

Wireless Lab

Name: Wayne Tsai

NetID: wetsai

GitHub Repository:

Screenshots and Explanations

1. Bluetooth Devices Detected

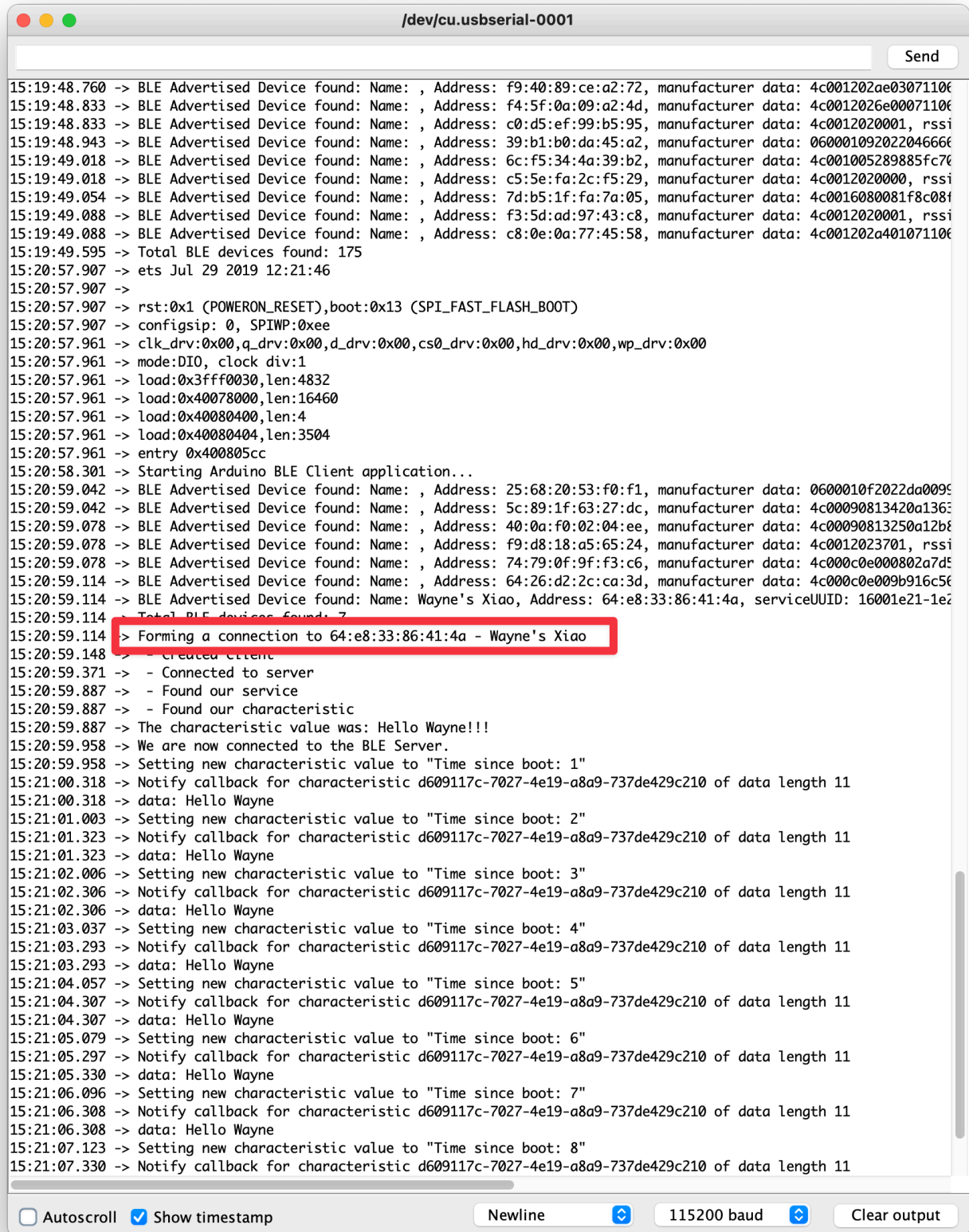
- **Description:** This screenshot shows the number of Bluetooth devices detected using the MCU as `BLEScanner`.
- **Screenshot:**

```
wayne@Waynes-MacBook-Pro: ~  
BLE Advertised Device found: Name: , Address: 72:c4:61:ba:9f:92, manufacturer data: 4c0007190114202b9a8f100009bd94fbff969ca316a83e5a8aa87c23ba, rssi: -60  
BLE Advertised Device found: Name: , Address: 73:ad:bb:af:35:b1, manufacturer data: 4c0010052b180d475a, txPower: 8, rssi: -88  
BLE Advertised Device found: Name: , Address: e3:4e:43:94:4e:18, manufacturer data: 4c0012020003, rssi: -78  
BLE Advertised Device found: Name: , Address: d6:05:33:04:39:27, manufacturer data: 4c001219107a4f0ede87bb99d4c218a4663f7f07731d8e489c5ddd02bc, rssi: -71  
BLE Advertised Device found: Name: , Address: 3d:4c:2c:ce:10:1e, manufacturer data: 4c00090603110a135907, rssi: -71  
BLE Advertised Device found: Name: , Address: 6f:f3:41:2c:38:23, manufacturer data: 4c000719011b2022f88f11000426b322a18d4a9800e2376b7a7342fcc3, rssi: -93  
BLE Advertised Device found: Name: , Address: 6a:b6:01:a1:c5:1c, manufacturer data: 4c0010073c1f9db2a82168, txPower: 15, rssi: -71  
BLE Advertised Device found: Name: , Address: d0:88:c0:36:c0:10, manufacturer data: 4c0012022e000711061848eb57352bb6883cf31a9af94126c0, rssi: -81  
BLE Advertised Device found: Name: , Address: d5:c5:32:44:32:fa, manufacturer data: 4c0012022400, rssi: -77  
BLE Advertised Device found: Name: , Address: 75:17:71:db:f9:43, manufacturer data: 4c0010077b1feb3973f068, txPower: 12, rssi: -82  
BLE Advertised Device found: Name: , Address: cd:3a:2f:3c:64:62, manufacturer data: 4c0012023902, rssi: -86  
BLE Advertised Device found: Name: , Address: c6:0b:48:78:01:83, manufacturer data: 4c0012020002, rssi: -76  
BLE Advertised Device found: Name: , Address: 42:91:bd:a5:0a:b7, manufacturer data: 4c00090813500a1254771b581608008de92f61816dee, rssi: -78  
BLE Advertised Device found: Name: , Address: d3:29:e9:6e:14:85, manufacturer data: 4c001219b0bb305d77b50e41f23d2b631c0d8b380d9ebdfc38ece1007d, rssi: -79  
BLE Advertised Device found: Name: , Address: 6b:40:b5:21:44:f2, manufacturer data: 4c0010064119326dbb78, txPower: 12, rssi: -77  
BLE Advertised Device found: Name: , Address: 7b:90:69:0b:ba:a6, manufacturer data: 4c0010064119326dbb78, txPower: 12, rssi: -76  
BLE Advertised Device found: Name: , Address: f7:24:f5:12:14:7a, manufacturer data: 4c0012020003, rssi: -81  
BLE Advertised Device found: Name: , Address: 48:4d:23:2c:a3:3f, manufacturer data: 4c001006491db53f2028, txPower: 12, rssi: -85  
BLE Advertised Device found: Name: , Address: e0:28:8b:eb:ac:1a, manufacturer data: 4c0012020000, rssi: -72  
BLE Advertised Device found: Name: , Address: 47:64:94:23:d8:73, manufacturer data: 4c0010064d1dab7c7938, txPower: 12, rssi: -74  
BLE Advertised Device found: Name: , Address: e9:1c:cc:46:95:36, manufacturer data: 4c0012020003, rssi: -68  
BLE Advertised Device found: Name: , Address: e3:4b:fa:3d:7c:b2, manufacturer data: 4c0012023502, rssi: -87  
BLE Advertised Device found: Name: , Address: e4:e1:aa:a9:3c:ed, manufacturer data: 4c00121910184ea859c9e6f9fc0193b097eb175fea0f19ca113eeaa0393, rssi: -74  
BLE Advertised Device found: Name: , Address: e5:1f:f5:6f:af:02, manufacturer data: 4c0012020000, rssi: -75  
BLE Advertised Device found: Name: , Address: 4b:47:f6:87:b3:59, manufacturer data: 4c0010073d1f6258447d08, txPower: 12, rssi: -82  
BLE Advertised Device found: Name: , Address: 71:ad:75:7c:13:bd, manufacturer data: 4c001007311fd9c283f528, txPower: 12, rssi: -72  
BLE Advertised Device found: Name: , Address: 4d:fe:01:2f:1a:33, manufacturer data: 4c00160800be408fa59b5a56, rssi: -95  
BLE Advertised Device found: Name: , Address: c1:9d:b3:e2:94:c1, manufacturer data: 4c0012020002, rssi: -79  
BLE Advertised Device found: Name: , Address: 59:58:b8:74:5d:02, manufacturer data: 4c00090813100a12c0511b58, rssi: -87  
BLE Advertised Device found: Name: , Address: c6:8e:24:e4:81:b6, manufacturer data: 4c0012020002, rssi: -73  
BLE Advertised Device found: Name: , Address: 73:4c:4f:a2:34:b1, manufacturer data: 4c00160800fa31cc7a931f91, rssi: -78  
Total BLE devices found: 175
```

2. Successful Client Connection

- **Description:** This screenshot displays the serial monitor of the client device indicating a successful connection with the server device. The name of the server device is displayed.

- Screenshot:



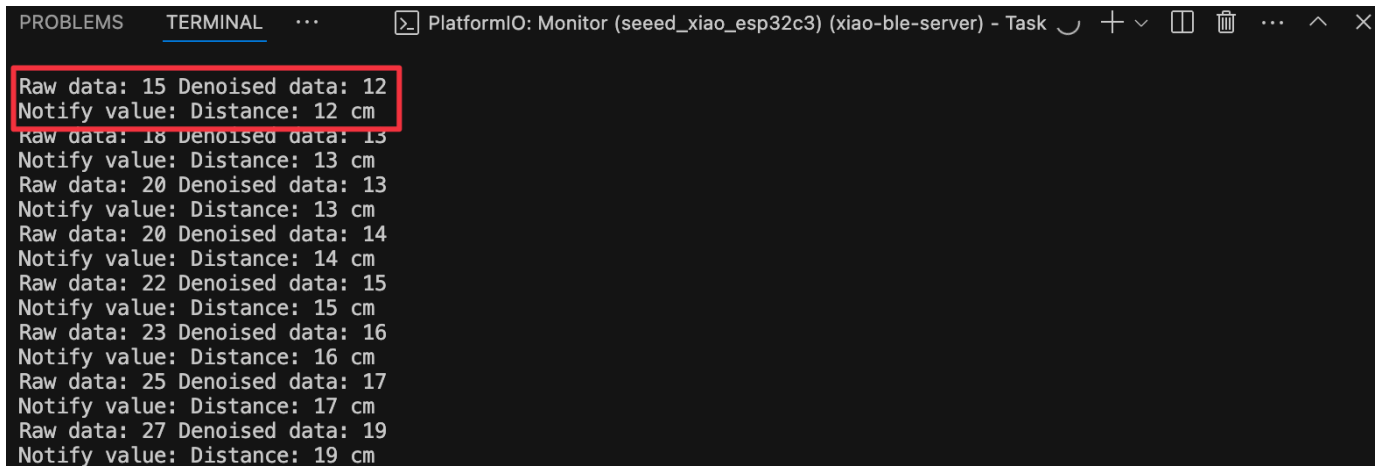
The screenshot shows a terminal window titled `/dev/cu.usbserial-0001` with a 'Send' button in the top right. The terminal displays a series of log messages for BLE device discovery and connection. The messages are timestamped and include details about discovered devices, their addresses, and manufacturer data. A red box highlights the line: `> Forming a connection to 64:e8:33:86:41:4a - Wayne's Xiao`. Below this, the terminal shows the connection process, including 'Connected to server', 'Found our service', and 'Found our characteristic'. The final part of the log shows the device sending 'Hello Wayne' multiple times.

```
15:19:48.760 -> BLE Advertised Device found: Name: , Address: f9:40:89:ce:a2:72, manufacturer data: 4c001202ae03071106
15:19:48.833 -> BLE Advertised Device found: Name: , Address: f4:5f:0a:09:a2:4d, manufacturer data: 4c0012026e00071106
15:19:48.833 -> BLE Advertised Device found: Name: , Address: c0:d5:ef:99:b5:95, manufacturer data: 4c0012020001, rssi
15:19:48.943 -> BLE Advertised Device found: Name: , Address: 39:b1:b0:da:45:a2, manufacturer data: 060001092022046666
15:19:49.018 -> BLE Advertised Device found: Name: , Address: 6c:f5:34:4a:39:b2, manufacturer data: 4c001005289885fc70
15:19:49.018 -> BLE Advertised Device found: Name: , Address: c5:5e:fa:2c:f5:29, manufacturer data: 4c0012020000, rssi
15:19:49.054 -> BLE Advertised Device found: Name: , Address: 7d:b5:1f:fa:7a:05, manufacturer data: 4c0016080081f8c08f
15:19:49.088 -> BLE Advertised Device found: Name: , Address: f3:5d:ad:97:43:c8, manufacturer data: 4c0012020001, rssi
15:19:49.088 -> BLE Advertised Device found: Name: , Address: c8:0e:0a:77:45:58, manufacturer data: 4c001202a401071106
15:19:49.595 -> Total BLE devices found: 175
15:20:57.907 -> ets Jul 29 2019 12:21:46
15:20:57.907 ->
15:20:57.907 -> rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
15:20:57.907 -> configip: 0, SPIWP:0xee
15:20:57.961 -> clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
15:20:57.961 -> mode:DIO, clock div:1
15:20:57.961 -> load:0x3ffff0030,len:4832
15:20:57.961 -> load:0x40078000,len:16460
15:20:57.961 -> load:0x40080400,len:4
15:20:57.961 -> load:0x40080404,len:3504
15:20:57.961 -> entry 0x400805cc
15:20:58.301 -> Starting Arduino BLE Client application...
15:20:59.042 -> BLE Advertised Device found: Name: , Address: 25:68:20:53:f0:f1, manufacturer data: 0600010f2022da0095
15:20:59.042 -> BLE Advertised Device found: Name: , Address: 5c:89:1f:63:27:dc, manufacturer data: 4c00090813420a1363
15:20:59.078 -> BLE Advertised Device found: Name: , Address: 40:0a:f0:02:04:ee, manufacturer data: 4c00090813250a12b8
15:20:59.078 -> BLE Advertised Device found: Name: , Address: f9:d8:18:a5:65:24, manufacturer data: 4c0012023701, rssi
15:20:59.078 -> BLE Advertised Device found: Name: , Address: 74:79:0f:9f:f3:c6, manufacturer data: 4c000c0e000802a7d5
15:20:59.114 -> BLE Advertised Device found: Name: , Address: 64:26:d2:2c:ca:3d, manufacturer data: 4c000c0e0009b916c56f
15:20:59.114 -> BLE Advertised Device found: Name: Wayne's Xiao, Address: 64:e8:33:86:41:4a, serviceUUID: 16001e21-1e2
15:20:59.114 -> Total BLE devices found: 7
15:20:59.114 -> > Forming a connection to 64:e8:33:86:41:4a - Wayne's Xiao
15:20:59.148 -> - Created client
15:20:59.371 -> - Connected to server
15:20:59.887 -> - Found our service
15:20:59.887 -> - Found our characteristic
15:20:59.887 -> The characteristic value was: Hello Wayne!!!
15:20:59.958 -> We are now connected to the BLE Server.
15:20:59.958 -> Setting new characteristic value to "Time since boot: 1"
15:21:00.318 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:00.318 -> data: Hello Wayne
15:21:01.003 -> Setting new characteristic value to "Time since boot: 2"
15:21:01.323 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:01.323 -> data: Hello Wayne
15:21:02.006 -> Setting new characteristic value to "Time since boot: 3"
15:21:02.306 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:02.306 -> data: Hello Wayne
15:21:03.037 -> Setting new characteristic value to "Time since boot: 4"
15:21:03.293 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:03.293 -> data: Hello Wayne
15:21:04.057 -> Setting new characteristic value to "Time since boot: 5"
15:21:04.307 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:04.307 -> data: Hello Wayne
15:21:05.079 -> Setting new characteristic value to "Time since boot: 6"
15:21:05.297 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:05.330 -> data: Hello Wayne
15:21:06.096 -> Setting new characteristic value to "Time since boot: 7"
15:21:06.308 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
15:21:06.308 -> data: Hello Wayne
15:21:07.123 -> Setting new characteristic value to "Time since boot: 8"
15:21:07.330 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 11
```

☐ Autoscroll ☒ Show timestamp Newline 115200 baud Clear output

3. Server Device Data

- **Description:** This screenshot reflects the serial monitor of the server device, showing both raw and denoised sensor data.
- **Screenshot:**



The screenshot shows a serial monitor window titled "PlatformIO: Monitor (seeed_xiao_esp32c3) (xiao-ble-server) - Task". The window has tabs for "PROBLEMS" and "TERMINAL". The terminal output displays a series of sensor data readings. The first two lines are highlighted with a red box:

```
Raw data: 15 Denoised data: 12
Notify value: Distance: 12 cm
```

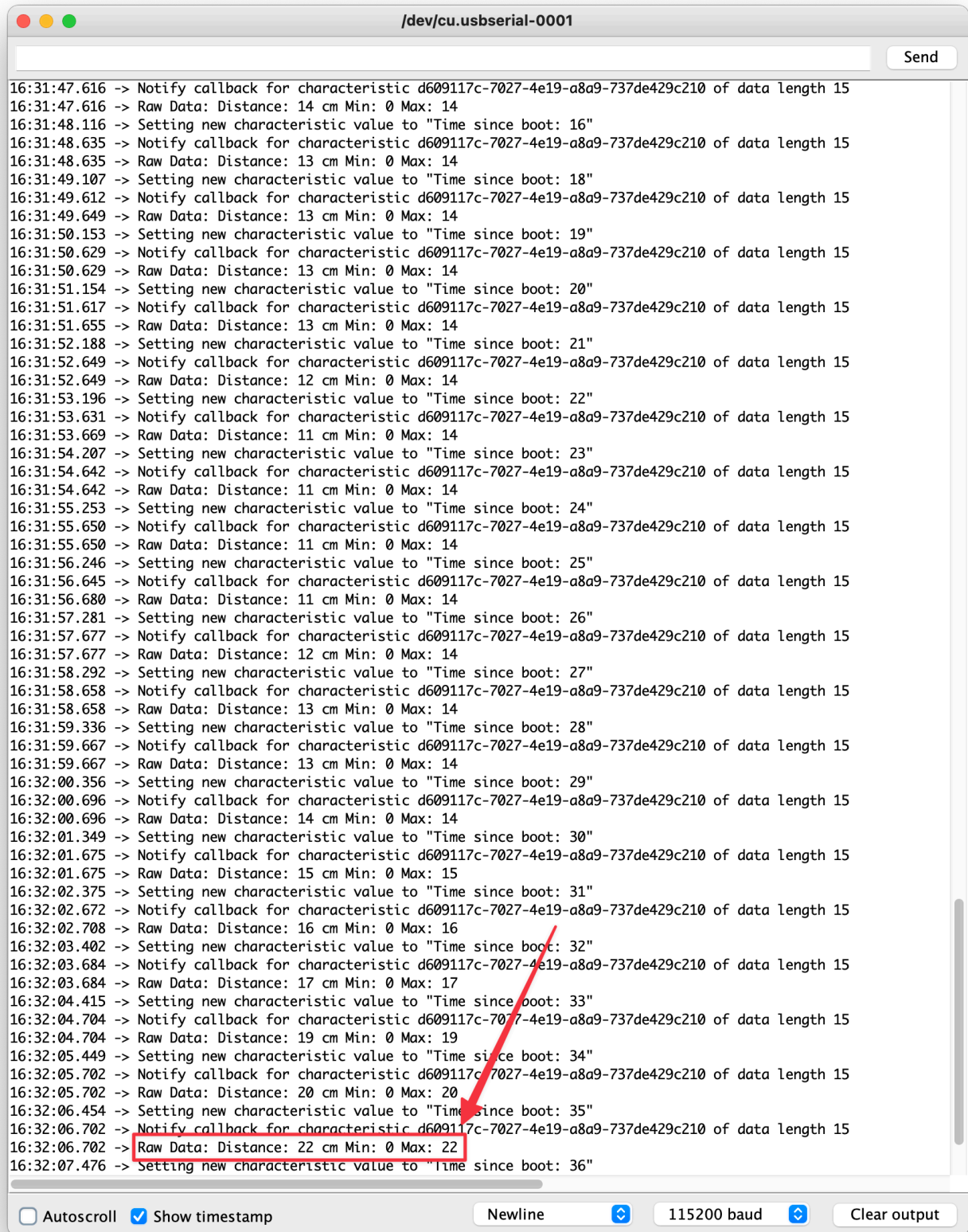
The subsequent lines show the following data:

```
Raw data: 18 Denoised data: 13
Notify value: Distance: 13 cm
Raw data: 20 Denoised data: 13
Notify value: Distance: 13 cm
Raw data: 20 Denoised data: 14
Notify value: Distance: 14 cm
Raw data: 22 Denoised data: 15
Notify value: Distance: 15 cm
Raw data: 23 Denoised data: 16
Notify value: Distance: 16 cm
Raw data: 25 Denoised data: 17
Notify value: Distance: 17 cm
Raw data: 27 Denoised data: 19
Notify value: Distance: 19 cm
```

4. Transmitted Data from Server

- **Description:** This screenshot captures the serial monitor of the client device, displaying the current, maximum, and minimum data transmitted from the server device.

- Screenshot:



```
/dev/cu.usbserial-0001
Send

16:31:47.616 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:47.616 -> Raw Data: Distance: 14 cm Min: 0 Max: 14
16:31:48.116 -> Setting new characteristic value to "Time since boot: 16"
16:31:48.635 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:48.635 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:31:49.107 -> Setting new characteristic value to "Time since boot: 18"
16:31:49.612 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:49.649 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:31:50.153 -> Setting new characteristic value to "Time since boot: 19"
16:31:50.629 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:50.629 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:31:51.154 -> Setting new characteristic value to "Time since boot: 20"
16:31:51.617 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:51.655 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:31:52.188 -> Setting new characteristic value to "Time since boot: 21"
16:31:52.649 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:52.649 -> Raw Data: Distance: 12 cm Min: 0 Max: 14
16:31:53.196 -> Setting new characteristic value to "Time since boot: 22"
16:31:53.631 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:53.669 -> Raw Data: Distance: 11 cm Min: 0 Max: 14
16:31:54.207 -> Setting new characteristic value to "Time since boot: 23"
16:31:54.642 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:54.642 -> Raw Data: Distance: 11 cm Min: 0 Max: 14
16:31:55.253 -> Setting new characteristic value to "Time since boot: 24"
16:31:55.650 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:55.650 -> Raw Data: Distance: 11 cm Min: 0 Max: 14
16:31:56.246 -> Setting new characteristic value to "Time since boot: 25"
16:31:56.645 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:56.680 -> Raw Data: Distance: 11 cm Min: 0 Max: 14
16:31:57.281 -> Setting new characteristic value to "Time since boot: 26"
16:31:57.677 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:57.677 -> Raw Data: Distance: 12 cm Min: 0 Max: 14
16:31:58.292 -> Setting new characteristic value to "Time since boot: 27"
16:31:58.658 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:58.658 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:31:59.336 -> Setting new characteristic value to "Time since boot: 28"
16:31:59.667 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:31:59.667 -> Raw Data: Distance: 13 cm Min: 0 Max: 14
16:32:00.356 -> Setting new characteristic value to "Time since boot: 29"
16:32:00.696 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:00.696 -> Raw Data: Distance: 14 cm Min: 0 Max: 14
16:32:01.349 -> Setting new characteristic value to "Time since boot: 30"
16:32:01.675 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:01.675 -> Raw Data: Distance: 15 cm Min: 0 Max: 15
16:32:02.375 -> Setting new characteristic value to "Time since boot: 31"
16:32:02.672 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:02.708 -> Raw Data: Distance: 16 cm Min: 0 Max: 16
16:32:03.402 -> Setting new characteristic value to "Time since boot: 32"
16:32:03.684 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:03.684 -> Raw Data: Distance: 17 cm Min: 0 Max: 17
16:32:04.415 -> Setting new characteristic value to "Time since boot: 33"
16:32:04.704 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:04.704 -> Raw Data: Distance: 19 cm Min: 0 Max: 19
16:32:05.449 -> Setting new characteristic value to "Time since boot: 34"
16:32:05.702 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:05.702 -> Raw Data: Distance: 20 cm Min: 0 Max: 20
16:32:06.454 -> Setting new characteristic value to "Time since boot: 35"
16:32:06.702 -> Notify callback for characteristic d609117c-7027-4e19-a8a9-737de429c210 of data length 15
16:32:06.702 -> Raw Data: Distance: 22 cm Min: 0 Max: 22
16:32:07.476 -> Setting new characteristic value to "Time since boot: 36"
```

☐ Autoscroll ☒ Show timestamp Newline 115200 baud Clear output

Note:: I used ChatGPT to create the report markdown template.