 (pin 15) and the Right Sensor to P16 (Pin 16)

11. Now it's time to program what happens when the sensors detect a line.

We will now start using Logic Blocks from: ⤧ Logic

```
if  true ▼  then
⊕
```

Drag this block: underneath the set Detector blocks you just did in the previous
step.

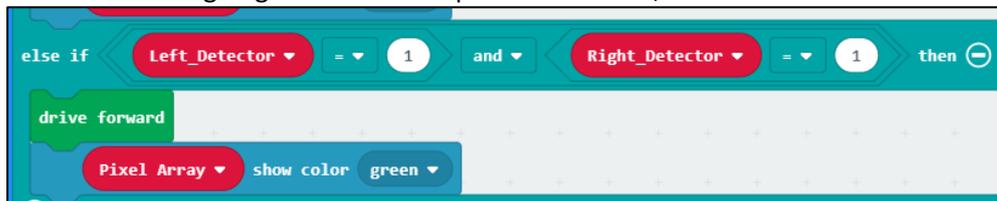12. Now we are going to code the following block:

This code block means: if the Left Detector detects a line AND the Right Detector detects a line then stop. Then make the LEDs go red.

The green 'stop' block comes from the block.

13. Now we are going to add the last part to the block, like this:

This code block means: if the Left Detector detects **no** line AND the Right Detector detects **no** line then drive forward. Then make the LEDs go green.

Testing the first code.

14.	Connect your robot **carefully** with the USB-microUSB cable to the computer. You may have to hold it with one hand here.
15.	Click
16.	The code should now be on the robot. Carefully disconnect the robot and place in the **middle** of the test track sheet.
17.	If your code has worked, when you turn it on (with the little switch on top) it will drive forward and stop when it detects the line. Turn it on and test this. If it does not work check your code again, there is an error you need to fix.

Now time for a roboREACH challenge!

Your challenge is to add to your code so that it rides the line and if it detects the white space it turns to stay on the line. As a hint you will need the 'turn left' and 'turn right' blocks from the servo:lite library. You will also need to add different options in the if block using the icon.

As an extra challenge see if you can get the LEDs to change to different colours when turning either direction. Once you think you have got the code right, download it again into your bot like in step 14-15.

Good Luck!