

Data collection workshop

Introduction to the Arduino BLE Sense:

Download Arduino IDE & example code

- <https://www.arduino.cc/en/software>
1. Install Arduino BLE Sense board
 - <https://www.arduino.cc/en/Guide/NANO33BLESense>
 2. Install Arduino BLE Sense examples
 - Matt's github: <https://github.com/mattjarvis/data-collection-workshop-code>
 3. Upload blink sketch to test everything works ok!

1. Set up real-time serial connection to computer

1. Send real-time humidity & temperature data from sensors through the serial port:
 - Install the HTS221 library from the library manager
 - Open the HTS221 example from the example sketches menu
 - Upload the example sketch
 - Open the serial monitor and check you are getting data
2. Send the audio analysis through the serial port:
 - Open the PDM Serial Plotter example
 - Upload the PDM example sketch
 - Open the Serial Plotter
 - Make some noise!
 - Review the documentation: <https://docs.arduino.cc/learn/built-in-libraries/pdm>
 - What happens if you change the number of channels? How about the frequency?
3. Run a program on the computer to use the data in something
 - Change the channel number back to 1 in the PDM example sketch
 - Open the **GraphProcessingCode** Processing 3 sketch (Install Processing, if you don't have it: <https://processing.org/download>)
 - Change the number of the serial array index (line 29) to match your serial port (you can run the sketch and it will print the array)
 - Run the sketch and watch the results
 - What happens if you change the input and output of the `map()` function (on line 63)?
4. Let's try getting some data in really fast, using the built in accelerometer
 - Open the Arduino sketch at <https://github.com/mattjarvis/data-collection-workshop-code/blob/main/2%20-%20AccelerometerTest/AccelerometerTest.ino>
 - Upload it to the arduino
 - Open the Processing sketch from <https://github.com/mattjarvis/data-collection-workshop-code/blob/main/ProcessingSketches/2%20-RotateCubeSerialInput/RotateCubeSerialInput.pde>

Extra challenge: How would you add the sound from point 2, the PDM Serial Plotter example to point 4, the accelerometer example? (An answer is [here](#) and [here](#))

2. Data logging

Now we are familiar in having the Arduino give us data, let's try and do something with it. Let's start by saving the data:

1. Upload the ENV sensing Arduino sketch

- https://github.com/mattjarvis/data-collection-workshop-code/tree/main/3.1_SendEnvData
- 2. Run a bridge program to save your data
 - https://github.com/mattjarvis/data-collection-workshop-code/tree/main/ProcessingSketches/sketch_3_SaveSerialInputAsTable

3. Going online

Now let's look at ways to use the data with MQTT:

1. Upload the ENV sensing Arduino sketch
 - https://github.com/mattjarvis/data-collection-workshop-code/tree/main/3.1_SendEnvData
2. Run a bridge program to send data to MQTT on cci server
 - https://github.com/mattjarvis/data-collection-workshop-code/tree/main/ProcessingSketches/sketch_4_PublishSerialToMQTT
3. Show incoming MQTT data with <http://mqtt-explorer.com/>