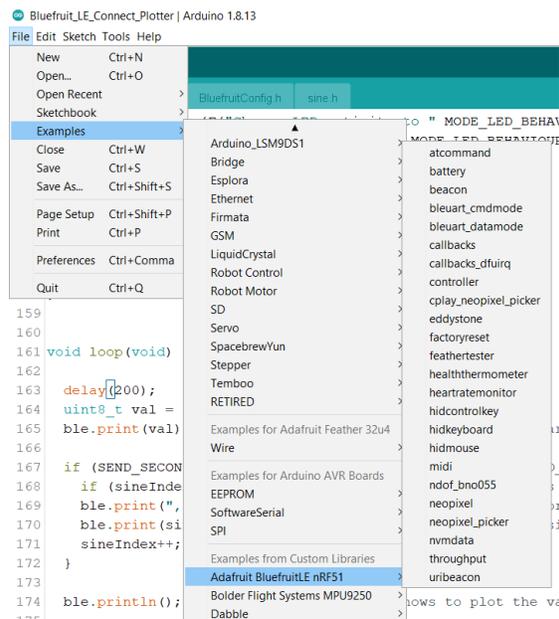


Adafruit Feather 32u4 BLE: plotting real-time on your mobile device

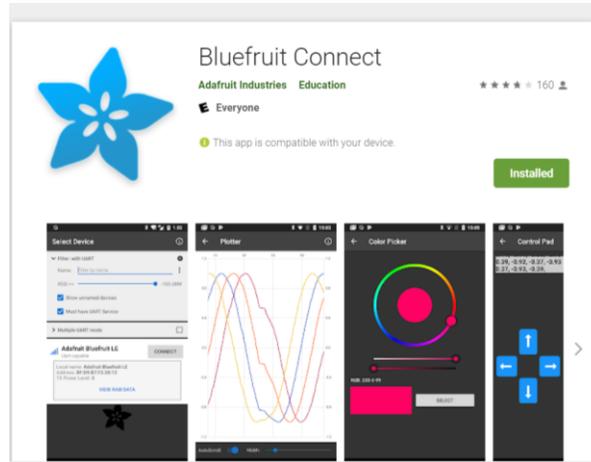
A little tutorial for Circuits fall 2020 by JE

1. Install the Adafruit nRF51 BLE library for Arduino:
 - a. Directions how to do so here: <https://learn.adafruit.com/adafruit-feather-32u4-bluefruit-le/installing-ble-library>.
 - b. This library will install multiple helpful example sketches. Look under File > Examples > Adafruit nRF51 BLE...

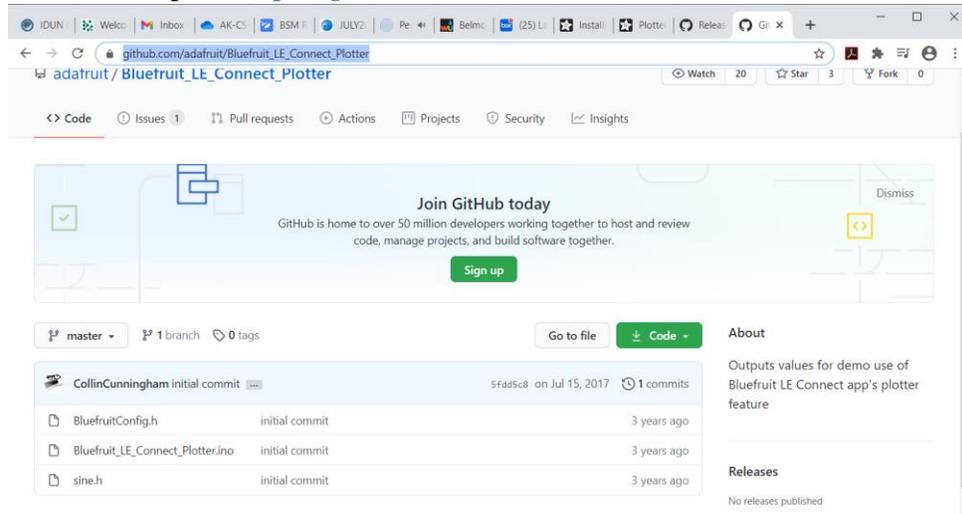


- c. Fun bit of electronics knowledge: nRF stands for “Nordic Radio Frequency”. Nordic is a premier electronics hardware company (highly proprietary, super awesome electronics)
 - d. When running the demo code, I found that I did *not* have to edit code as suggested under the olive warning bar “Don’t upload your sketch yet! You will have to begin by changing the configuration.” This is probably an older tutorial page and they have since updated their default code settings. YMMV. Double check to be sure.
 - e. Big finale is the “AT command testing”. If you get a reasonable ambient temperature reading read out in your serial monitor, that’s a big win!
2. Hop on over to the “Adafruit BLE Connect for iOS and Android” main tutorial page: <https://learn.adafruit.com/bluefruit-le-connect/ios-setup>
 - a. Basically, following this tutorial with tips and tricks to accelerate you up the curve

- b. JE has an Android device. YMMV for Apple device.
3. Install Adafruit Bluefruit Connect App on your mobile device via Google Play Store or Apple App Store:

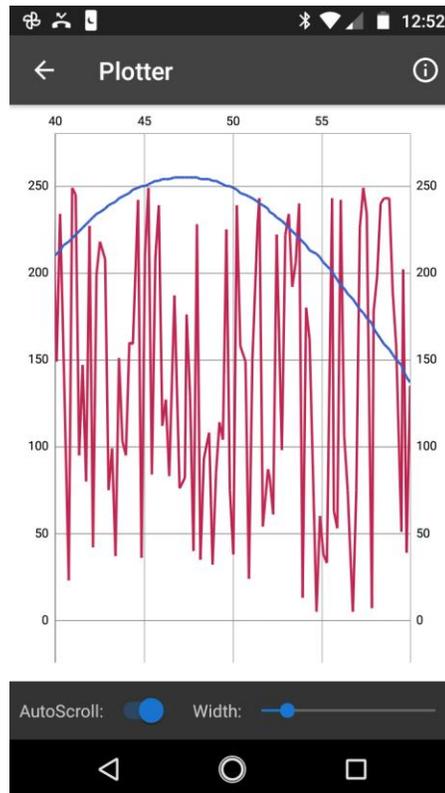


4. Make sure your mobile device can connect to the Feather nrf51 BLE.
 - a. Enable Bluetooth
 - b. Enable service location (in my hands, I *had* to do this in order to connect, even though the message makes it seem optional).
5. Features -Plotting data in real time! Using your phone like Adafruit's serial plotter
 - a. Navigate to: <https://learn.adafruit.com/bluefruit-le-connect/plotter>
 - b. Download Arduino code from github. This demo code connects to BLE and sends data to plot: https://github.com/adafruit/Bluefruit_LE_Connect_Plotter



- c. Upload the code to your Feather board.
- d. Use Adafruit Bluefruit Connect App to:

- i. Scan for your device (it was cleverly named “Adafruit Feather BLE” on my mobile device)
- ii. Connect to your device
- iii. Choose Plotter
- iv. Watch the data roll in live!
- v. If you’re getting a graphics like this, you’ve got a winner. Here I am plotting two signals at once (blue = sine wave; red = random signal). This was enabled. To get both you have to modify your Arduino code at line 63: `#define SEND_SECOND_PLOT` 1



- vi. Try playing with the `delay()` time in line 163 of the `Bluefruit_LE_ConnectPlotter.ino` code. How fast can you send data while maintaining a stable connection? Can you send data at 10 Hz? 20 Hz? Fast enough in terms of the goals to plot the PPG signal in real-time for the final project? Only one way to find out!
- vii. If you need to troubleshoot, some suggestions if you are having trouble connecting (I sometimes got a “can’t connect to peripheral” message in the Adafruit app)
 1. Power cycle the Feather
 2. On your mobile device, “forget” the Feather, then rescan and add it back

3. One or both of the above solved 99% of the issues I encountered.
 4. For iPhone you might clear your Bluetooth cache:
<https://learn.adafruit.com/bluefruit-le-connect/troubleshooting>
6. Another fun thing to try...Using your phone like a Serial Monitor in Arduino
- a. Navigate to and follow instructions here: <https://learn.adafruit.com/bluefruit-le-connect/uart-terminal>