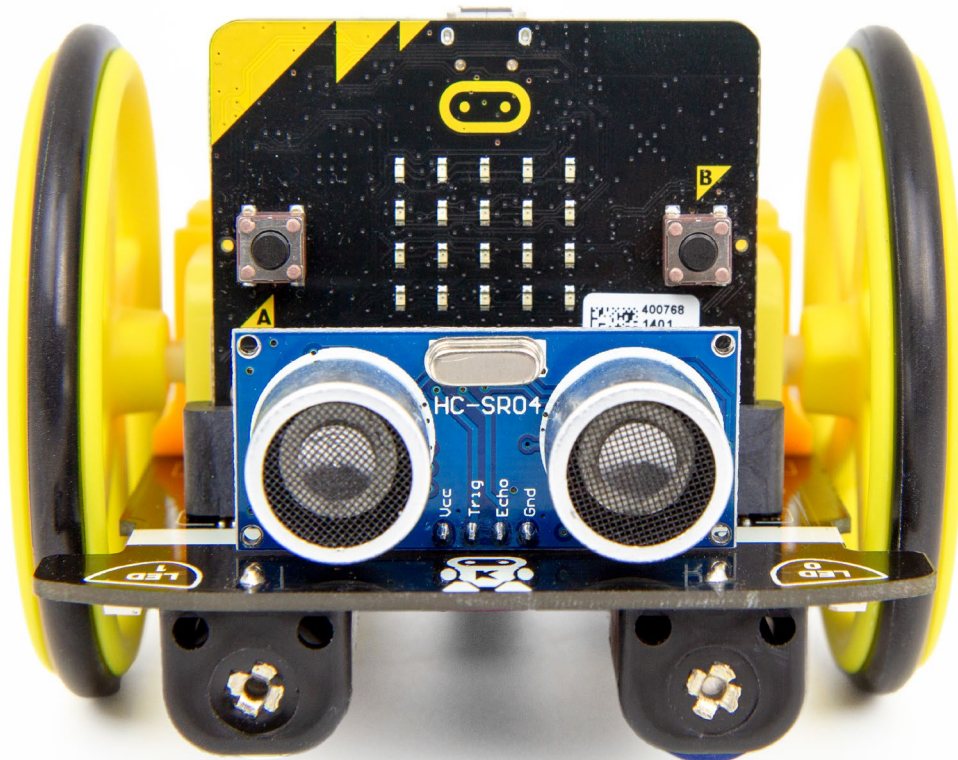

:MOVE MOTOR ULTRASONIC SENSOR TUTORIAL

KITRONIK RESOURCES



INTRODUCTION

Learn how to use the :MOVE Motor's Ultrasonic Distance Sensor to detect objects and stay a certain distance from them.

SETTING UP

EQUIPMENT REQUIRED:

- 1 x BBC micro:bit (www.kitronik.co.uk/5613),
- 1 x :MOVE Motor Buggy (www.kitronik.co.uk/5683)

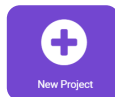
ADDING IN CUSTOM MAKECODE BLOCKS:

We have made custom coding blocks especially for the :MOVE Motor, which helps to make coding super simple within Microsoft MakeCode.

To add these blocks, follow the steps below:

STEP 1: Bring up the MakeCode Block Editor - (makecode.microbit.org).

STEP 2: Click 'New Project'.

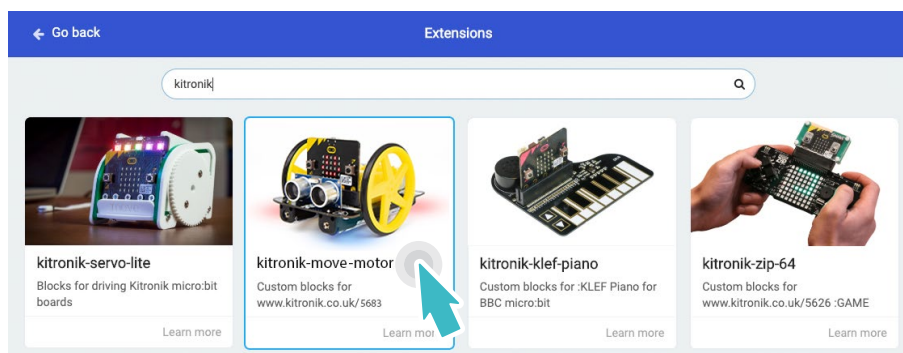
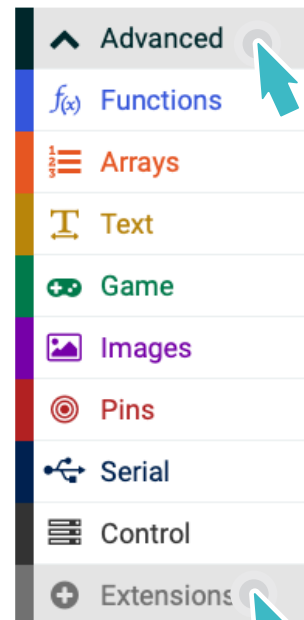


STEP 3: In the toolbox towards the left of the screen, select the 'Advanced' section. Additional block categories will appear below.

STEP 4: Select 'Extensions'.

STEP 5: In the pop up's search bar type 'Kitronik'.

STEP 6: Locate & select the 'kitronik-move-motor' box.

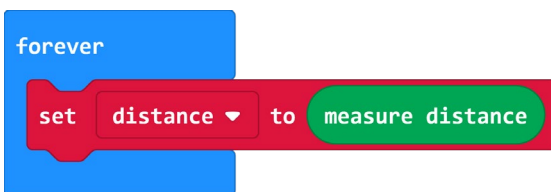


THE TUTORIAL

INTRODUCTION

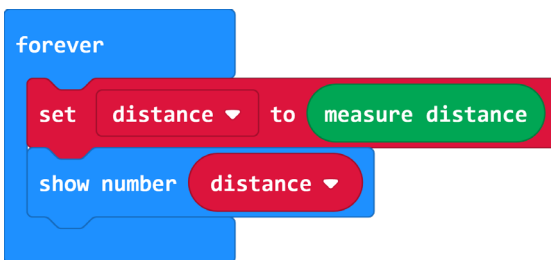
STEP 1: First, let's use the sensor to display the distance to an object.

Start by creating a variable called 'distance' and place the 'set distance to' block in the 'forever' loop. Make 'distance' equal to 'measure distance' by dropping the block inside (this can be found in the 'Sensors' section of the 'MOVE Motor' category).



STEP 2: Now add a 'show number' block below the set variable block.

Place the variable 'distance' inside the 'show number' block.



STEP 3: If you have a micro:bit connected, click 'Download' to transfer your code and switch on :MOVE Motor. Then move a box in front of the :MOVE Motor and see the micro:bit display show the distance to the box.

:MOVE MOTOR - ULTRASONIC SENSOR TUTORIAL

FOLLOW THE OBJECT

Now we know the distance to the box, we can use that to drive the motors and make the :MOVE Motor follow the box if it moves away.

STEP 1: Start by removing the 'show number' block, then add an 'if' statement, with 'distance > 10' as the test condition.

Inside the 'if' block, make the :MOVE Motor "move forward" if the condition is met.

STEP 2: If you have a micro:bit connected, click 'Download' to transfer your code and switch on :MOVE Motor. Place a box in front of the :MOVE Motor and, as you move it away, see the :MOVE Motor follow. But there is a problem. We only start the motors!

STEP 3: This means the motors start as soon as the box is more than 10cm away, but they never stop, so the :MOVE motor will just keep going. We need to stop when we are closer to the object.

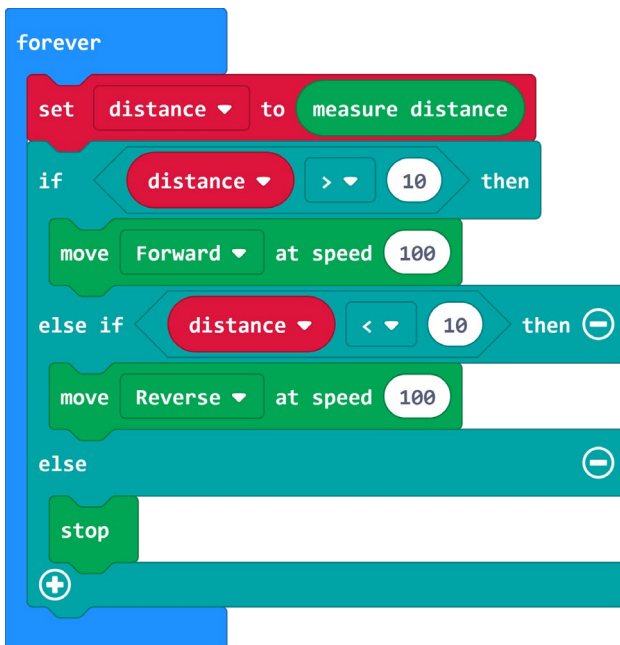
So, click the '+' icon to add an 'else' statement and place a 'stop' block from the 'MOVE Motor' category inside.

:MOVE MOTOR - ULTRASONIC SENSOR TUTORIAL

STEP 4: If you have a micro:bit connected, click 'Download' to transfer your code and switch on :MOVE Motor. As before, place a box in front of the :MOVE Motor and see it follow as the box is moved away, but this time, it stops when it gets within 10cm.

STEP 5: Currently, the code only allows the :MOVE Motor to follow the object if it moves away. If the object comes closer, we want to reverse the :MOVE Motor. To do this, we need another test condition to check whether the distance is less than 10cm. If it is, we reverse.

Click the '+' icon on the 'if else' block to add an 'else if' statement. Put in 'distance < 10' as the test condition, and make the :MOVE Motor "reverse" if the condition is met.



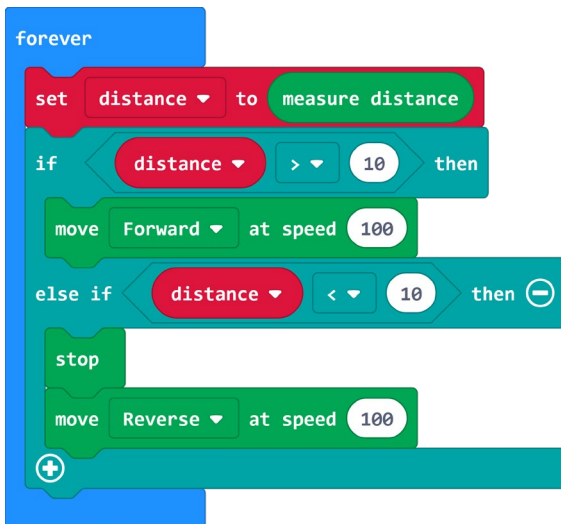
```
forever
  set distance to measure distance
  if distance > 10 then
    move Forward at speed 100
  else if distance < 10 then
    move Reverse at speed 100
  else
    stop
```

STEP 6: If you have a micro:bit connected, click 'Download' to transfer your code and switch on :MOVE Motor. Now try out making the :MOVE Motor drive forwards and backwards as you move the box.

FREE ROAMING

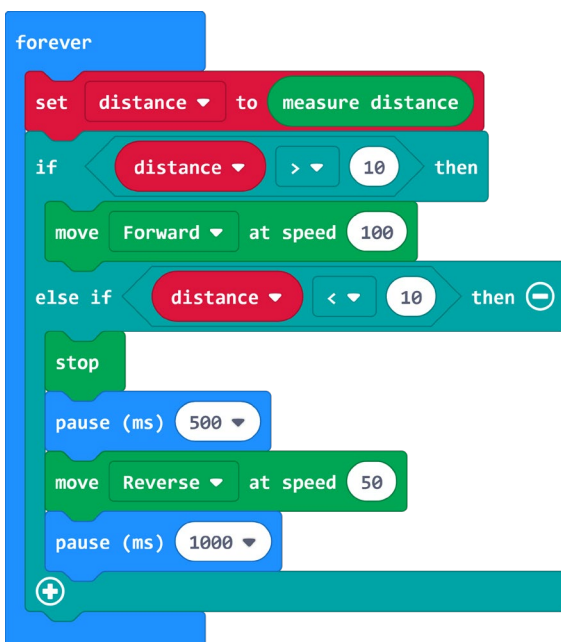
Great! The :MOVE Motor can now move forwards and backwards, keeping the same distance from the box as you move it. But it can only move in a straight line. It would be much better if it could drive around by itself and not crash into things...

STEP 1: To turn :MOVE Motor into a free roaming robot, we just need to make a few changes to our code. Begin by moving the 'stop' block to the 'else if' section, above the 'reverse' block. Then, click the '-' icon on the 'else' statement to remove it.



```
forever
  set distance to measure distance
  if distance > 10 then
    move Forward at speed 100
  else if distance < 10 then
    stop
    move Reverse at speed 100
```

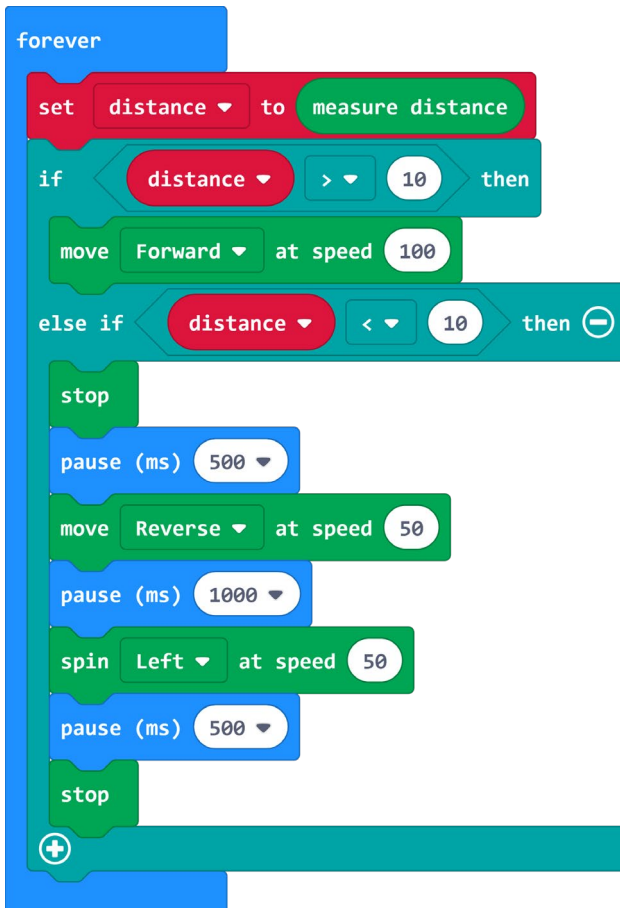
STEP 2: Next, add a 500ms 'pause' after the 'stop', and a 1 second 'pause' after the 'reverse' block. We also want to slow :MOVE Motor down a bit when it's avoiding obstacles, so change the 'reverse' speed to 50.



```
forever
  set distance to measure distance
  if distance > 10 then
    move Forward at speed 100
  else if distance < 10 then
    stop
    pause (ms) 500
    move Reverse at speed 50
    pause (ms) 1000
```

:MOVE MOTOR - ULTRASONIC SENSOR TUTORIAL

STEP 3: Finally, we need to make :MOVE Motor turn away from the obstacle it has detected. Add a 'spin left at speed 50' block to the "else if" section, followed by another 500ms 'pause' and a 'stop' block.



```
forever
  set distance to measure distance
  if distance > 10 then
    move Forward at speed 100
  else if distance < 10 then
    stop
    pause (ms) 500
    move Reverse at speed 50
    pause (ms) 1000
    spin Left at speed 50
    pause (ms) 500
    stop
```

STEP 4: CODING COMPLETE! If you have a micro:bit connected, click 'Download' to transfer your code and switch on :MOVE Motor. Now put :MOVE Motor on the floor and watch it roam around avoiding obstacles.

For any further queries or support, please visit the Kitronik website: www.kitronik.co.uk/5683

Or get in touch:

Telephone +44 (0) 115 970 4243

Sales email: sales@kitronik.co.uk

Tech Support email: support@kitronik.co.uk

Web: www.kitronik.co.uk



[kitronik.co.uk/twitter](https://twitter.com/kitronik)



[kitronik.co.uk/facebook](https://www.facebook.com/kitronik)



[kitronik.co.uk/youtube](https://www.youtube.com/kitronik)



[kitronik.co.uk/instagram](https://www.instagram.com/kitronik)



Designed & manufactured
in the UK by 

