



enviro:bit pack for teachers

Guidance notes for educators - lesson ideas

Starters:

What can you measure with a micro:bit? Students could discuss what they can use the onboard sensors for. As an extension, some could think about what they could measure *indirectly* eg cloud level, likelihood of rain, earthquakes.

List the following jobs and get students to discuss why they might need to measure temperature as part of their job.

Bricklayer, Butcher, Nurse, Artist, Insurance Assessor

Make your enviro:bit check the weather

Find the pink commands in the "input" menu and the blue ones in "basic".

Download your code and copy it onto the micro:bit by dragging the saved file onto the micro:bit file system.

Download

Could you make it show both results on one button press?

Challenges:

- 1) Can you make the micro:bit scroll the word "temperature" and then show the actual temperature?
- 2) Can you make the micro:bit show an icon (small picture) to represent the weather, then display the readings?
- 3) Could you have one micro:bit measuring the weather and send the data to a different one connected to a display?
- 4) Can you work out what the readings in the "expert" menu show you, and why you might need these?

PIMORONI education

Activities:

This is a good opportunity to introduce using radio to send and receive data, and for students to effectively make their own dataloggers.

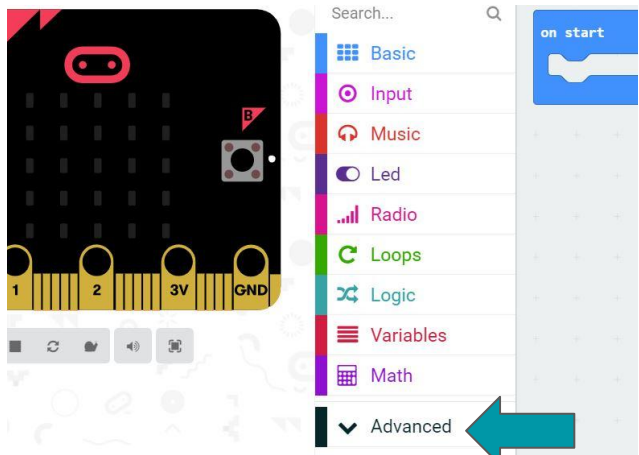
Students could put the micro:bit and enviro:bit in a sealed food bag, and squeeze it to look at changes in air pressure.

Use sound readings to discuss error and how to compensate for it. What is the difference between noise level and sound level? What kind of mathematical operations are likely to give you decimals?

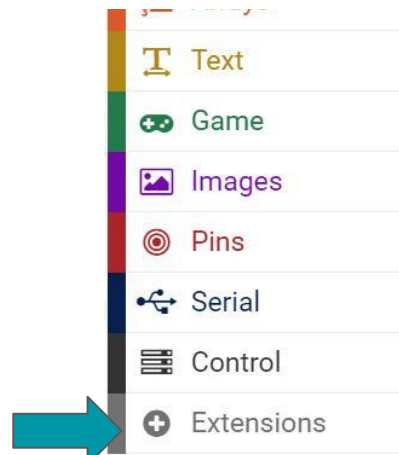
Design a housing for the micro:bit and enviro:bit to keep it protected from the elements outside.

Connect the device to a commercially available bluetooth logger such as the Bitty Data Logger - https://www.bittysoftware.com/apps/bitty_data_logger.html or use the serial connection to see your data in real time.

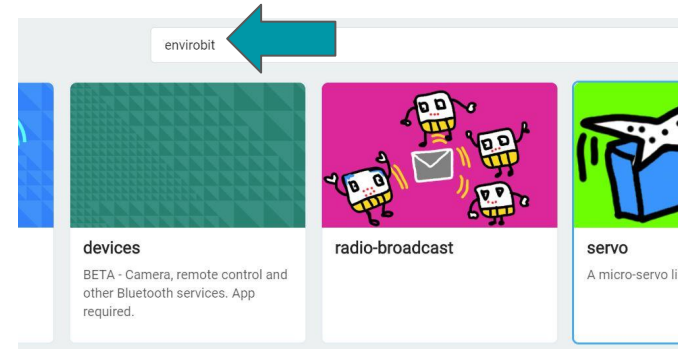
How to install the enviro:bit library



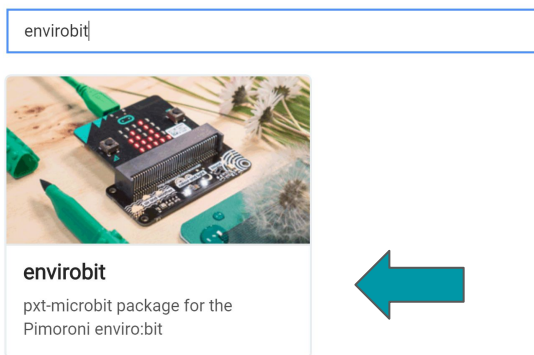
1. Go to MakeCode and click on the Advanced part of the menu.



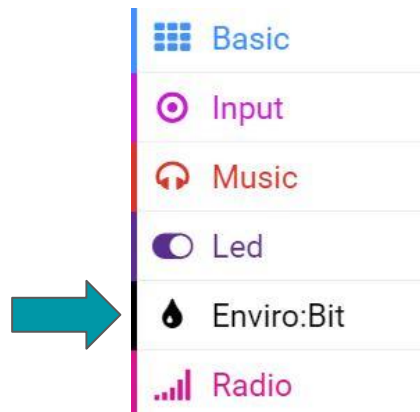
2. Choose "extensions" from the menu.



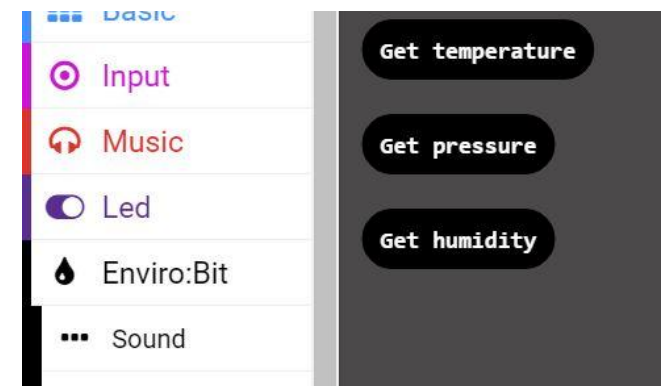
3. In the pop-up that appears, type in the URL of your chosen package, or search keywords.



4. Pick your package from the results.

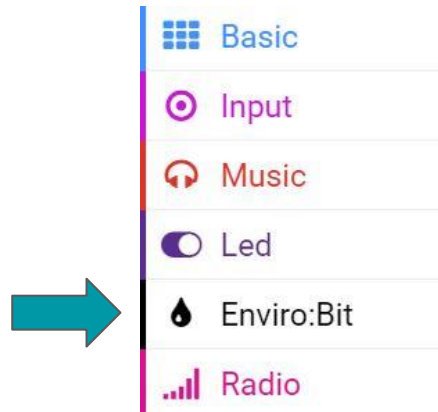


5. After a few seconds, you should see your new package in the menu.

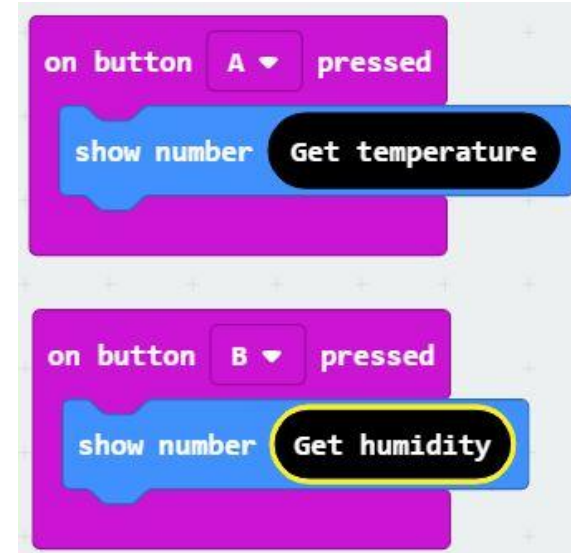


6. Have a browse at the commands. Enjoy!

Make your enviro:bit check the weather



Find the pink commands in the “input” menu, and the blue ones in “basic”.



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Code for the Weather Station

Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables**
- Math

Variables

Make a Variable...

New variable name:

Ok ✓

If you click on this box you can make a new variable and call it what you want.

Download your code and copy it onto the micro:bit by dragging the saved file onto the micro:bit file system.



Instead of showing the information all the time, could you make it show when you clap?



```
on start
  show string "Welcome!"

forever
  set temperature to Get temperature
  show number temperature
  show leds
  set pressure to Get pressure
  show string join pressure " Pa"
  set humidity to Get humidity
  show string join humidity "%"
  set light to Get light
  show string join "Light:" light
```

A nice welcome message lets people know the program is starting.

A "join" block puts two bits of information together to show them as one.

Is there a way of simplifying the program? Hint: no variables needed.

Showing how noisy it is

The enviro:bit has a built in sound sensor, so you can use it to measure how noisy it is, or make a sound-activated toy.

When you use the **Get sound** block, it takes a reading from the sound sensor, and you can build this into simple programs like our example here, or more complex ones like a clap-on, clap-off thermometer!

Basic

Input

Music

Led

Enviro:Bit

Radio

forever

plot bar graph of **Get sound**

up to 0

It really is this easy!

If you leave this as zero, the graph will choose its own scale to fit on the screen.

Download your code and flash it onto the micro:bit by dragging the saved file onto the micro:bit file system.

Instead of showing the information all the time, could you make it tell you how loud a shout is?



Arrr! I challenge ye to make a noise meter that does a sad face when it's too noisy!

Challenges:

1. Display the noise reading as numbers on the LEDs. What is the biggest number you can make it show?



Squashing the air

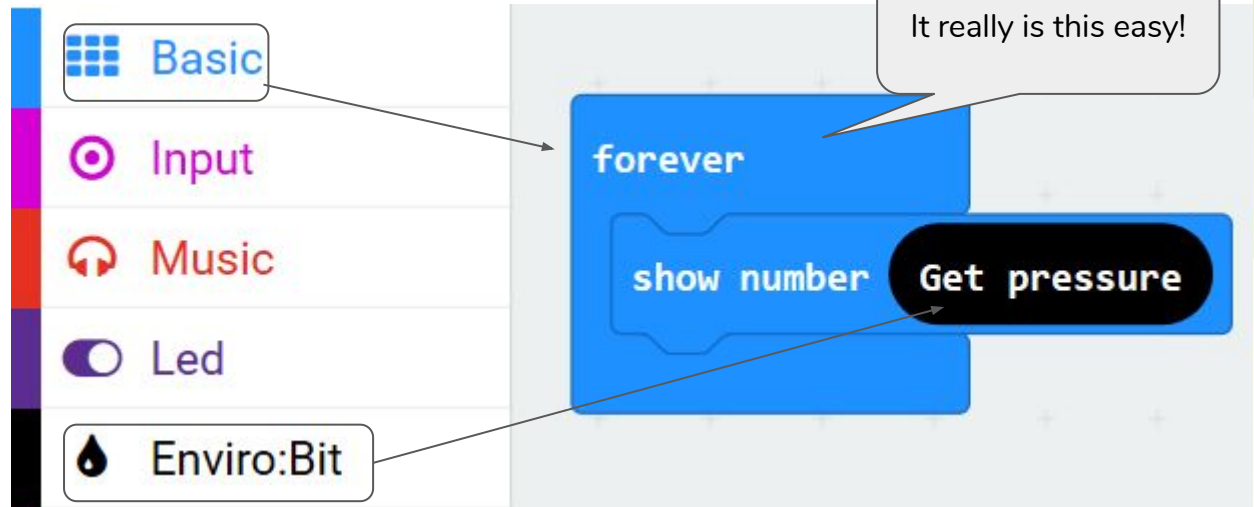
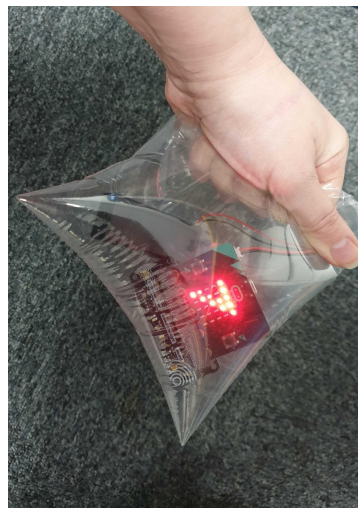
The enviro:bit has a built in pressure sensor, so you can use it to measure air pressure..

When you use the **Get pressure** block, it takes a reading from the pressure sensor, and you can build this into simple programs like our example here, or more complex ones where something happens at certain pressures.

Download your code and flash it onto the micro:bit by dragging the saved file onto the micro:bit file system.

 [Download](#)

Instead of showing a number, could you make it draw a graph of the air pressure?



Challenges:

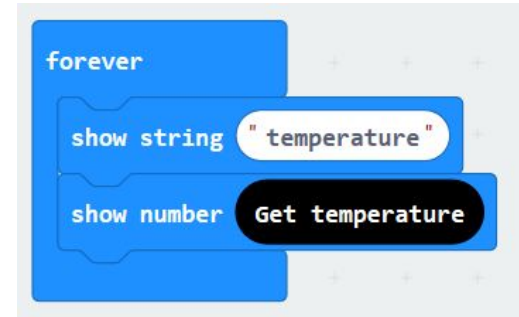
1. Keep records of the air pressure at various times of the day, and what the weather was like. See if you can spot a pattern.
2. Put the enviro:bit, micro:bit, and a battery pack in a sealed bag. Squash the bag and see how the air pressure reading changes.
3. Draw pictures of the particles in the air at high pressure compared to low pressure.

Guidance notes for educators - challenges

Make your envirobit check the weather:

- 1) Can you make the micro:bit scroll the word “temperature” and then show the actual temperature?

One way of doing this is shown.



- 2) Can you make the micro:bit show an icon (small picture) to represent the weather, then display the readings?

An example is shown.



- 3) Could you have one micro:bit measuring the weather and send the data to a different one connected to a display?

This is a good opportunity to introduce using radio to send and receive data, and for students to effectively make their own dataloggers.

- 4) Can you work out what the readings in the “expert” menu show you, and why you might need these?

The micro:bit will only show the temperature as whole numbers by default, so if you want greater accuracy, use the “expert” menu, which gives you the temperature to two decimal places.

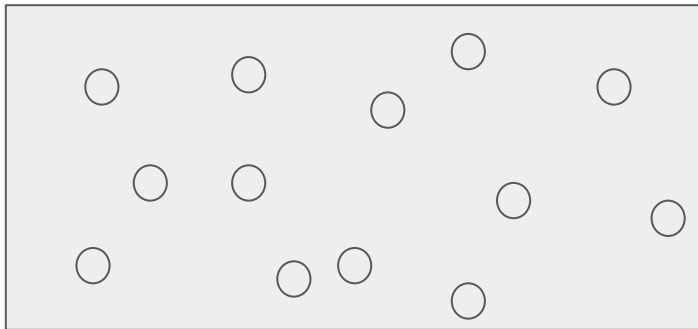
Showing how noisy it is:

- 1) The highest the readings will go is 1023, this is on a scale of no noise measured to the limit of the microphone.

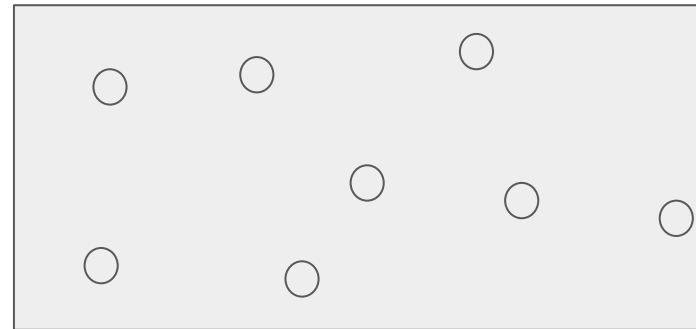
Guidance notes for educators - challenges

Squashing the Air

1. Keep records of the air pressure at various times of the day, and what the weather was like. See if you can spot a pattern.
Try to keep the weather station in the same place in school, and take readings consistently. You should notice a drop in pressure before rain or a storm. The bigger the drop in pressure, the worse the weather is going to get. High pressure should coincide with good dry weather. A sudden rise in pressure might indicate windy weather is coming.
2. Put the enviro:bit, micro:bit, and a battery pack in a sealed bag. Squash the bag and see how the air pressure reading changes.
Squashing the bag should increase the air pressure. You can model this in the classroom by standing students in a large space, then moving the same number of students to a smaller space.
3. Draw pictures of the particles in the air at high pressure compared to low pressure.



High pressure



Low pressure