**Title:** Low Power ECG App Communication Protocol and steps

**Date:** 3/17/2021

**Revision:** X01

BLE GATT Database:

Configuration Service: CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:D4:8C:AD:8A

-Settings Characteristic: 06:0D:00:CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:AA:46:AD:8A

Data type: uint8\_t [10]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bluetooth Header | Module | Sub Message #1 | Sub Message #2 | Sub Message #3 | Sub Message #4 | Sub Message #5 | Sub Message #6 | Sub Message #7 | Bluetooth Footer |

-Response Characteristic: 12:0F:00:CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:AB:46:AD:8A

Data type: uint8\_t [4]

|  |  |  |  |
| --- | --- | --- | --- |
| Response #1 | Response #2 | Response #3 | Response #4 |

Temperature Service: CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:D5:8C:AD:8A

-Instant Temp Characteristic: 12:1D:00:CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:AF:46:AD:8A

Data type: uint8\_t [2]

|  |  |
| --- | --- |
| Temperature [0] | Temperature [1] |

ECG Service: CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:D6:8C:AD:8A

-Instant ECG Characteristic: 12:1D:00:CE:13:10:B0:F0:74:3E:A1:EE:45:30:38:B1:46:AD:8A

Data type: uint8\_t [64]

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ECG V1 [0] | ECG V1 [1] | ECG V2 [0] | ECG V2 [1] | ECG V3 [0] | ECG V3 [1] | ECG V4  [0] | ECG V4  [1] | ECG  V5 [0] | ECG  V5 [1] | … | ECG  V32  [0] | ECG V32 [1] |

1. Connect to Device.
   1. Device name: LP\_ECG-X01
   2. Manufacturer name: GT-BITNG
2. Discover all attributes and services.
3. Enable all characteristic notifications.
4. Write the following command to the SETTINGS CHARACTERISTIC
   1. Enable Bluetooth Advertising after disconnection.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | BLUETOOTH MODULE | BLUETOOTH ENABLE ADVERTISING AFTER DISCONNECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X06 | 0X18 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

1. Write the following command to the SETTINGS CHARACTERISTIC
   1. Start Instant Temperature Data Recording Command

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0B | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR START | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0XBB |

1. Write the following command to the SETTINGS CHARACTERISTIC
   1. Start Instant ECG Data Recording Command

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

Data is written to the isntant temperature and instant ecg characteristic above at the desired sampling rate. After data is written to the characteristic, a notification is sent to the BLE Client.

To stop data transfer of pressure, send the following commands:

1. Write the following command to the SETTINGS CHARACTERISTIC
   1. Stop instant ECG data recording.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

1. Write the following command to the SETTINGS CHARACTERISTIC
   1. Stop instant TEMP data recording

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0C | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR STOP | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0XBB |

\* Only call this function once to stop all timer enabled sensor data collection.

1. Write the following command to the SETTINGS CHARACTERISTIC
   1. Shutdown pressure sensing glove.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 COMMON COMMAND | NRF52 VCC LDO DISABLE | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X06 | 0X07 | 0 | 0 | 0 | 0 | 0 | 0XBB |