

Wireless Lab

Name: Wayne Tsai

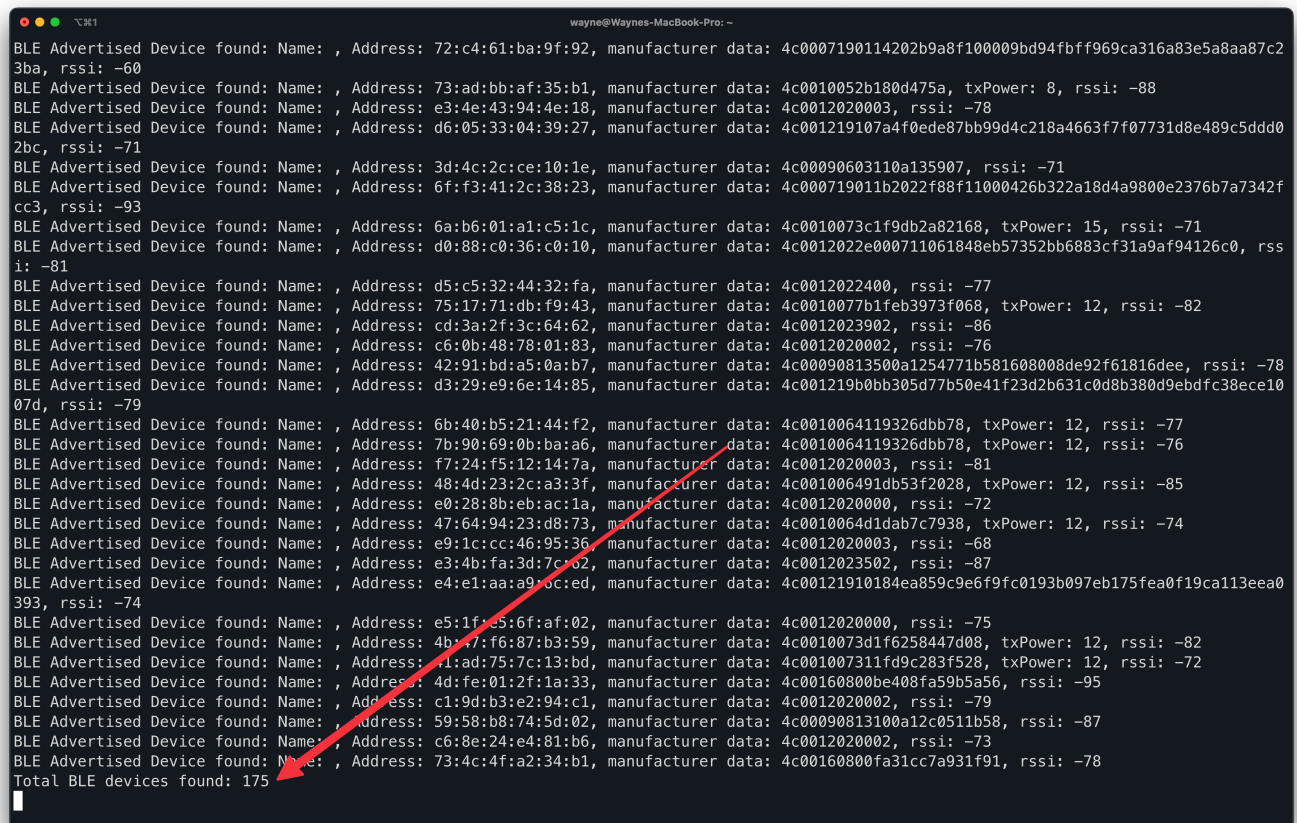
NetID: wetsai

GitHub Repository: <https://github.com/wayne-tsai/hslab>

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: 4c000719011b2022f88f11000426b322a18da9800e2376b7a7342fcc3, 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:02, manufacturer data: 4c0012023502, rssi: -87  
BLE Advertised Device found: Name: , Address: e4:e1:aa:a9:0c:ed, manufacturer data: 4c00121910184ea859c9e6f9fc0193b097eb175fea0f19ca113eea0393, rssi: -74  
BLE Advertised Device found: Name: , Address: e5:1f:25:6f:af:02, manufacturer data: 4c0012020000, rssi: -75  
BLE Advertised Device found: Name: , Address: 4b:17:f6:87:b3:59, manufacturer data: 4c0010073d1f6258447d08, txPower: 12, rssi: -82  
BLE Advertised Device found: Name: , Address: 11: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:

```

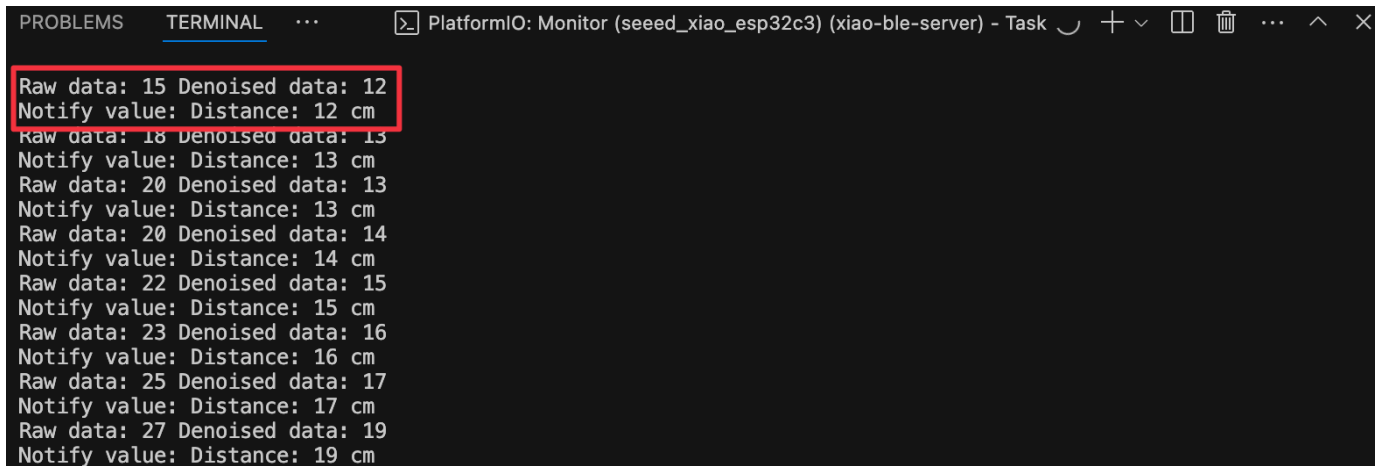
/dev/cu.usbserial-0001
Send
15:19:48.760 -> BLE Advertised Device found: Name: , Address: f9:40:89:ce:a2:72, manufacturer data: 4c001202ae0307110f
15:19:48.833 -> BLE Advertised Device found: Name: , Address: f4:5f:0a:09:a2:4d, manufacturer data: 4c0012026e0007110f
15:19:48.833 -> BLE Advertised Device 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: 4c001202a40107110f
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: 0600010f2022da009f
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:**

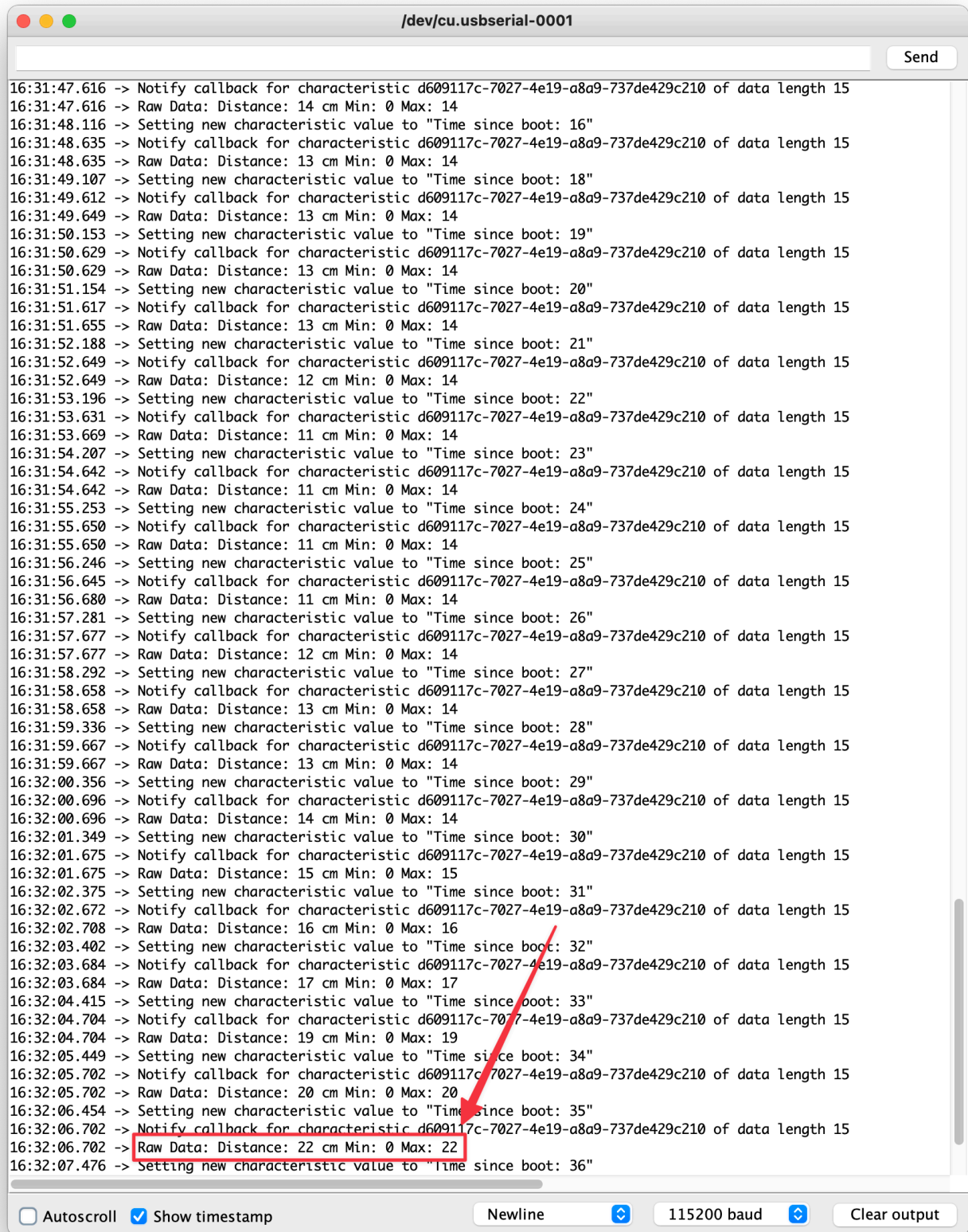
A screenshot of a serial monitor window titled "PlatformIO: Monitor (seeed_xiao_esp32c3) (xiao-ble-server) - Task". The window has tabs for "PROBLEMS" and "TERMINAL". The terminal output shows a series of sensor readings. The first two lines are highlighted with a red box: "Raw data: 15 Denoised data: 12" and "Notify value: Distance: 12 cm". The subsequent lines follow a similar pattern with increasing values: "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", and "Notify value: Distance: 19 cm".

```
PROBLEMS  TERMINAL  ...  PlatformIO: Monitor (seeed_xiao_esp32c3) (xiao-ble-server) - Task
Raw data: 15 Denoised data: 12
Notify value: Distance: 12 cm
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.