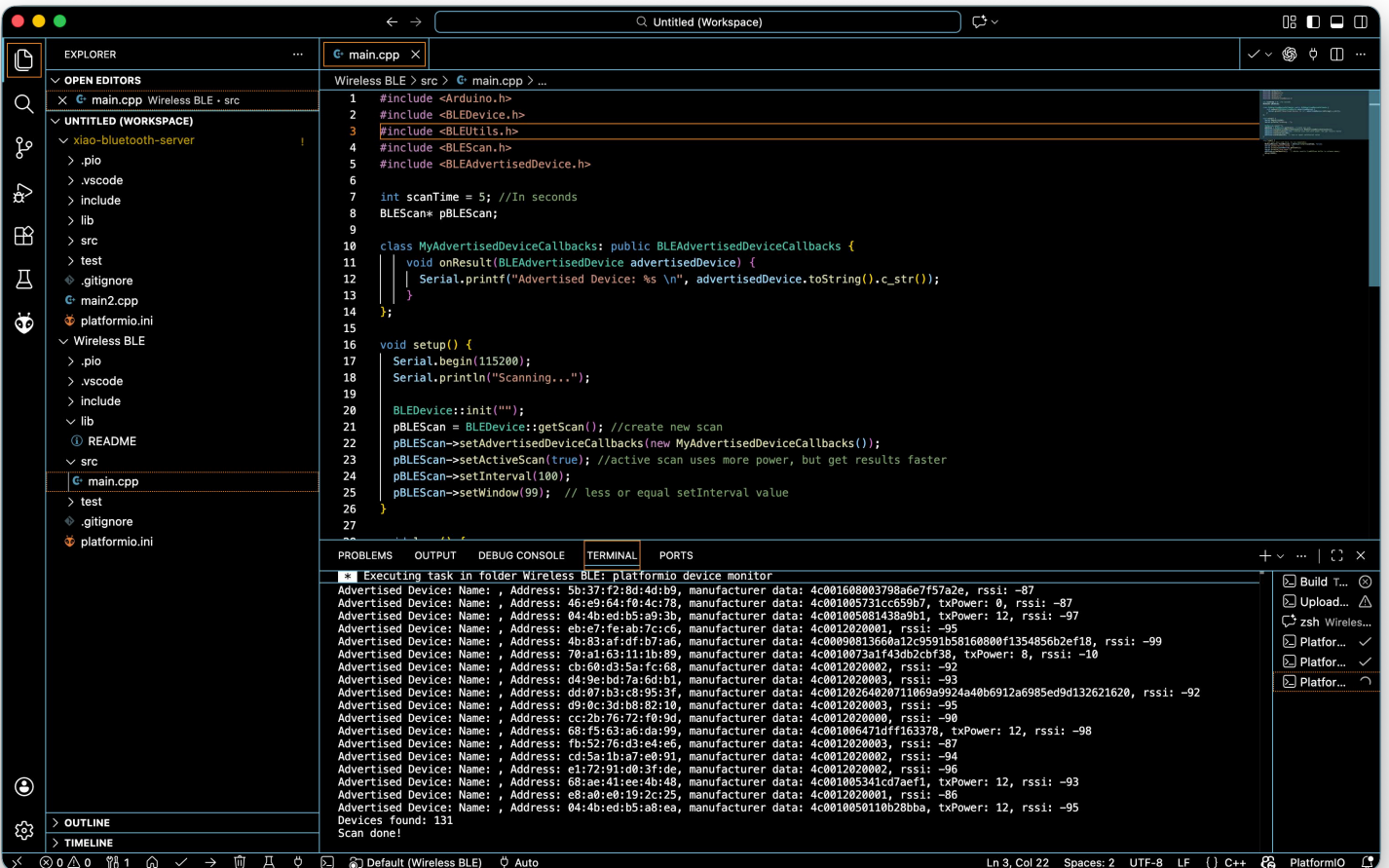


Team members: Yunxiao Du, Yuwen Chen

GitHub Link: <https://github.com/Felix-Jr056/TECHIN514A-Wi26.git>

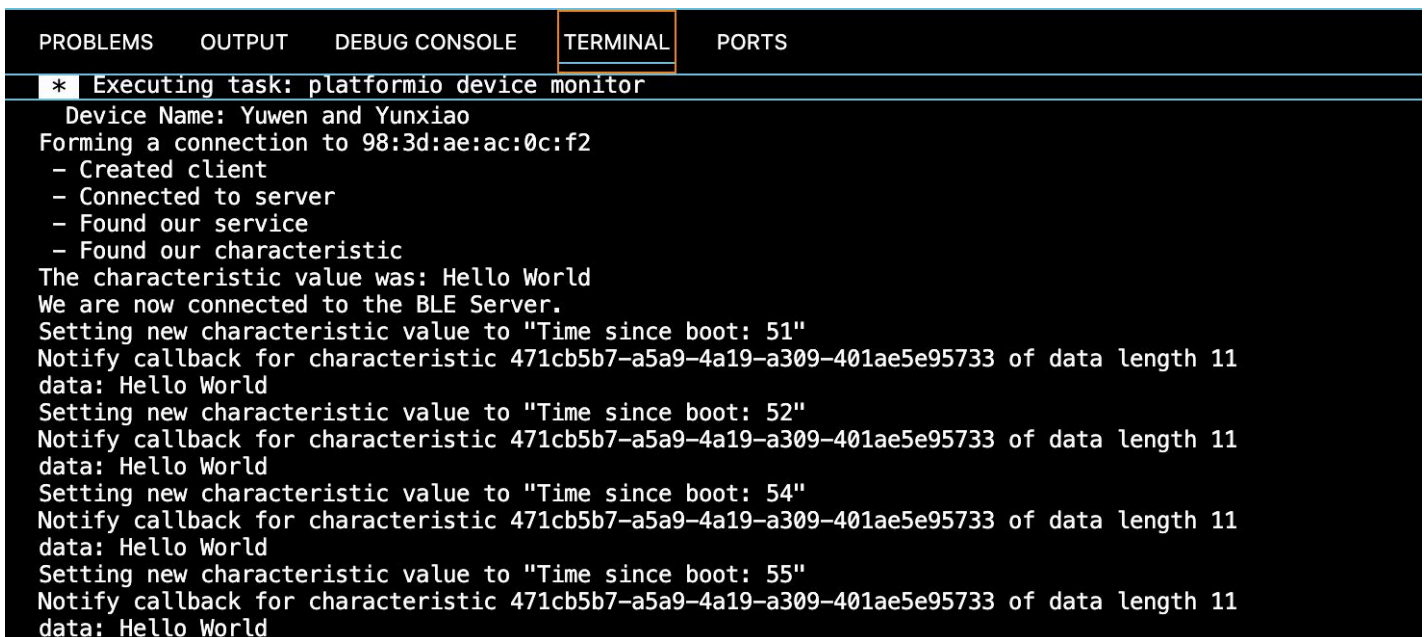
Screenshot of serial monitor displaying the number of Bluetooth devices detected using MCU as BLEScanner



The screenshot shows the Visual Studio Code editor with the 'main.cpp' file open. The code is a C++ program for an Arduino Uno, using the Arduino IDE's C++ compiler. It includes the following headers: `<Arduino.h>`, `<BLEDevice.h>`, `<BLEUtils.h>`, `<BLEScan.h>`, and `<BLEAdvertisedDevice.h>`. The program defines a constant `scanTime = 5` (in seconds) and a pointer `pBLEScan` of type `BLEScan`. It then defines a class `MyAdvertisedDeviceCallbacks` that inherits from `BLEAdvertisedDeviceCallbacks`. The class has a method `onResult` that prints the name and address of the discovered device. The `setup` function initializes the serial port at 115200 baud, prints a message, and initializes the BLE device. It then creates a new `BLEScan` object, sets the `MyAdvertisedDeviceCallbacks` as the callback, and starts the scan. The `loop` function is empty. The serial monitor at the bottom shows the output of the program, which is a list of discovered BLE devices, including their names, addresses, and manufacturer data. The output is as follows:

```
Executing task in folder Wireless BLE: platformio device monitor
Advertised Device: Name: , Address: 5b:37:f2:8d:4d:b9, manufacturer data: 4c001608003798a6e7f57a2e, rssi: -87
Advertised Device: Name: , Address: 46:e9:64:f0:4c:78, manufacturer data: 4c001005731cc659b7, txPower: 0, rssi: -87
Advertised Device: Name: , Address: 04:4b:ed:b5:a9:3b, manufacturer data: 4c001005981438a9b1, txPower: 12, rssi: -97
Advertised Device: Name: , Address: eb:e7:fe:ab:7c:c6, manufacturer data: 4c0012020001, rssi: -95
Advertised Device: Name: , Address: 4b:83:af:df:b7:a6, manufacturer data: 4c00090813660a12c9591b58160800f1354856b2ef18, rssi: -99
Advertised Device: Name: , Address: 70:a1:63:11:b:89, manufacturer data: 4c0010073a1f43db2cbf38, txPower: 8, rssi: -10
Advertised Device: Name: , Address: cb:60:d3:5a:fc:68, manufacturer data: 4c0012020002, rssi: -92
Advertised Device: Name: , Address: d4:9e:bd:7a:6d:b1, manufacturer data: 4c0012020003, rssi: -93
Advertised Device: Name: , Address: dd:07:b3:c8:95:3f, manufacturer data: 4c00120264020711069a9924a40b6912a6985ed9d132621620, rssi: -92
Advertised Device: Name: , Address: d9:0c:3d:b8:82:10, manufacturer data: 4c0012020003, rssi: -95
Advertised Device: Name: , Address: cc:2b:76:72:f0:9d, manufacturer data: 4c0012020000, rssi: -90
Advertised Device: Name: , Address: 60:f5:63:a6:da:99, manufacturer data: 4c001006471dfff163378, txPower: 8, rssi: -98
Advertised Device: Name: , Address: fb:52:76:d3:e4:ef, manufacturer data: 4c0012020003, rssi: -87
Advertised Device: Name: , Address: e1:72:91:d0:3f:de, manufacturer data: 4c0012020002, rssi: -94
Advertised Device: Name: , Address: 68:ae:41:ee:4b:48, manufacturer data: 4c001005341cd7aef1, txPower: 12, rssi: -93
Advertised Device: Name: , Address: e8:a0:e0:19:2c:25, manufacturer data: 4c0012020001, rssi: -86
Advertised Device: Name: , Address: 04:4b:ed:b5:a8:ea, manufacturer data: 4c0010050110b28bba, txPower: 12, rssi: -95
Devices found: 131
Scan done!
```

Screenshot of the serial monitor of client device to show a successful connection with server device.



The screenshot shows the serial monitor output of a client device. The output is as follows:

```
* Executing task: platformio device monitor
Device Name: Yuwen and Yunxiao
Forming a connection to 98:3d:ae:ac:0c:f2
- Created client
- Connected to server
- Found our service
- Found our characteristic
The characteristic value was: Hello World
We are now connected to the BLE Server.
Setting new characteristic value to "Time since boot: 51"
Notify callback for characteristic 471cb5b7-a5a9-4a19-a309-401ae5e95733 of data length 11
data: Hello World
Setting new characteristic value to "Time since boot: 52"
Notify callback for characteristic 471cb5b7-a5a9-4a19-a309-401ae5e95733 of data length 11
data: Hello World
Setting new characteristic value to "Time since boot: 54"
Notify callback for characteristic 471cb5b7-a5a9-4a19-a309-401ae5e95733 of data length 11
data: Hello World
Setting new characteristic value to "Time since boot: 55"
Notify callback for characteristic 471cb5b7-a5a9-4a19-a309-401ae5e95733 of data length 11
data: Hello World
```

Screenshot of the serial monitor of server device to show the raw and denoised sensor data.

The screenshot shows the IDE interface for the 'xiao-bluetooth-server' project. The 'main.cpp' file is open, displaying code for a BLE server. The 'TERMINAL' tab is active, showing the output of the 'platformio device monitor' task. The output displays a series of raw distance measurements and their corresponding denoised values, along with the duration of each measurement. The data is as follows:

Duration (us)	Raw Distance (cm)	Denoised Distance (cm)
15095	258.88	60.05
756	12.87	62.65
657	11.27	62.29
681	11.68	61.93
664	11.39	61.24
629	10.79	11.62
618	10.60	11.14
594	10.19	10.93
563	9.66	10.52
590	10.12	10.27

Screenshot of the serial monitor of client device to show the current, maximum, and minimum data transmitted from server device.

The screenshot shows the IDE interface for the 'xiao-bluetooth-client' project. The 'main.cpp' file is open, displaying code for a BLE client. The 'TERMINAL' tab is active, showing the output of the 'platformio device monitor' task. The output displays the current, maximum, and minimum distance data received from the server device. The data is as follows:

Data Count	Current Distance (cm)	Maximum Distance (cm)	Minimum Distance (cm)
8	10.93	11.62	2.61
9	10.52	11.62	2.61
10	10.27	11.62	2.61