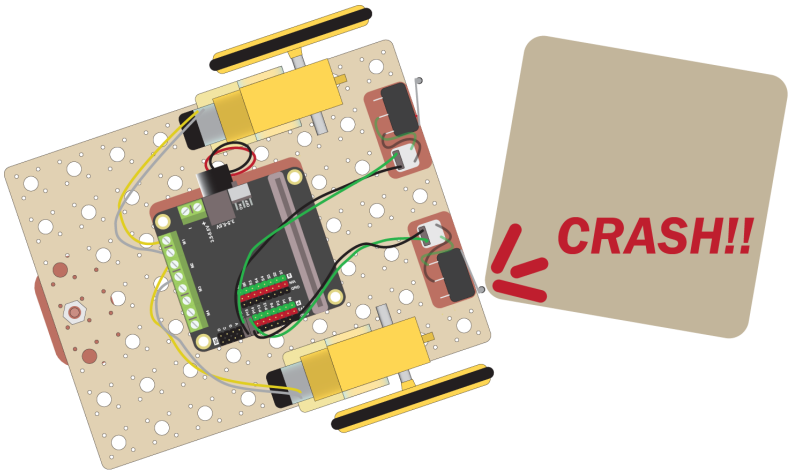
Add Crash Sensors to your Robot

Project 1.03

In this workshop you will add some crash sensors to your robot. These will detect when the robot has crashed into a wall or another robot. You can use these to take evasive action, such as turning around or making a noise.



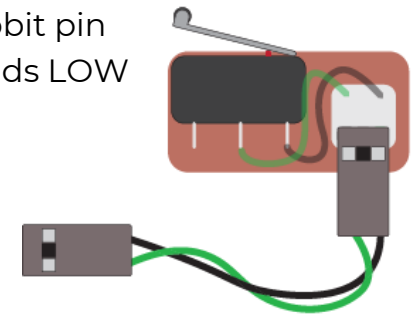
How it Works

The crash sensors are a type of switch called a microswitch. We will use a digital input to detect when the switch is hit, which closes the switch.

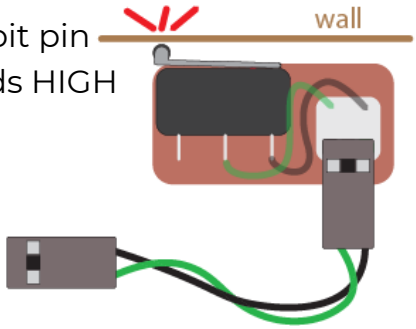
Each switch will be connected to a pin on the Microbit. When the switch is open, the pin will read HIGH, corresponding to a value of 1. When the switch is closed, the pin will be set LOW, corresponding to a value of 0. We can use code to read to 0 and 1 values and respond accordingly.

The crash sensors need to be connected to the Microbit using GS cables, which have 2 wires. G is ground, which is the black wire. S is signal, which is the green wire and connects to the pin on the Microbit.

Microbit pin
13 reads LOW



Microbit pin
13 reads HIGH



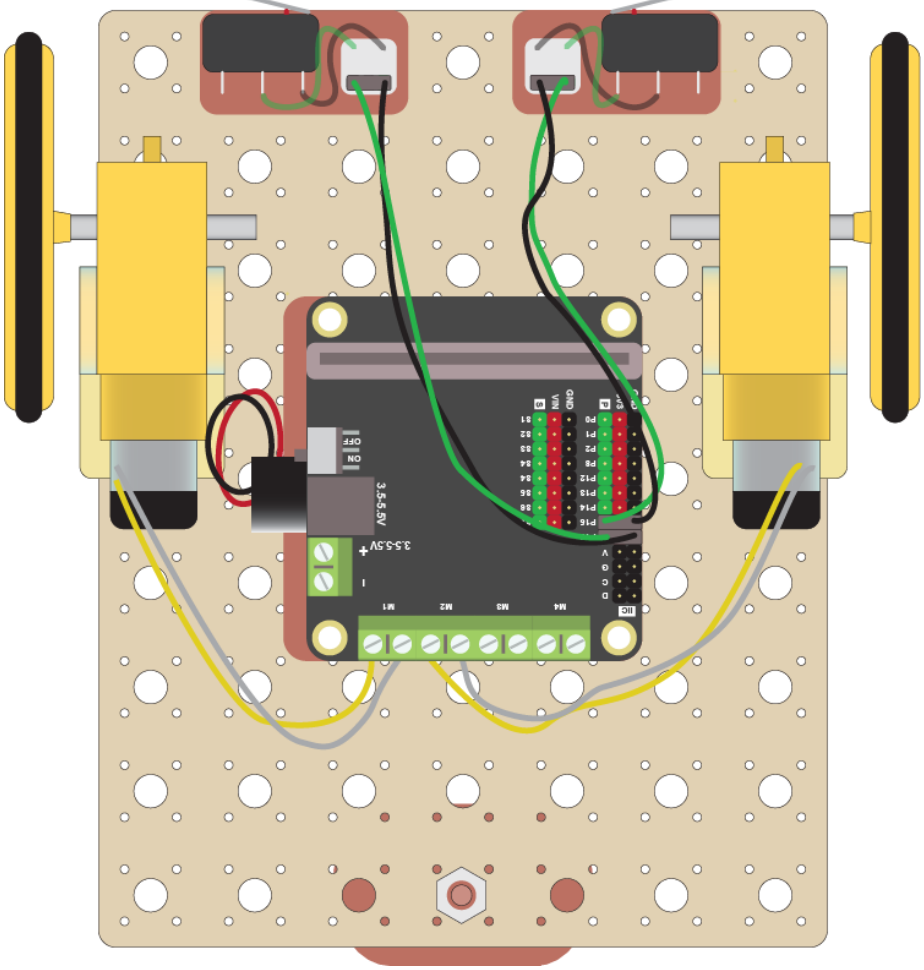
What to do

- If you haven't already done so, build the robot by referring to the previous worksheet
- Then follow this worksheet to add two crash sensors and make your robot stop when it crashes
- Finally, attempt the challenges to make your robot respond to a crash in different ways by following the coding instructions in this worksheet

Add the Crash Sensors

Connect Two Crash Sensors

1 Add two crash sensors to your robot.



These connections on the Microbit are called ***pins***

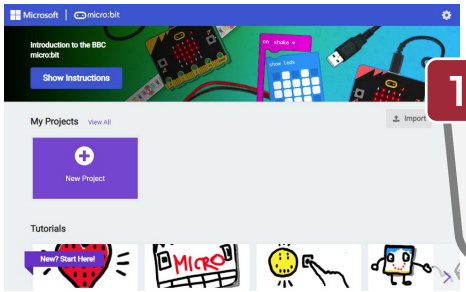
2 Wire up the crash sensors as follows using GS cables

Component	Microbit Connections
Right crash sensor	P15
Left crash sensor	P16

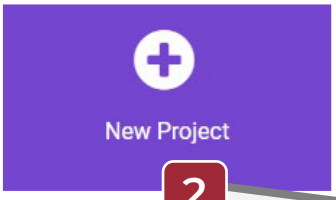
Code the Crash Sensors 1

Create a Project for the Robot

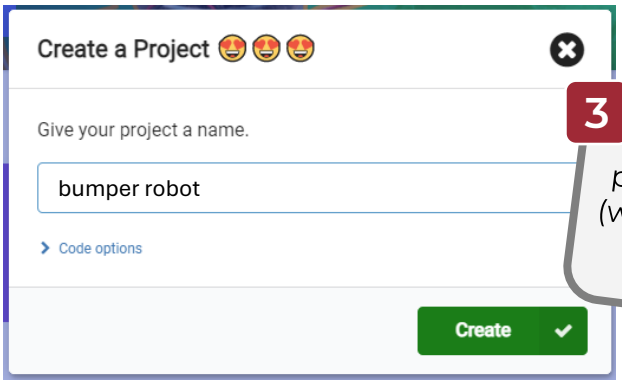
https://makecode.microbit.org/



1 Go to the Makecode website



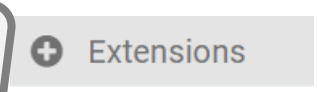
2 Click on New Project

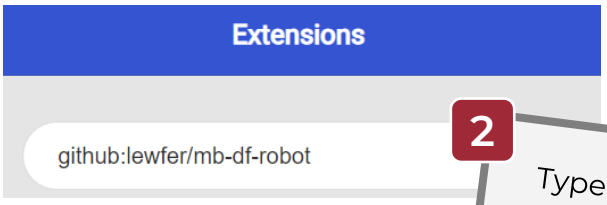


3 Give the project a name (whatever name you want!)

Add the Motor Driver Extension

1 Select this block

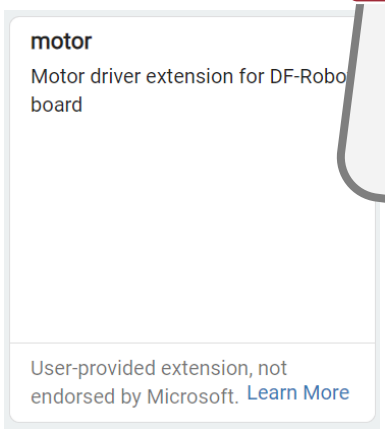




2 Type in the extension

github:lewfer/mb-df-robot

3 Select the motor extension that appears

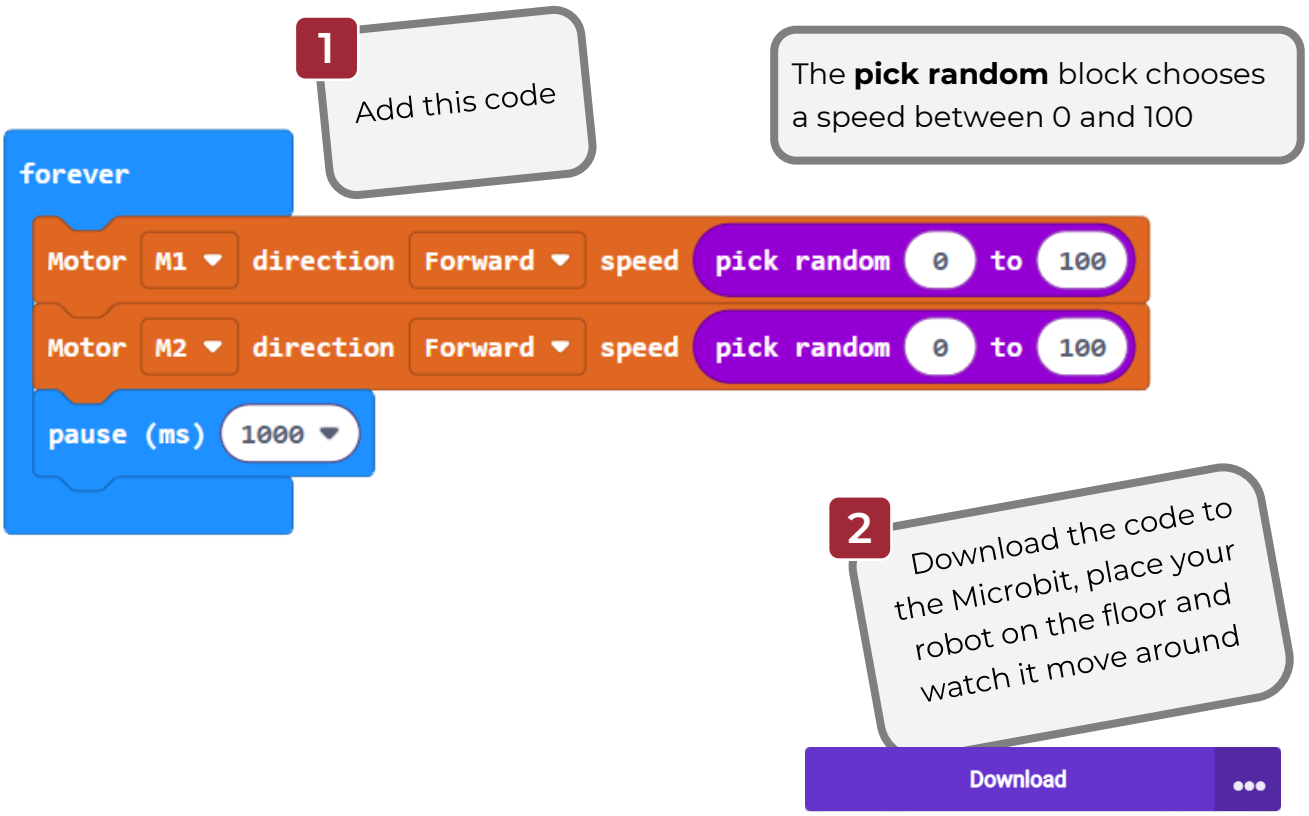


4 If all goes well you will see this new

Code the Crash Sensors 2

Code a Random Robot

First we will code a robot that moves at random speeds. By turning each wheel at a random speed, the robot will keep changing direction.



Set up the Crash Sensors

Now we will start to code the crash sensors. First we need to tell the Microbit that the pins should be set to HIGH when the switches are not pressed.

Code the Crash Sensors 3

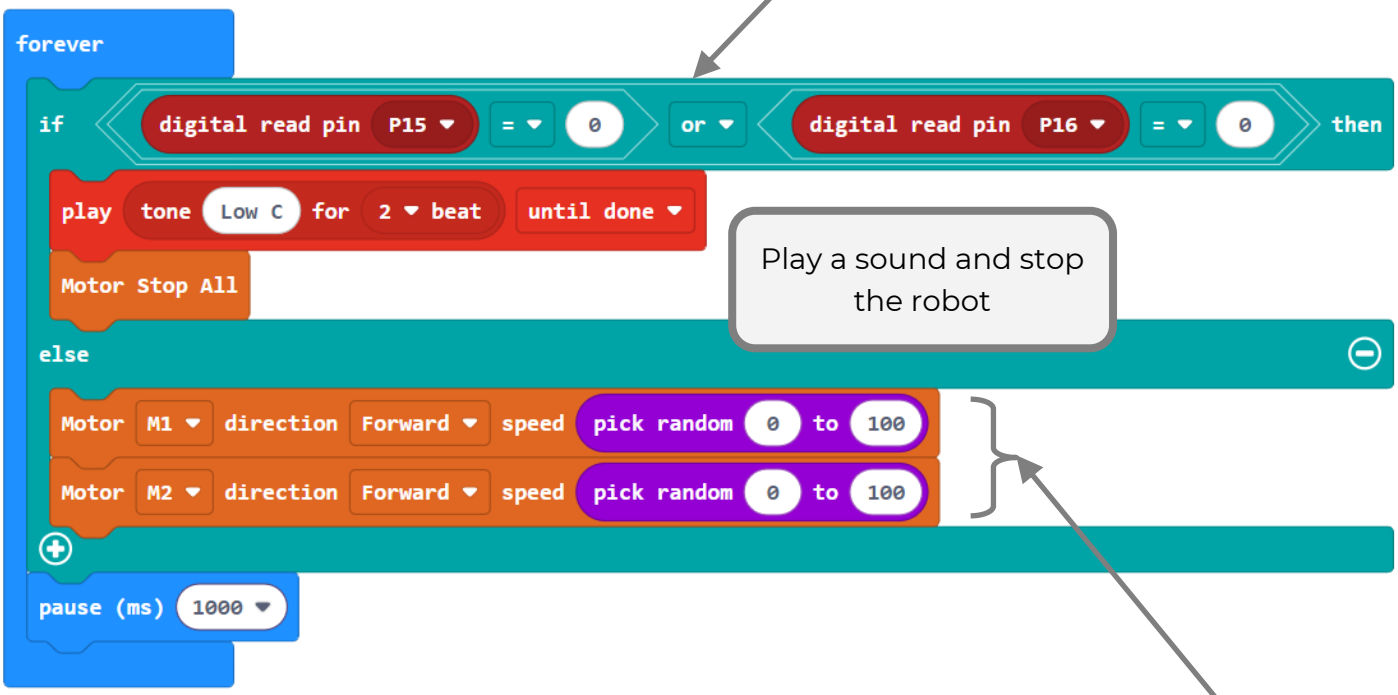
Responding to a Crash

Now we will get the robot to stop and play a sound when the robot hits something.

1 Change the forever block so it looks like this

Detect if either crash sensor is hit. We check if pin 15 is LOW or pin 16 is LOW. So only one sensor needs to be hit for a crash to be detected. This code block is a little tricky! There are several parts:

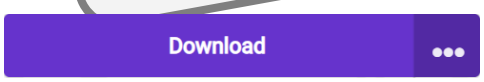
First add an OR block
then add the = blocks
and then add the pin blocks



Play a sound and stop the robot

Move forwards randomly

3 Download the code to the Microbit, place your robot on the floor and check that it stops when it hits something



Challenges

Your challenge!

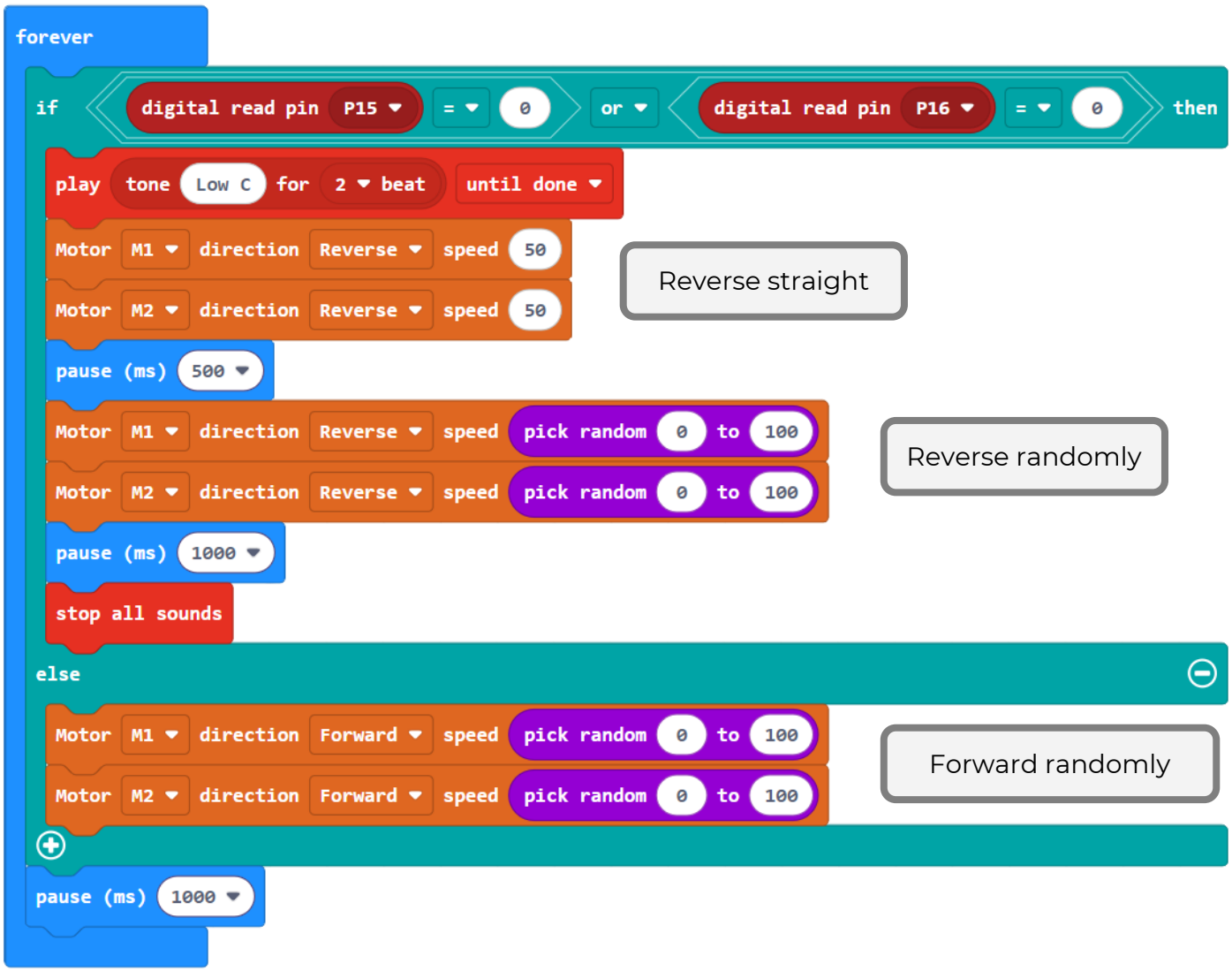
Try these challenges:

- Instead of just stopping, can you get your robot to turn around when it hits a wall?
- Get the robot to flash its lights when it crashes (if you haven't added lights go back to the worksheet **Adding Lights to your Robot**.

Solutions 1

Turning Around

This is one way to get your robot to turn around when it hits something. You may come up with a different way.



Solutions 2

Lights

This code will flash this lights while the robot is crashed.