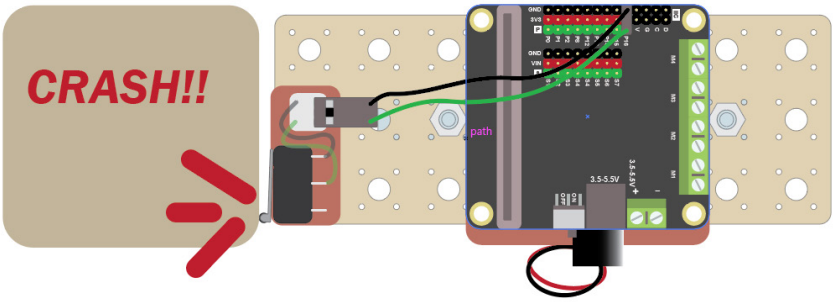
Add Crash Sensors to your Train

Project 2.03

In this workshop you will add a crash sensor to your train. This will detect when the train has crashed into a wall or another object. You can use these to take evasive action, such as stopping or reversing the train.



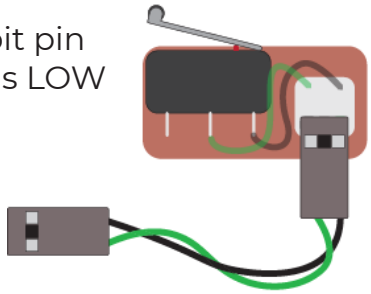
How it Works

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.

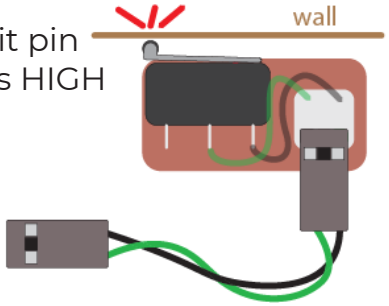
Each switch will be connected to a pin on the Microbit. When the switch is open, the pin will read HIGH, corresponding to a value of 1. When the switch is closed, the pin will be set LOW, corresponding to a value of 0. We can use code to read to 0 and 1 values and respond accordingly.

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
15 reads LOW



Microbit pin
15 reads HIGH



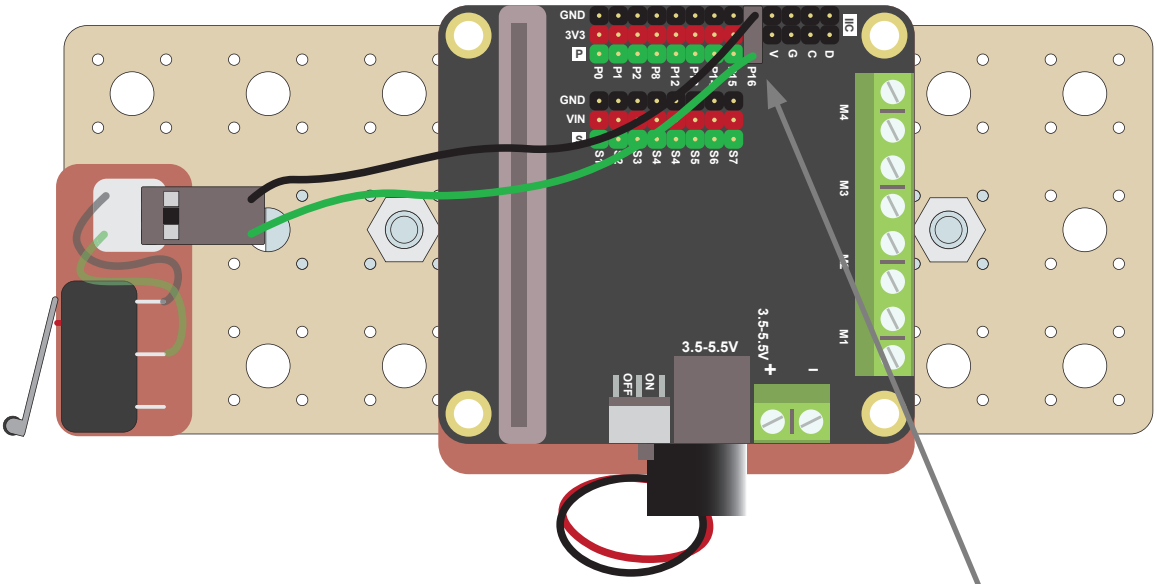
What to do

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

Add the Crash Sensor

Connect a Crash Sensor

1 Add an LED to the train.



2 Wire up the crash sensor as follows using **GS cables**

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

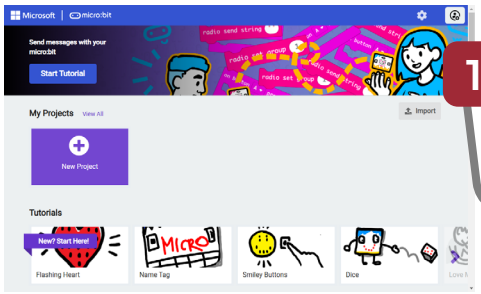
Component	Microbit Connections
Crash sensor	P16

Code the Crash Sensor 1

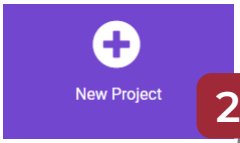
Create a Project

Create a new Makecode project so you can start coding.

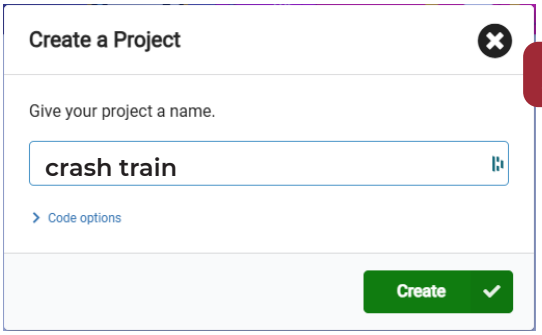
https://makecode.microbit.org/



1 Go to the Makecode website.



2 Click on New Project.

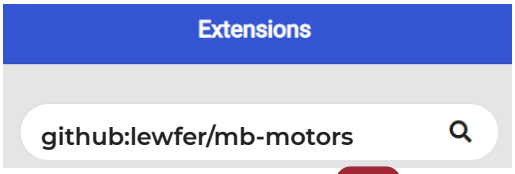


3 Give the project a name (whatever name you like).

Add the Motor Driver Extension

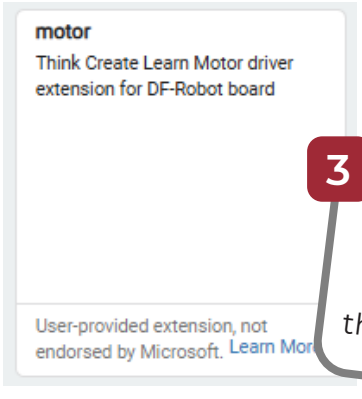
The motor driver extension adds code blocks that allow you to control motors.

1 Select this block.



2 Type in the extension.

github:lewfer/mb-motors



3 Select the motor extension that appears.

4 If all goes well you will see this new code block.

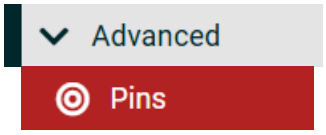
Code the Crash Sensor 2

Set up the Crash Sensor

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.

1 Add this code

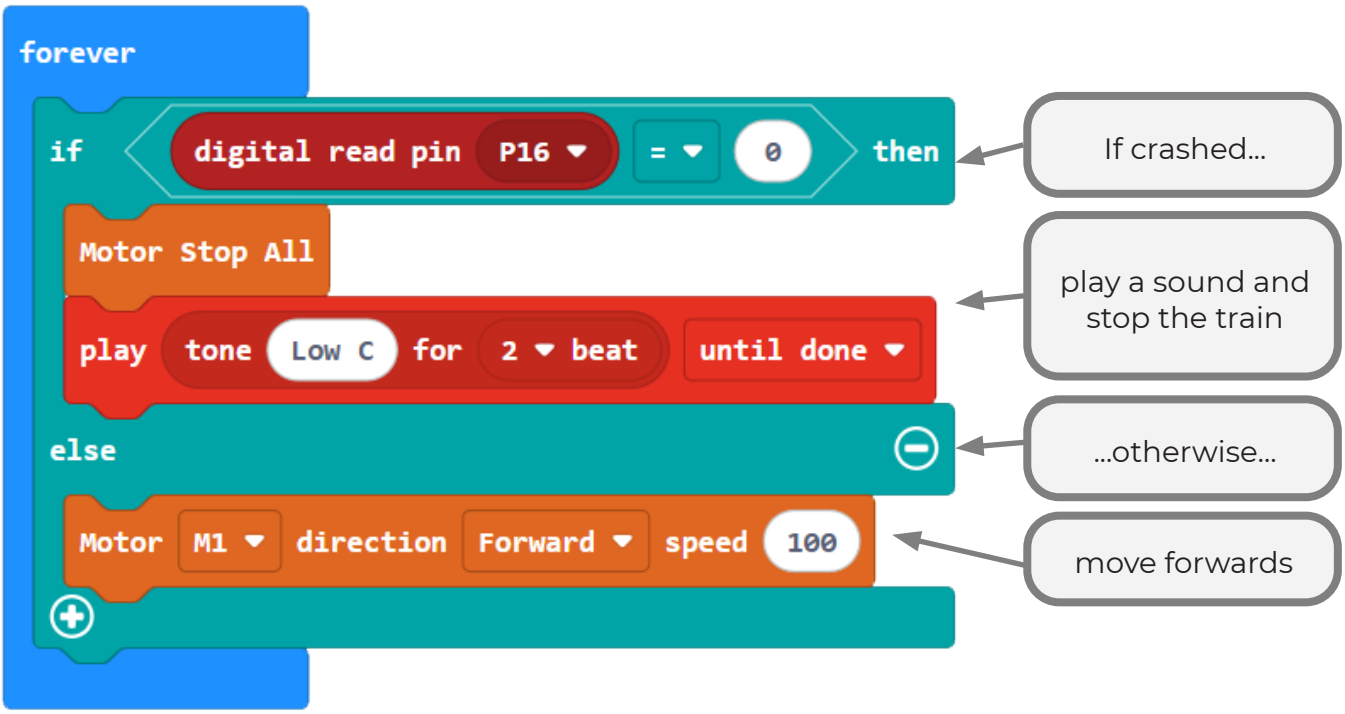
Find the **pins** blocks in Advanced



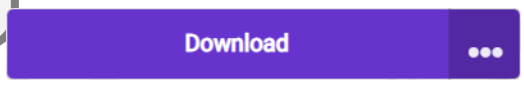
Respond to a Crash

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

1 Detect if the crash sensor is hit. To do this, we check if pin 16 is LOW. Add the following code.



2 Download the code to the Microbit and run the robot into a wall!



Challenges

Your Challenge!

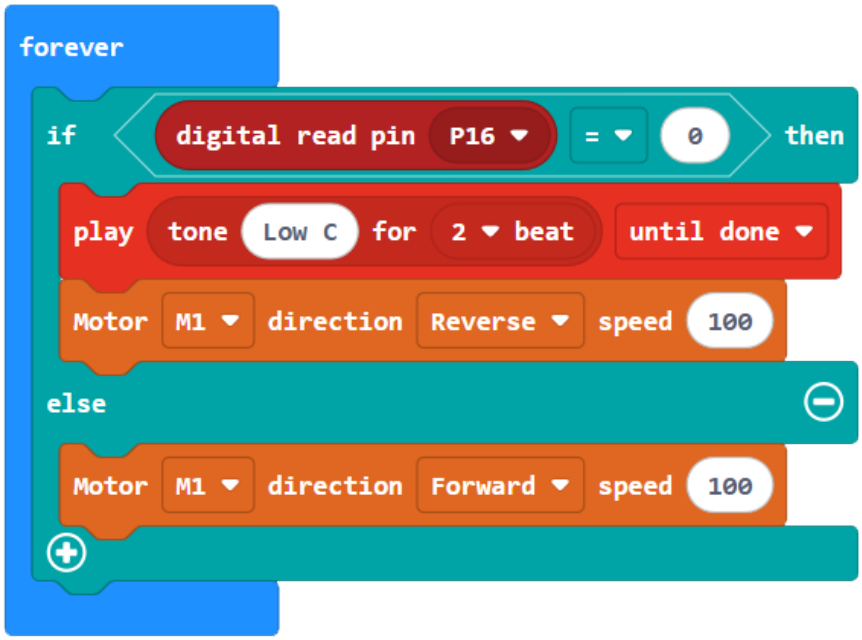
Now try out these challenges

- Instead of just stopping, can you get your train to reverse when it hits a wall?
- Get the train to flash its light when it crashes (if you haven't added lights go back to the worksheet **Adding Lights to your Train**.
- Add another crash sensor on the back of the train. Place a wall at both ends of a track. Change the code so the train moves back and forwards on a track.

Add a Crash Sensor to your Train: Solutions

Reversing

This code will drive the train forwards until a wall is hit. The train will then move backwards.



Flash Light

This code will flash an LED on pin 13 when the train crashes.