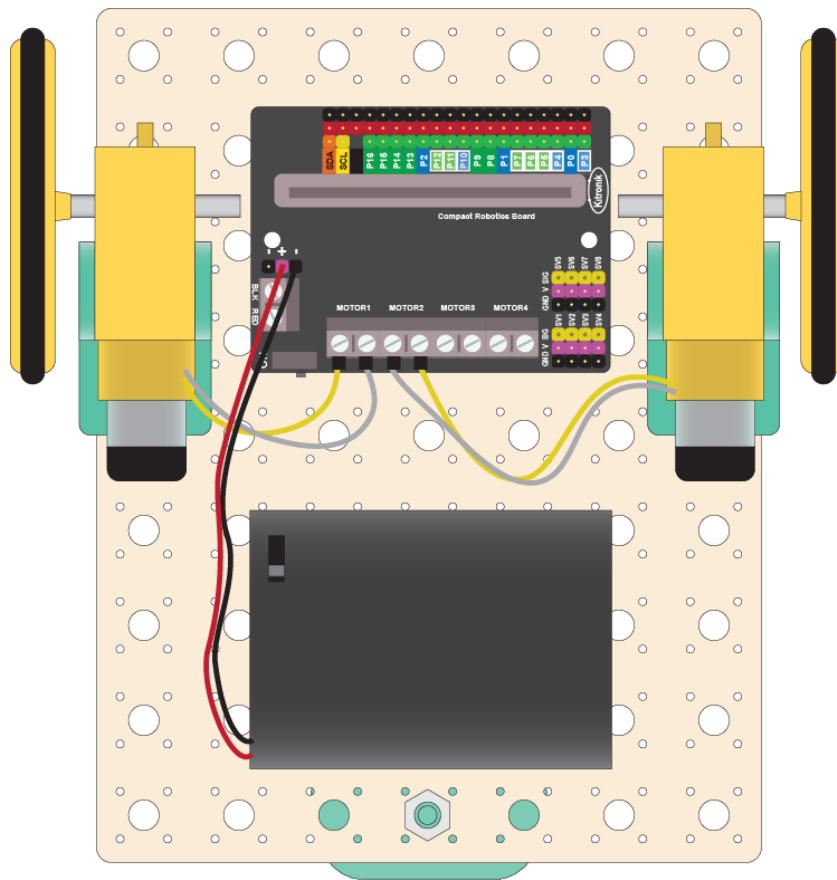


# Build a Basic Robot

## Project 1.01

In this workshop you will make a wheeled robot.



### How it Works

The robot will have 3 wheels. Two large wheels will be driven by motors. The third wheel is a caster wheel, which is not driven, but will rotate in any direction that the other wheels demand.

The Motor Controller is used to drive the motors. It turns on the current when you want the motor to spin and turns it off when you want the motor to stop. You can also change the speed and direction of the motor.

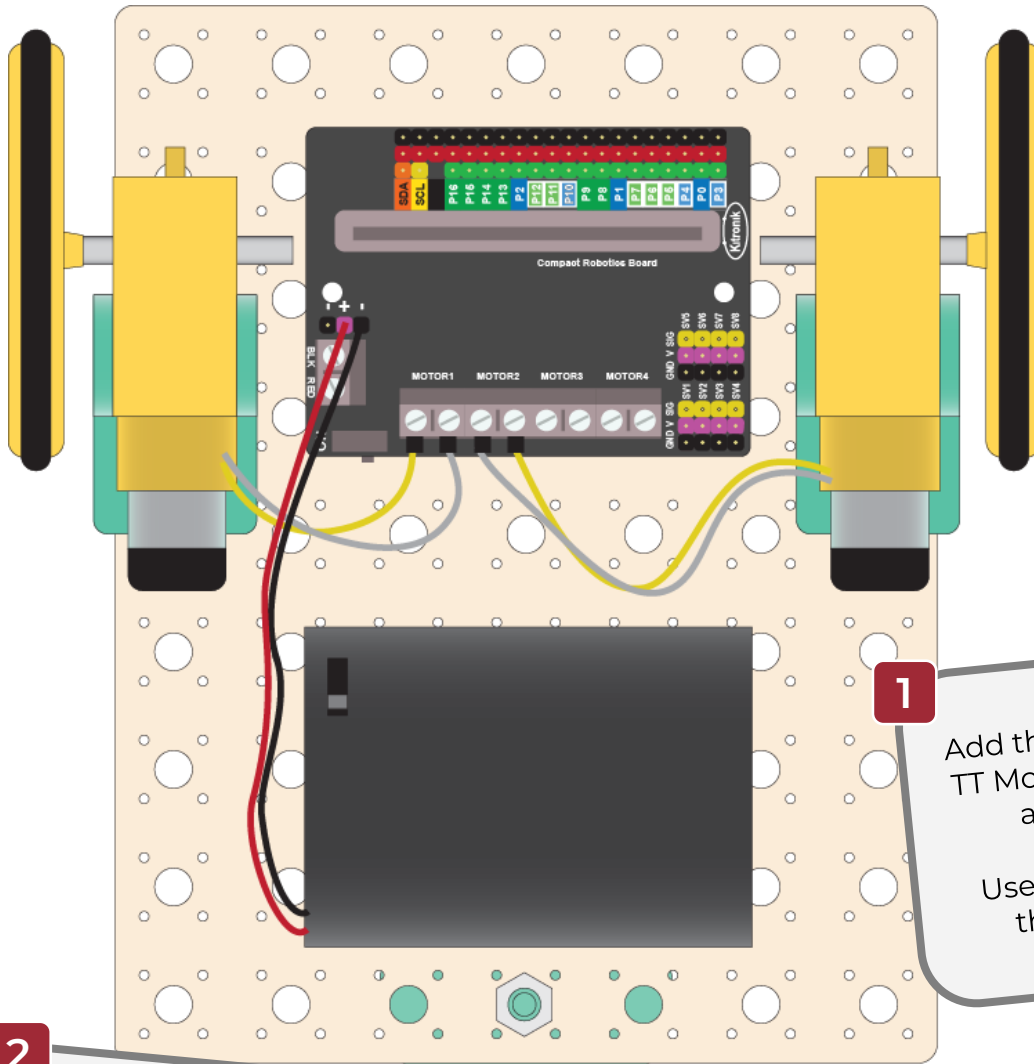
A Microbit will be coded to make whatever movements you want.

### What to do

- Follow this worksheet to build and code the basic forwards movement of the robot.
- Attempt the challenges to get other movements—backwards, turning, dancing, or whatever you want!

# Assemble the Robot

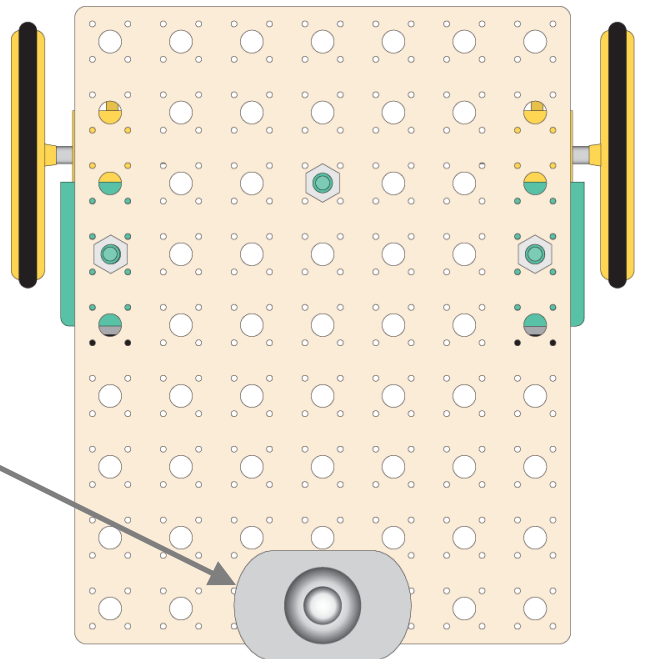
## Find and Connect the Parts



**1** Add the Motor Driver, TT Motors, TT Wheels and Battery. Use nuts to secure them in place.

**2** You don't have to use the exact layout shown here. Experiment with your own design!

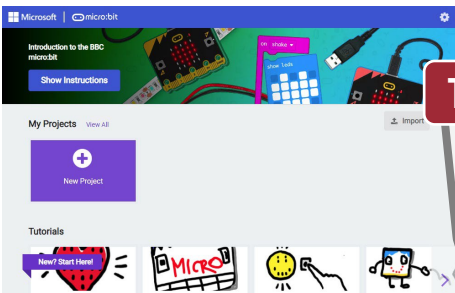
**3** On the bottom, add the Caster Wheel



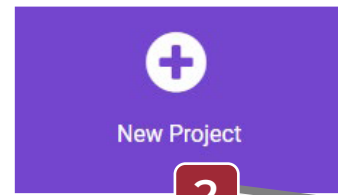
# Code the Basic Movements 1

## Create a Project for the Robot

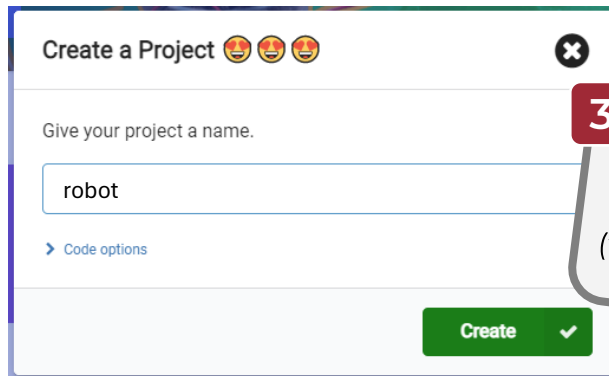
<https://makecode.microbit.org/>



1 Go to the Makecode website



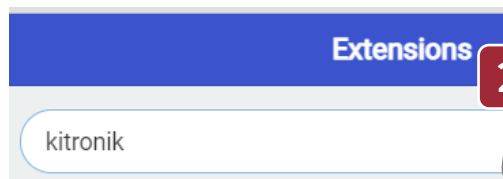
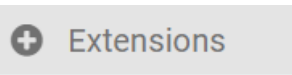
2 Click on New Project



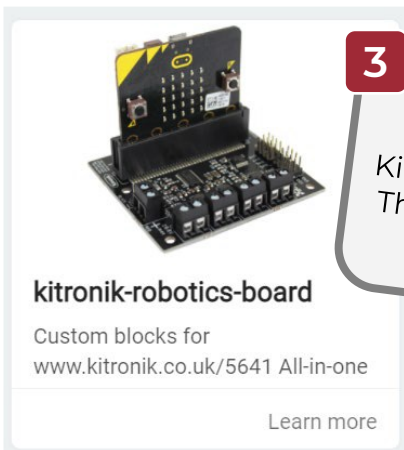
3 Give the project a name (whatever name)

## Add the Motor Driver Extension

1 Select this block

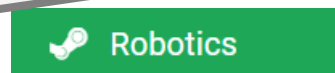


2 Search for Kitronik



3 Make sure you select the right Kitronik extension. There are a few of them!

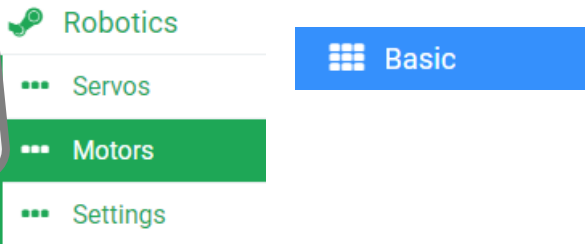
4 If all goes well you will see this new menu appear



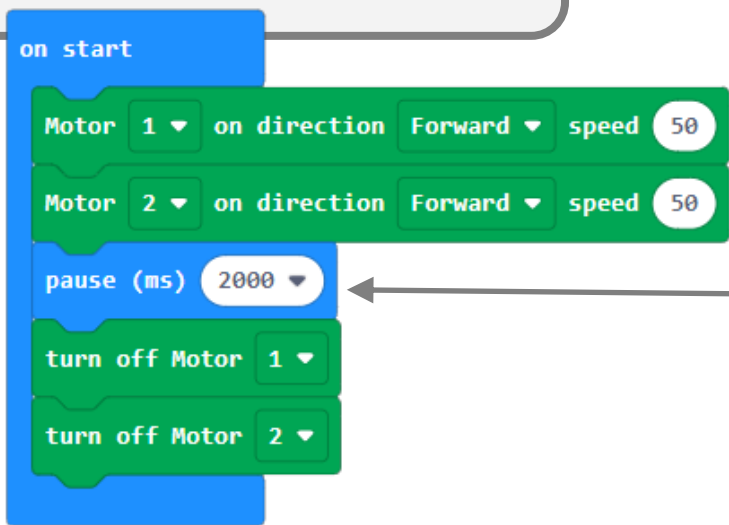
# Code the Basic Movements 2

## Add Code to Move the Motors

1 Find these code blocks

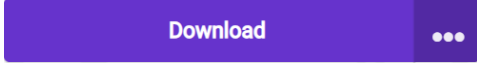


2 Add this code. This moves the robot forward at 50% speed for 2 seconds and then stops.

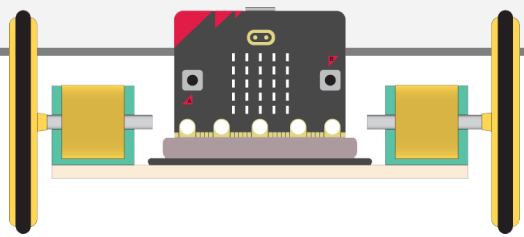


The pause tells the robot how long to carry on doing the previous thing. In this case this says how long the robot will keep moving forwards. The number is the time in milliseconds, There are 1000 milliseconds in 1 second.

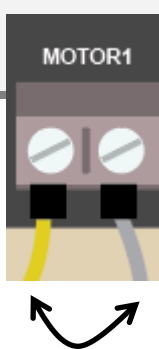
3 Download the code to the Microbit



4 Insert the Microbit into the Motor Controller board



5 Check that the robot runs correctly. If one or both of the wheels is turning the wrong way, swap the wires on the motor



### Your challenge!

- Get your robot to perform different movements:
- How can you get the robot to move backwards?
  - How can you change the speed of the robot?
  - How can you get the robot to turn?
- Then try these:
- Get your robot to dance!
  - Get your robot to make a perfect square!
  - Design your own challenge for your robot!

# Solutions

## Moving Backwards

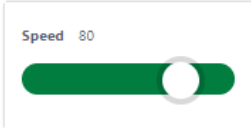
Use the "Reverse" direction to move backwards

```
Motor 1 on direction Reverse speed 50
Motor 2 on direction Reverse speed 50
```

## Changing Speed

Click on the speed to adjust it

```
Motor 1 on direction Forward speed 80
```



## Turning

Adjust the speed of each motor to make a turn. Switch the speeds to turn the other way

Sharp Turn

```
Motor 1 on direction Forward speed 100
Motor 2 on direction Forward speed 0
```

Gentle Turn

```
Motor 1 on direction Forward speed 100
Motor 2 on direction Forward speed 60
```

Spin

```
Motor 1 on direction Forward speed 50
Motor 2 on direction Reverse speed 50
```

## Square

straight

```
on start
repeat 4 times
do
Motor 1 on direction Forward speed 50
Motor 2 on direction Forward speed 50
pause (ms) 1000
Motor 1 on direction Forward speed 50
Motor 2 on direction Reverse speed 50
pause (ms) 500
turn off Motor 1
turn off Motor 2
```

turn

## Dance!

wiggle one way

```
on start
repeat 4 times
do
Motor 1 on direction Reverse speed 50
Motor 2 on direction Forward speed 50
pause (ms) 500
Motor 1 on direction Forward speed 50
Motor 2 on direction Reverse speed 50
pause (ms) 500
turn off Motor 1
turn off Motor 2
```

wiggle other way