

2 - Weather Station

Use the Grove OLED and Barometer modules to create your own wireless weather station!




INTRODUCTION

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Step 1

Introducing the BMP280

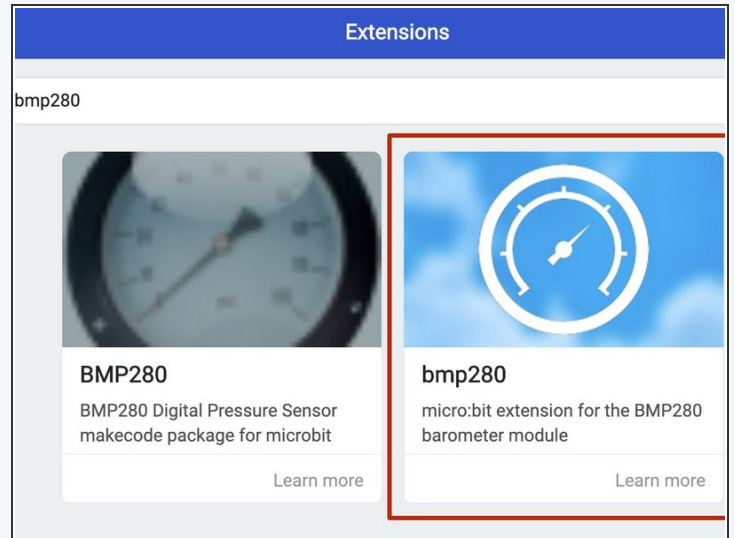
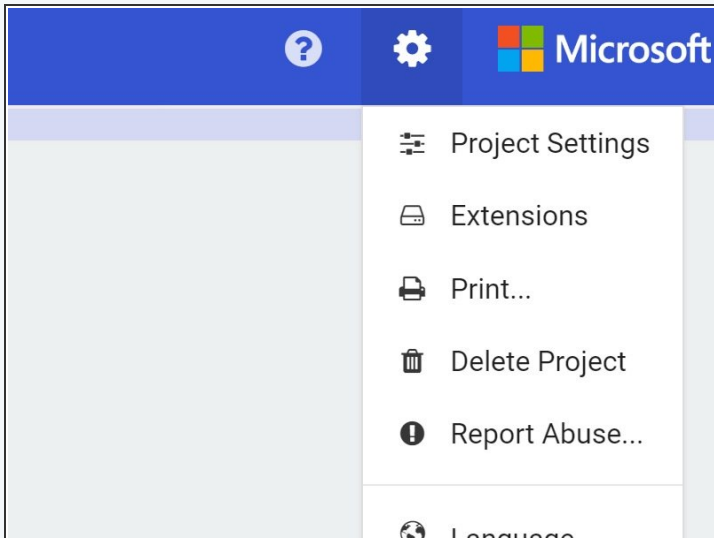
- In this project, we'll be using the BMP280, which is a small barometer which can read out the current air pressure as well as the temperature.
- In weather, air pressure is super useful to know as it can predict a variety of weather phenomenon like big storms!

 [If you're curious \(and brave!\) this is the full datasheet for the BMP280. \(https://cdn-shop.adafruit.com/datasheets/BST-BMP280-DS001-1.1.pdf\)](https://cdn-shop.adafruit.com/datasheets/BST-BMP280-DS001-1.1.pdf) It's very technical, but don't worry, we've done the work for you!

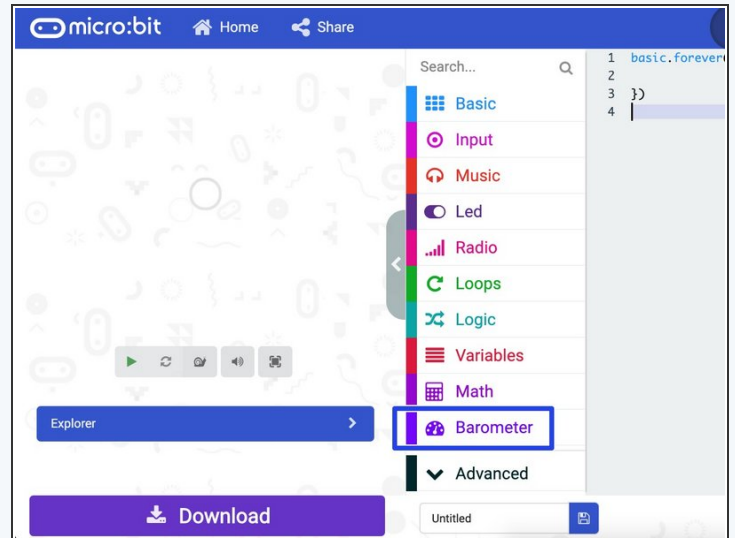


Step 2

Installing the BMP280 extension



- In the MakeCode editor, click the settings icon and select "Extensions".
 - Search for "BMP280" - the name of the barometer module, and click the highlighted extension.
 - You'll know it's worked if you see a new barometer section on the sidebar!
- i** We need this extension to interact with the BMP280!



Step 3

Writing our weather station code

- We'll be using the micro:bit's internal radio to communicate between the station and the receiver, hence the radio namespace.
- ⚠ Make sure the radio's group is set to 1 and that the barometer is initialised! If you forget either of these lines your transmitter may not work!
- The code here simply sends the current temperature and pressure over the radio to our receiver. We use the `sendValue` function to associate each value with its appropriate measurement.
- ℹ We've used the BMP280's internal thermometer, however you could use the micro:bit's thermometer as well.

```
1 radio.setGroup(1);
2 barometer.init();
3
4 basic.forever(function () {
5     radio.sendValue("temp", barometer.getTemperature());
6     radio.sendValue("pressure", barometer.getPressure());
7 });
8
9
10
11
```

Step 4

Building the transmitter

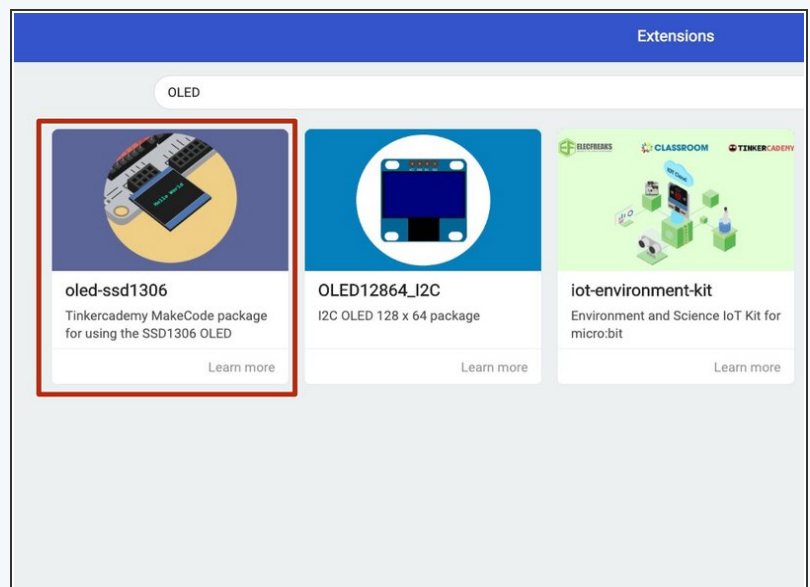


- Take the micro:bit board off of the mounting frame.
- Attach the barometer module to the header labelled "I2C P19"
- ❗ It's important we use the "I2C" header, as this allows us to use a more complex communication method with the barometer module. If we used another header, we wouldn't get any feedback at all!

Step 5

Receiver extensions

- Now that our transmitter is built, we need to make our receiver!
- We'll be using an OLED screen to display the readings from our station. It's a low power display which can also be found in high-end phones and televisions!
- Create a new project, and this time search for "OLED" in the search box. Install the oled-ssd1306 extension.



Step 6

Writing our receiver code

- The code here is a little more complex. First we initialise the radio and OLED screen and define two variables to hold the current readings.
- Next we write code to handle the incoming data to the micro:bit. If the value is a temperature reading we write it to temp, and pressure if it's a pressure reading.
- Finally we display the readings on our screen and update the display every second.

```
1 radio.setGroup(1);
2 OLED.init(64, 128);
3
4 let temp = 0;
5 let pressure = 0;
6
7 radio.onReceivedValue(function (name: string, value: number) {
8   if (name === "temp") {
9     temp = value;
10  } else if (name === "pressure") {
11    pressure = value;
12  }
13 });
14
15 basic.forever(function () {
16   OLED.showStringWithNewLine("Currently:");
17   OLED.showStringWithNewLine("-----");
18   OLED.showStringNoNewLine("Temp (C): ");
19   OLED.showNumberWithNewLine(temp);
20   OLED.showStringNoNewLine("Pressure (hPa): ");
21   OLED.showNumberWithNewLine(pressure);
22   basic.pause(1000);
23   OLED.clear();
24 });
25
26
27
```

Step 7

Building the receiver



- Like before, attach the OLED module to the I2C header on the second micro:bit.

Step 8

Testing the station




- Put your weather station outside and turn it on.
- Now turn on your receiver. You should see the screen displaying the current outside temperature and pressure!

Step 9

Challenge: an American problem



- Paul, the person who wrote this guide, is American, and therefore unable to understand Celsius! Can you add a row below the temperature reading that shows the current temperature in Fahrenheit?

 The formula to convert Celsius to Fahrenheit is $\text{temp} * 1.8 + 32$.