# arm

# Inputs

Lesson 3

arm School Program

# Objectives

- Identifying the environment using sensors

- To be able to use code to take a reading from an **ultrasonic** sensor to gauge distance

- To be able to use code to take an **analogue** reading from a **light sensor**

- To be able to use code to detect the presence of a line or marker as part of a **line follower**

**arm** School Program

# Introduction to the Bit:Bot

- The Bit:Bot from 4tronix is a robot kit with:

  - Motors

  - Sensors

  - LEDs

- You can use it to experiment with various inputs and outputs utilising the micro:bit as the core computer

**arm** School Program

# Adding the Bit:Bot Extension
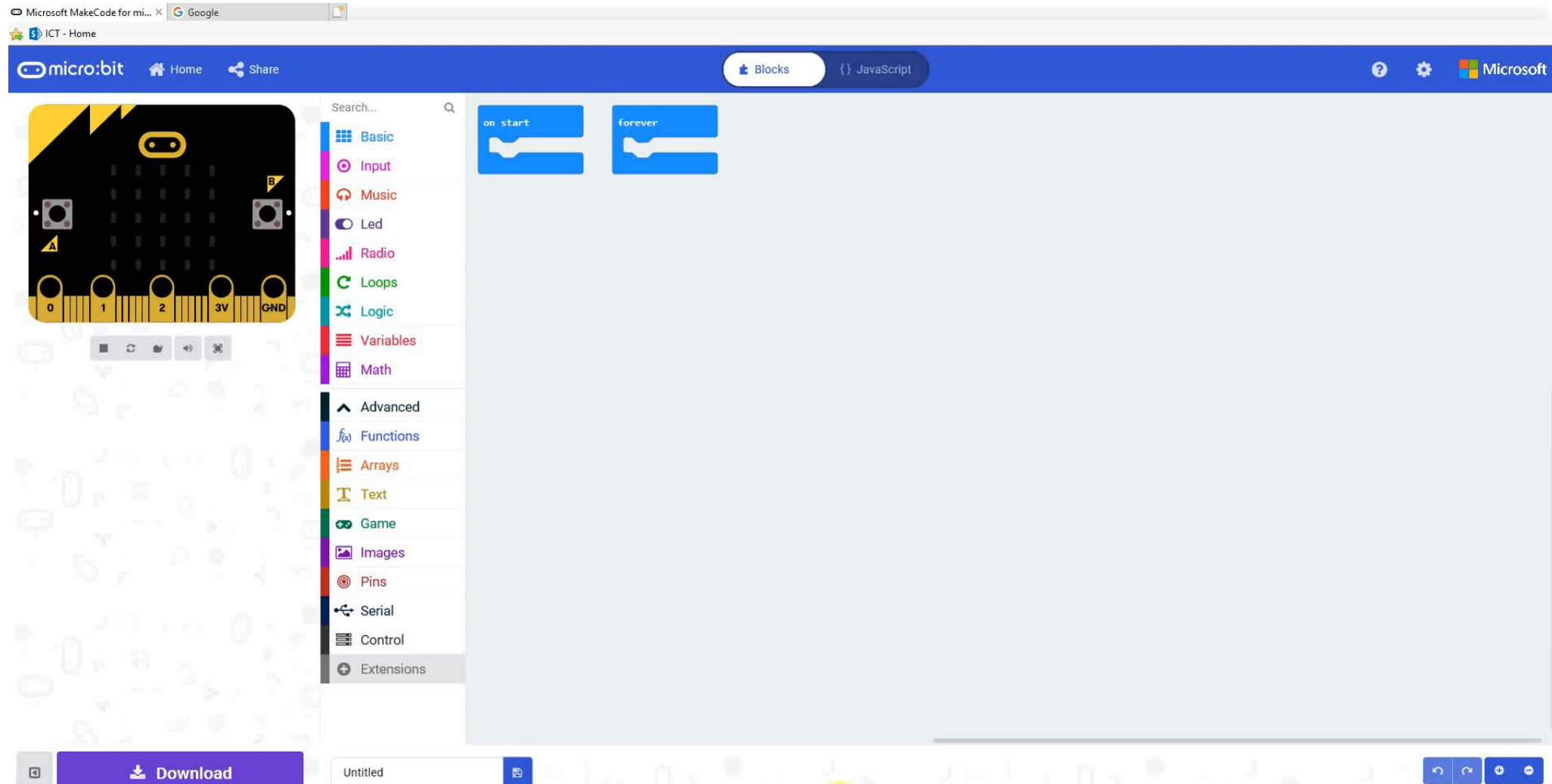
# Light Sensor

- The two analogue light sensors at the front of the Bit:Bot will give a value between 0 and 1023 where

  - 0 is fully dark

  - 1023 is maximum brightness



- We need to use a **digital** output signal on Pin 16 to set whether we are reading from the left sensor or the right sensor

- Setting Pin 16 to:

  - 0 utilises the left sensor
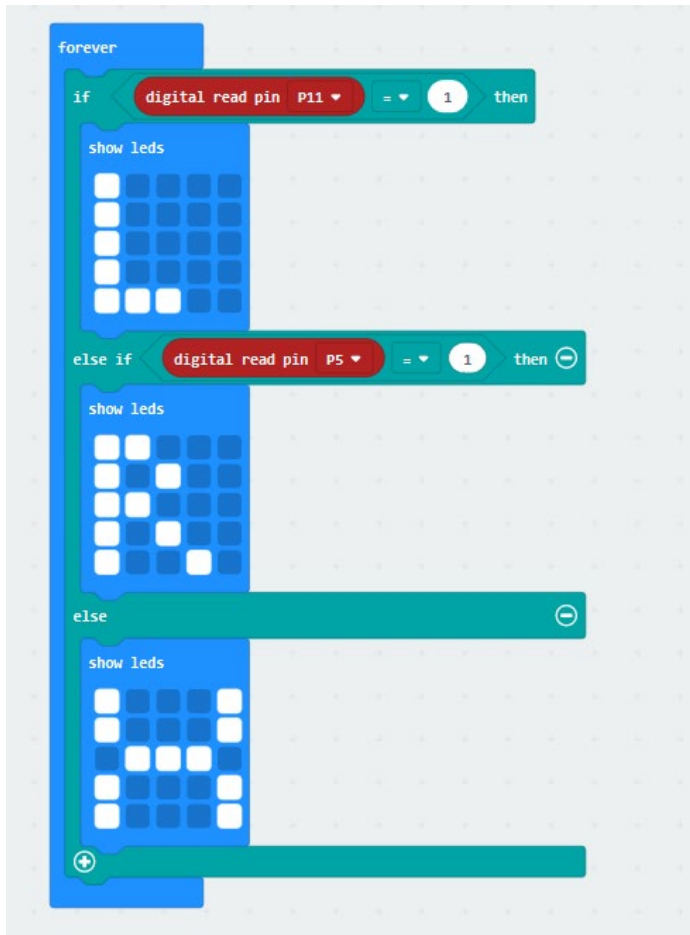
  - 1 utilises the right sensor

# Light Sensor

- Try out the example on the right

- What happens to the screen when you cover the sensor

- How high is the reading under ambient lighting conditions

- What happens if you point a torch on the sensor

arm School Program
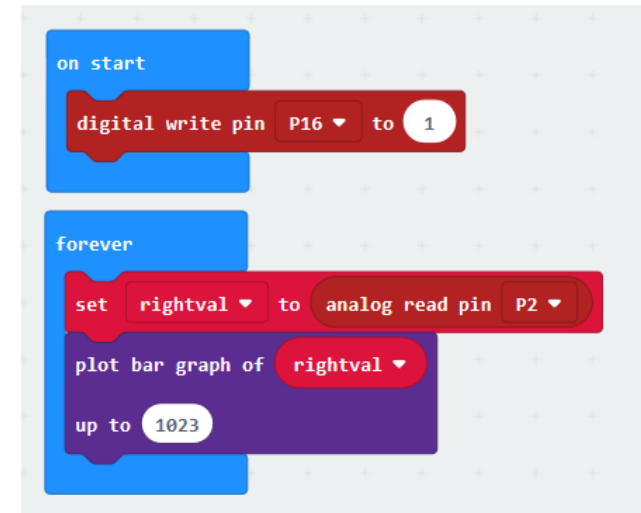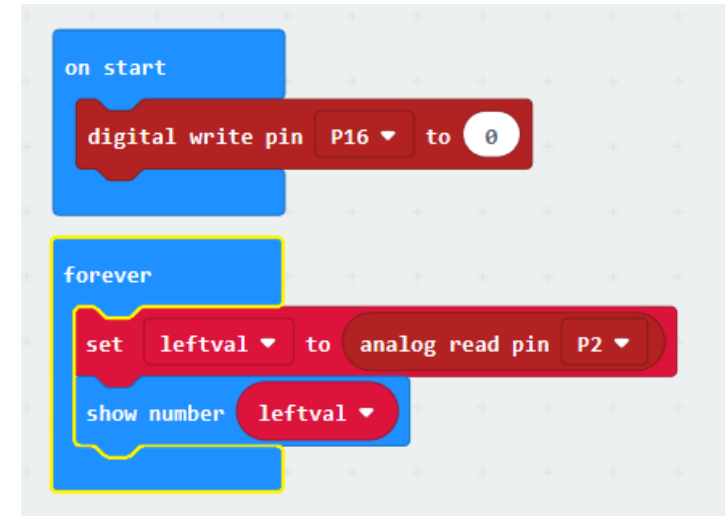
# Line Follower Sensor

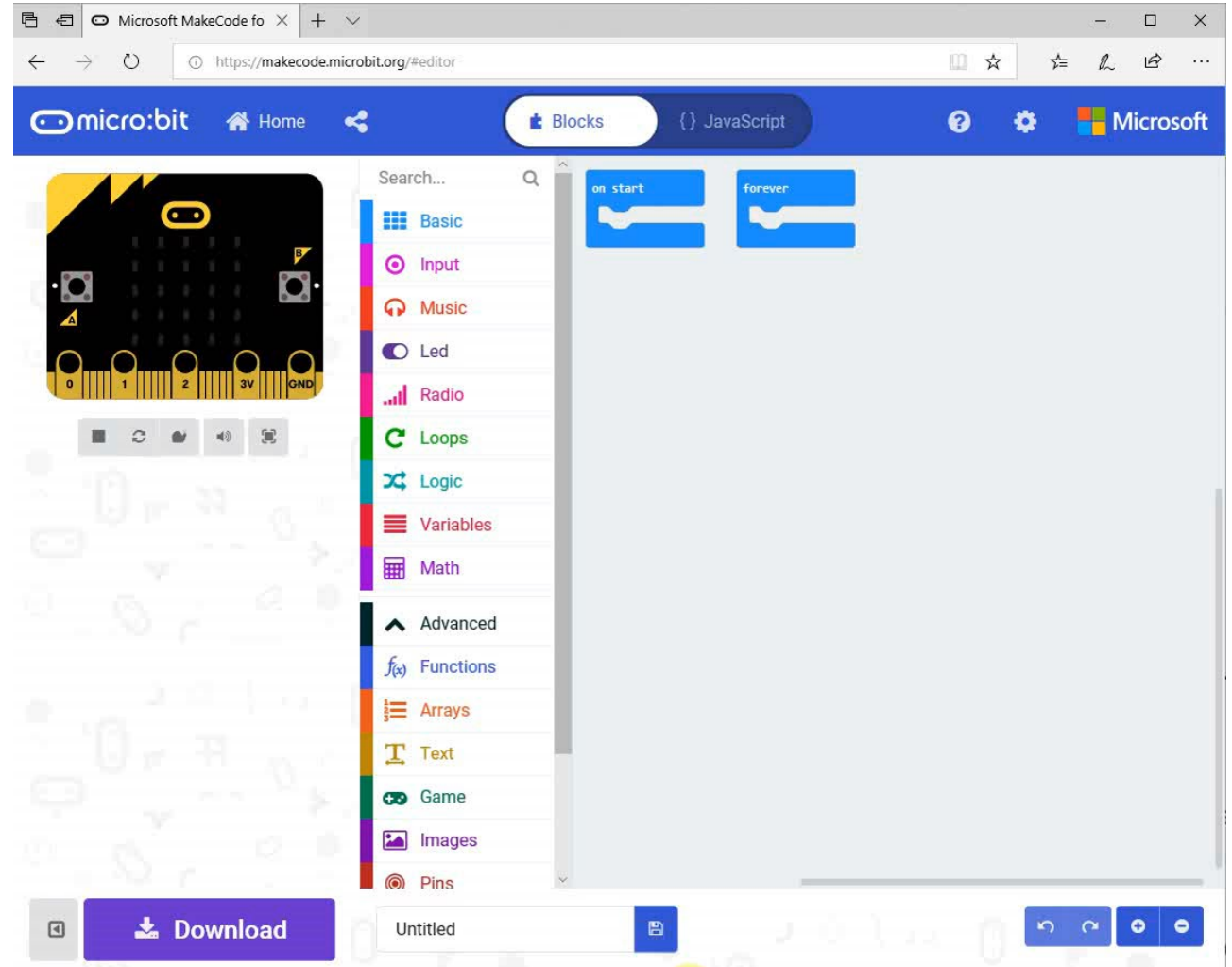- These connect to Pin 11 for the left and Pin 5 for the right

  - Try out the example on the left

  - What happens when you cover each sensor

  - What happens when no sensors are covered

  - Try experimenting with different thickness of lines, different colours and on different materials

  - Identify the best size, colour and material for a line to be detected reliably

  - Create a table of your results

# Ultrasonic Distance Sensor

- The Bit:Bot comes with an optional HC-SR04 ultrasonic distance sensor

- To use this sensor you will need to add the Sonar package

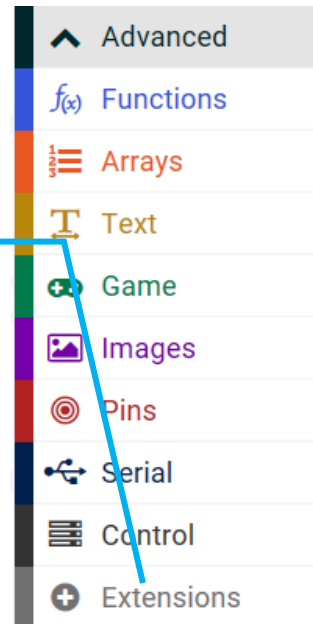- Follow the video to add this extension
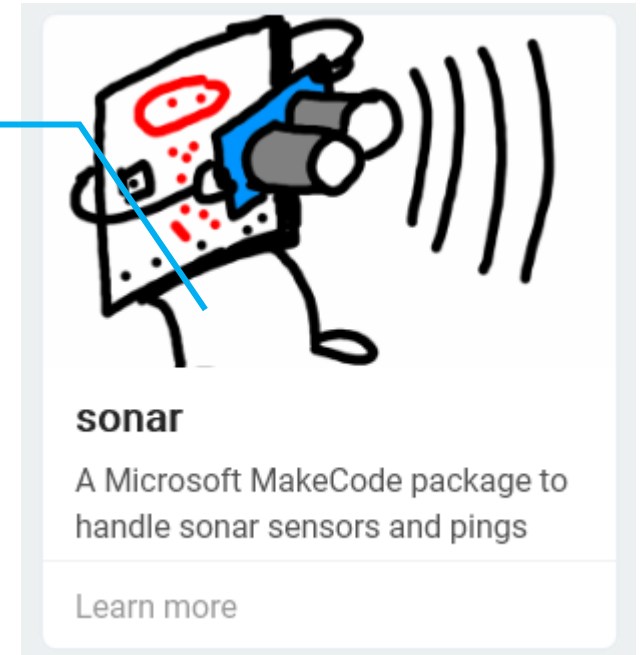
# Ultrasonic Distance Sensor

**Step By Step**

Advanced
f(x) Functions
Arrays
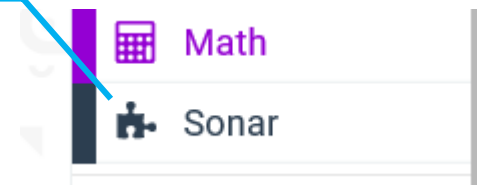T Text
Game
Images
Pins
Serial
Control
Extensions

1. From advanced select Extensions

2. Search for **Sonar**

sonar

3. Select the sonar extension

4. Sonar will now appear in your blocks

Math
Sonar

sonar

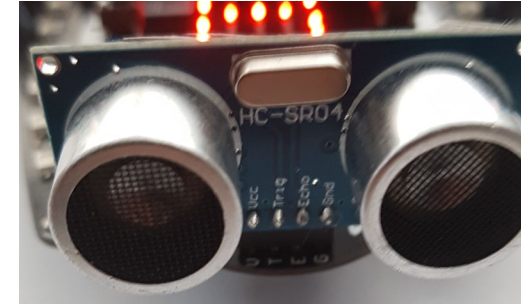A Microsoft MakeCode package to handle sonar sensors and pings
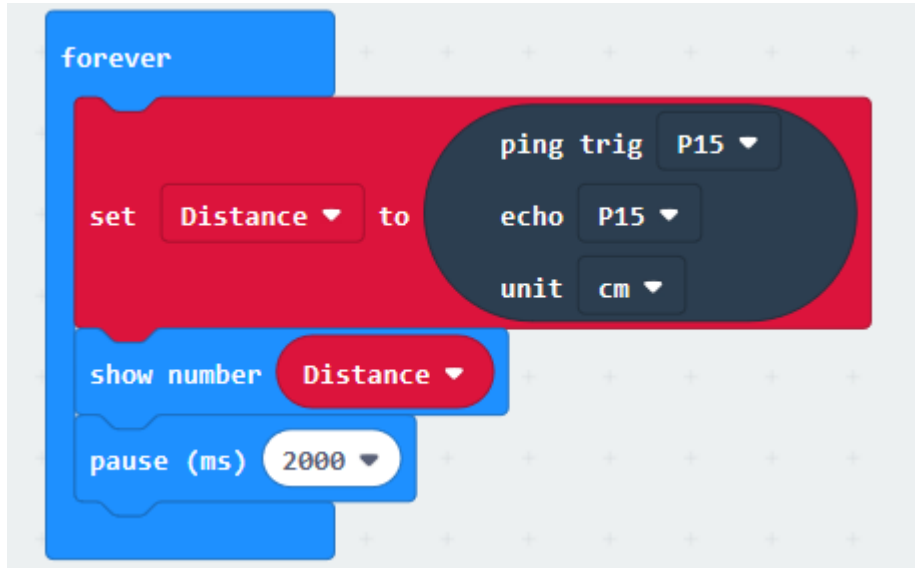
Learn more

arm School Program

# Ultrasonic Distance Sensor

- An ultrasonic sensor works by:

  - Sending out an ultrasonic sound wave out as ping

  - It measures how long it takes for the sound wave to reflect off a solid object and be echoed back

  - This time can then be converted into distance

**arm** School Program

# Ultrasonic Distance Sensor



- Try out the example on the left

- It simply sends a ping out every 2 seconds and displays the distance on the screen

- How accurate is the sensor?

- What materials reflect the sound best? (brick, plaster, wood etc)

- Is the sensor affected by outside noise sources?

- Document your results

**arm** School Program

Thank You
Danke
Merci
谢谢
ありがとう
Gracias
Kiitos
감사합니다
 धन्यवाद
תודה

**arm** School Program