

# Assignments T7 and T8

DGMD E-14

Wearable Devices and Computer Vision

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## Tutorial 7

**Part 1.** Please follow the tutorial 7 ([https://drive.google.com/file/d/1lQ7VI9qYdqsyPQAd-\\_jTx7GHQTQbHwRy/view](https://drive.google.com/file/d/1lQ7VI9qYdqsyPQAd-_jTx7GHQTQbHwRy/view))

Answer in the context of BlueZ Gatttool:

1. What is a **handle** and give an example of one of them.

**The handle is a 16 bit address that acts as a unique identifier for a UUID**

Example: Attr handle: 0x001

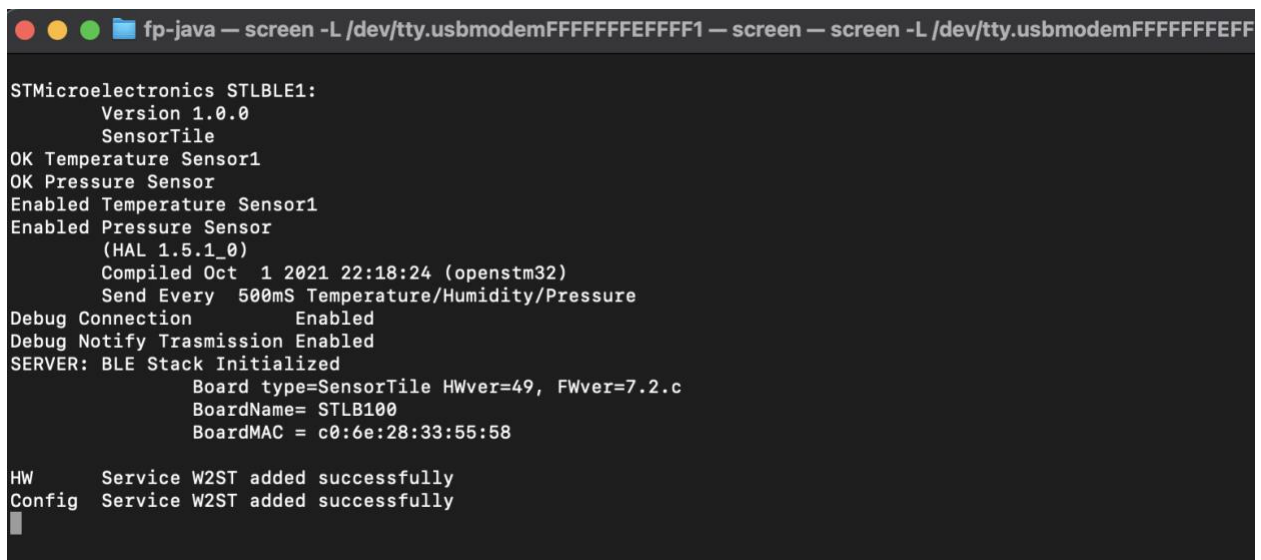
2. What is a **characteristic value** and give an example of one of them.

**A characteristic is a basic data element used to construct a GATT service**

Example: handle: 0x0011, char properties: 0x02, char value handle: 0x0012, uuid: 00002a23-0000-1000-8000-00805f9b34fb

3. Create your own versions of the figures 1 to 23.

Figure 1: BLE debug interface via USB streaming.



```
fp-java — screen -L /dev/tty.usbmodemFFFFF0001 — screen — screen -L /dev/tty.usbmodemFFFFF0001

STMicroelectronics STBLE1:
  Version 1.0.0
  SensorTile
OK Temperature Sensor1
OK Pressure Sensor
Enabled Temperature Sensor1
Enabled Pressure Sensor
  (HAL 1.5.1_0)
  Compiled Oct 1 2021 22:18:24 (openstm32)
  Send Every 500ms Temperature/Humidity/Pressure
Debug Connection Enabled
Debug Notify Transmission Enabled
SERVER: BLE Stack Initialized
  Board type=SensorTile HWver=49, FWver=7.2.c
  BoardName= STLB100
  BoardMAC = c0:6e:28:33:55:58

HW Service W2ST added successfully
Config Service W2ST added successfully
```

Figure 2: Use bluetoothctl in BeagleBone

```
pi@raspberrypi:~ $ bluetoothctl
Agent registered
[bluetooth]#
```

Figure 3: Use bluetoothctl to check if the SensorTile is paired and disconnected

```
Attempting to disconnect from C0:6E:28:33:55:58
[CHG] Device C0:6E:28:33:55:58 ServicesResolved: no
Successful disconnected
[CHG] Device C0:6E:28:33:55:58 Connected: no
[CHG] Device 45:03:21:1A:1B:55 RSSI: -81
[bluetooth]# info C0:6E:28:33:55:58
Device C0:6E:28:33:55:58 (random)
    Name: STLB100
    Alias: STLB100
    Paired: yes
    Trusted: no
    Blocked: no
    Connected: no
    LegacyPairing: no
    UUID: Vendor specific (00000000-0001-11e1-9ab4-0002a5d5c51b)
    UUID: Vendor specific (00000000-000f-11e1-9ab4-0002a5d5c51b)
    UUID: Generic Access Profile (00001800-0000-1000-8000-00805f9b34fb)
    UUID: Generic Attribute Profile (00001801-0000-1000-8000-00805f9b34fb)
    ManufacturerData Key: 0x0201
    ManufacturerData Value:
20 f4 00 00 c0 6e 28 33 55 58      ....n(3UX
    RSSI: -50
    TxPower: 0
[CHG] Device 5C:4F:71:08:DC:12 RSSI: -74
```

Figure 4: Exit bluetoothctl

```
[NEW] Device 43:03:21:1A:1B:55 RSSI: -73
[NEW] Device 76:33:09:B5:F8:44 76-33-09-B5-F8-44
[NEW] Device 7D:C0:91:99:A0:AF 7D-C0-91-99-A0-AF
[NEW] Device 1E:5D:0C:57:F0:8A 1E-5D-0C-57-F0-8A
[NEW] Device D1:9B:9E:AA:7C:07 Tile
[CHG] Device 39:44:74:21:2E:E8 RSSI: -69
[CHG] Device 53:14:9F:43:7F:63 RSSI: -47
[CHG] Device 5C:4F:71:08:DC:12 RSSI: -77
[CHG] Device 53:14:9F:43:7F:63 RSSI: -60
[CHG] Device 39:44:74:21:2E:E8 RSSI: -77
[NEW] Device F9:D5:47:71:74:D9 Forerunner 735XT
[CHG] Device 79:63:01:27:3D:57 RSSI: -45
[CHG] Device 79:63:01:27:3D:57 ManufacturerData Key: 0x004c
[CHG] Device 79:63:01:27:3D:57 ManufacturerData Value:
10 05 5c 1c 84 f7 67 ..\...g
[NEW] Device 64:D2:C4:D1:CE:6C 64-D2-C4-D1-CE-6C
[CHG] Device 5C:4F:71:08:DC:12 RSSI: -67
[NEW] Device 78:2C:19:A6:B4:42 78-2C-19-A6-B4-42
[bluetooth]# quit
pi@raspberrypi:~ $
```

Figure 5: Use gatttool with proper options in interactive mode

```
pi@raspberrypi:~ $ gatttool -b C0:6E:28:33:55:58 -t random -I
[C0:6E:28:33:55:58][LE]>
```

Figure 6: Connect with SensorTile in gatttool interactive mode

```
pi@raspberrypi:~ $ gatttool -b C0:6E:28:33:55:58 -t random -I
[C0:6E:28:33:55:58][LE]> connect
Attempting to connect to C0:6E:28:33:55:58
Connection successful
[C0:6E:28:33:55:58][LE]>
```



Figure 7: BLE\_SampleApp USB debug interface for successful connection

```
fp-java — screen -L /dev/tty.usbmodemFFFFFEEFFF1 — screen — screen -L /dev/tty.usbm
STMicroelectronics STBLE1:
  Version 1.0.0
  SensorTile
OK Temperature Sensor1
OK Pressure Sensor
Enabled Temperature Sensor1
Enabled Pressure Sensor
  (HAL 1.5.1_0)
  Compiled Oct  1 2021 22:18:24 (openstm32)
  Send Every 500mS Temperature/Humidity/Pressure
Debug Connection      Enabled
Debug Notify Trasmission Enabled
SERVER: BLE Stack Initialized
      Board type=SensorTile HWver=49, FWver=7.2.c
      BoardName= STL8100
      BoardMAC = c0:6e:28:33:55:58

HW      Service W2ST added successfully
Config Service W2ST added successfully
>>>>>CONNECTED b8:27:eb:28:8e:6
Notification UNKNOW handle
<<<<<<DISCONNECTED
>>>>>CONNECTED b8:27:eb:28:8e:6
```

Figure 8: GATT primary services discovery in gatttool

```
connection successful
[C0:6E:28:33:55:58][LE]> primary
attr handle: 0x0001, end grp handle: 0x0004 uuid: 00001801-0000-1000-8000-00805f
9b34fb
attr handle: 0x0005, end grp handle: 0x000b uuid: 00001800-0000-1000-8000-00805f
9b34fb
attr handle: 0x000c, end grp handle: 0x0012 uuid: 00000000-0001-11e1-9ab4-0002a5
15c51b
attr handle: 0x0019, end grp handle: 0x001c uuid: 00000000-000f-11e1-9ab4-0002a5
15c51b
[C0:6E:28:33:55:58][LE]>
```

Figure 10: GATT characteristic descriptors discovery in gatttool

```

[C0:6E:28:33:55:58][LE]> char-desc
handle: 0x0001, uuid: 00002800-0000-1000-8000-00805f9b34fb
handle: 0x0002, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x0003, uuid: 00002a05-0000-1000-8000-00805f9b34fb
handle: 0x0004, uuid: 00002902-0000-1000-8000-00805f9b34fb
handle: 0x0005, uuid: 00002800-0000-1000-8000-00805f9b34fb
handle: 0x0006, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x0007, uuid: 00002a00-0000-1000-8000-00805f9b34fb
handle: 0x0008, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x0009, uuid: 00002a01-0000-1000-8000-00805f9b34fb
handle: 0x000a, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x000b, uuid: 00002a04-0000-1000-8000-00805f9b34fb
handle: 0x000c, uuid: 00002800-0000-1000-8000-00805f9b34fb
handle: 0x000d, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x000e, uuid: 00140000-0001-11e1-ac36-0002a5d5c51b
handle: 0x000f, uuid: 00002902-0000-1000-8000-00805f9b34fb
handle: 0x0010, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x0011, uuid: 20000000-0001-11e1-ac36-0002a5d5c51b
handle: 0x0012, uuid: 00002902-0000-1000-8000-00805f9b34fb
handle: 0x0019, uuid: 00002800-0000-1000-8000-00805f9b34fb
handle: 0x001a, uuid: 00002803-0000-1000-8000-00805f9b34fb
handle: 0x001b, uuid: 00000002-000f-11e1-ac36-0002a5d5c51b
handle: 0x001c, uuid: 00002902-0000-1000-8000-00805f9b34fb
[C0:6E:28:33:55:58][LE]>

```

Figure 11: Read characteristic value (environmental data) by handle 0x000e

```

[C0:6E:28:33:55:58][LE]> char-read-hnd 000e
Characteristic value/descriptor: a8 0a 03 8a 01 00 15 01
[C0:6E:28:33:55:58][LE]>

```

Figure 12: Characteristic write to enable environmental data notification in gatttool



```

[CO:6E:28:33:55:58][LE]> char-write-req 000f 0100
Characteristic value was written successfully
Notification handle = 0x000e value: 59 42 01 8a 01 00 18 01
Notification handle = 0x000e value: 97 42 03 8a 01 00 18 01
Notification handle = 0x000e value: d6 42 00 8a 01 00 18 01
Notification handle = 0x000e value: 14 43 05 8a 01 00 18 01
Notification handle = 0x000e value: 53 43 05 8a 01 00 18 01
Notification handle = 0x000e value: 91 43 01 8a 01 00 18 01
Notification handle = 0x000e value: d0 43 02 8a 01 00 18 01
Notification handle = 0x000e value: 0e 44 01 8a 01 00 16 01
Notification handle = 0x000e value: 4d 44 fc 89 01 00 16 01
Notification handle = 0x000e value: 8b 44 01 8a 01 00 18 01
Notification handle = 0x000e value: ca 44 01 8a 01 00 18 01
Notification handle = 0x000e value: 08 45 03 8a 01 00 18 01

```

Figure 13: BLE\_SampleApp USB debug interface for enabling environmental data notification

```

fp-java — screen -L /dev/tty.usbmodemFFFFFEEFFFF1 — screen — screen -L /dev/tty.u
Sending: Press=100864 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100867 Temp1=278
Sending: Press=100866 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100866 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100861 Temp1=278
Sending: Press=100866 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100867 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100864 Temp1=278

```

Figure 14: Characteristic write to disable environmental data notification in gatttool

```

[CO:6E:28:33:55:58][LE]> char-write-req 000f 0000
Characteristic value was written successfully

```

Figure 15: BLE\_SampleApp USB debug interface for disabling environmental data notification

```

Sending: Press=100865 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100867 Temp1=278
Sending: Press=100865 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100866 Temp1=278
Sending: Press=100872 Temp1=278
Sending: Press=100864 Temp1=278
Sending: Press=100866 Temp1=278
Sending: Press=100864 Temp1=278
--->Env=OFF

```

Figure 16: Characteristic write to handle 0x001b with command 2000000001

```

[C0:6E:28:33:55:58][LE]> char-write-cmd 001b 2000000001
[C0:6E:28:33:55:58][LE]>

```

Figure 17: BLE\_SampleApp USB debug interface for turn on LED

```

Conf Sig F=20000000 C= 1

```

Figure 18: Characteristic write to handle 0x001b with command 2000000000

```

[C0:6E:28:33:55:58][LE]> char-write-cmd 001b 2000000001
[C0:6E:28:33:55:58][LE]> char-write-cmd 001b 2000000000
[C0:6E:28:33:55:58][LE]>

```

Figure 19: BLE\_SampleApp USB debug interface for turn off LED

```

--->Env=OFF
Conf Sig F=20000000 C= 1

```

Figure 20: Disconnect SensorTile and exit gatttool



```

[LE]> char write cmd 0010 200000000
[C0:6E:28:33:55:58][LE]> disconnect

(gatttool:2250): GLib-WARNING **: 07:30:19.410: Invalid file descriptor.
[C0:6E:28:33:55:58][LE]> exit
pi@raspberrypi:~ $

```

Figure 21: Use gatttool to request environmental data

```

pi@raspberrypi:~ $ gatttool -b C0:6E:28:33:55:58 -t random --char-write-req --ha
ndle=0x000f --value=0100 --listen
Characteristic value was written successfully
Notification handle = 0x000e value: fe 5c fb 89 01 00 19 01
Notification handle = 0x000e value: 3d 5d 00 8a 01 00 19 01
Notification handle = 0x000e value: 7b 5d fc 89 01 00 19 01
Notification handle = 0x000e value: ba 5d 06 8a 01 00 19 01
Notification handle = 0x000e value: f8 5d fd 89 01 00 19 01
Notification handle = 0x000e value: 37 5e 01 8a 01 00 19 01
Notification handle = 0x000e value: 75 5e fd 89 01 00 19 01
Notification handle = 0x000e value: b4 5e fb 89 01 00 18 01
Notification handle = 0x000e value: f2 5e fb 89 01 00 18 01
Notification handle = 0x000e value: 31 5f ff 89 01 00 18 01
Notification handle = 0x000e value: 6f 5f 00 8a 01 00 18 01

```

Figure 22: Request environmental data and save data in test.txt

```

pi@raspberrypi:~ $ gatttool -b C0:6E:28:33:55:58 -t random --char-write-req --ha
ndle=0x000f --value=0100 --listen > test.txt
^C
pi@raspberrypi:~ $ ls
Bookshelf Documents Music Public test.txt
Desktop Downloads Pictures Templates Videos
pi@raspberrypi:~ $

```

Figure 23: Verify saved environmental data in test.txt

```

pi@raspberrypi:~ $ cat test.txt
Characteristic value was written successfully
Notification handle = 0x000e value: f9 8e fb 89 01 00 19 01
Notification handle = 0x000e value: 37 8f 00 8a 01 00 19 01
Notification handle = 0x000e value: 76 8f 00 8a 01 00 19 01
Notification handle = 0x000e value: b4 8f ff 89 01 00 19 01
Notification handle = 0x000e value: f3 8f fc 89 01 00 18 01
Notification handle = 0x000e value: 31 90 01 8a 01 00 18 01
Notification handle = 0x000e value: 70 90 00 8a 01 00 18 01
Notification handle = 0x000e value: ae 90 fd 89 01 00 18 01
Notification handle = 0x000e value: ed 90 00 8a 01 00 18 01
Notification handle = 0x000e value: 2b 91 fd 89 01 00 18 01
pi@raspberrypi:~ $

```

4. submit your test.txt file as in Figure 23.

**The test.txt would be submitted separately.**

5. Translate the data recorded in the final text file: test.txt to physical values. (you could write a python program to automate this otherwise you can do it manually).

**The following table was converted from test.txt by a block of python code.**

Hanldes	Timestamps (sec)	Pressure (mbar)	Temperature (degree C)
Notification handle = 0x000evalue:	366.01	1008.59	28.1
Notification handle = 0x000evalue:	366.63	1008.64	28.1
Notification handle = 0x000evalue:	367.26	1008.64	28.1
Notification handle = 0x000evalue:	367.88	1008.63	28.1
Notification handle = 0x000evalue:	368.51	1008.6	28
Notification handle = 0x000evalue:	369.13	1008.65	28
Notification handle = 0x000evalue:	369.76	1008.64	28
Notification handle = 0x000evalue:	370.38	1008.61	28
Notification handle = 0x000evalue:	371.01	1008.64	28
Notification handle = 0x000evalue:	371.63	1008.61	28

---

## Tutorial 8

---

### Part 1. Please follow the tutorial 8

Answer the following questions:

1. **GATT** is used exclusively after a connection has been established between the two devices

(True or False?)

Answer: **True**

2. Complete the sentence below:

We use SensorTile as the **GATT** \_\_\_\_\_

a. Server

b. Client

c. Peer

d. Service

Answer: **A.**

3. Complete the sentence below:

We use BeagleBone Black Rev. C/Raspberry Pi3B+/Pi Zero W as the GATT

---

- a. Server
- b. Client
- c. Peer
- d. Service

Answer: **B.**

4. Complete the sentence below:

We can discover, read, and write characteristics with gatttool.

**GATT** stands for **Generic Attribute Profile** and defines a data structure for organizing characteristics and attributes

## **Part 2 Please follow the tutorial 8**

1. Take screenshots corresponding to Figures 8, 13 and 15



Figure8: FP-SNS-ALLMEMS1 USB debug interface

```
STMicroelectronics FP-SNS-ALLMEMS1:
  Version 3.1.0
  STM32476RG-SensorTile board

OK Accelero Sensor
OK Gyroscope Sensor
OK Magneto Sensor
Error Humidity Sensor
OK Temperature Sensor1
Error Temperature Sensor2
OK Pressure Sensor
Enabled Accelero Sensor
Enabled Gyroscope Sensor
Enabled Magneto Sensor
Enabled Temperature Sensor1
Enabled Pressure Sensor
Battery not present

Meta Data Manager read from Flash
Meta Data Manager version=0.9.0
  Generic Meta Data found:
    CALIBRATION Size=120 [bytes]

    (HAL 1.7.1_0)
    Compiled Oct 12 2021 23:15:31 (openstm32)
    Send Every 30mS 3 Short precision Quaternions
    Send Every 500mS Temperature/Humidity/Pressure
    Send Every 50mS Acc/Gyro/Magneto
    Send Every 50mS dB noise

Debug Connection Enabled
Debug Notify Trasmission Enabled

SERVER: BLE Stack Initialized
  Board type=IDB05A1 HWver=49, FWver=7.2.c
  BoardName= AM1V310
  BoardMAC = c0:83:28:33:55:58

HW & SW Service W2ST added successfully
Console Service W2ST added successfully
Config Service W2ST added successfully

BootLoader Compliant with FOTA procedure

Initialized ST MotionFX v2.0.0
Magneto Calibration Not present
Initialized ST MotionAR v2.0.0
Initialized ST MotionCP v2.0.0
Initialized ST MotionGR v2.0.0
Initialized ST BlueVoiceADPCM v2.0.0
>>>>>CONNECTED b8:27:eb:28:8e:6
```

Figure 13: char-write-req to enable motiondata notification in gatttool

```
00 bd ff 25 ff
Notification handle = 0x0011 value: af 07 2c 00 56 ff d6 03 f0 ff d4 ff 10 00 b
00 c6 ff 1e ff
Notification handle = 0x0011 value: b6 07 2b 00 54 ff d5 03 ef ff d4 ff 10 00 d
00 bb ff 1e ff
Notification handle = 0x0011 value: bc 07 2a 00 54 ff d6 03 ee ff d4 ff 10 00 b
00 be ff 21 ff
Notification handle = 0x0011 value: c2 07 2b 00 54 ff d6 03 f0 ff d4 ff 10 00 d
00 c1 ff 18 ff
Notification handle = 0x0011 value: c8 07 2c 00 55 ff d5 03 f0 ff d4 ff 10 00 c
00 be ff 24 ff
Notification handle = 0x0011 value: cf 07 2b 00 55 ff d7 03 f0 ff d4 ff 10 00 d
00 bb ff 25 ff
Notification handle = 0x0011 value: d5 07 2b 00 55 ff d5 03 ef ff d4 ff 10 00 c
00 c1 ff 2a ff
Notification handle = 0x0011 value: db 07 2a 00 54 ff d6 03 ee ff d4 ff 10 00 c
00 ca ff 28 ff
Notification handle = 0x0011 value: e1 07 2b 00 53 ff d6 03 f0 ff d4 ff 10 00 c
00 bd ff 1c ff
Notification handle = 0x0011 value: e8 07 2b 00 54 ff d6 03 f0 ff d4 ff 10 00 c
00 c1 ff 19 ff
Notification handle = 0x0011 value: ee 07 2b 00 55 ff d7 03 f0 ff d4 ff 10 00 d
00 bb ff 1e ff
I
[C0:83:28:33:55:58][LE]>
```

Figure 15: USB debug interface for enable/disable motion data notification

```
austinhigh — screen -L /dev/tty.usbmodemFFFFF1 — scre Eject "NOD_L476R
turning it off.
8
ACC_X=48 ACC_Y=-176 ACC_Z=983 GYR_X=-18 GYR_Y=-45 GYR_Z=16 MAG_X=204 MAG_Y=-67 MAG_Z=-22
2
ACC_X=47 ACC_Y=-180 ACC_Z=981 GYR_X=-18 GYR_Y=-43 GYR_Z=16 MAG_X=207 MAG_Y=-72 MAG_Z=-21
7
ACC_X=46 ACC_Y=-177 ACC_Z=987 GYR_X=-9 GYR_Y=-44 GYR_Z=17 MAG_X=202 MAG_Y=-60 MAG_Z=-219
ACC_X=45 ACC_Y=-184 ACC_Z=982 GYR_X=-27 GYR_Y=-45 GYR_Z=16 MAG_X=208 MAG_Y=-70 MAG_Z=-22
9
ACC_X=44 ACC_Y=-181 ACC_Z=981 GYR_X=-7 GYR_Y=-41 GYR_Z=18 MAG_X=202 MAG_Y=-72 MAG_Z=-226
ACC_X=45 ACC_Y=-170 ACC_Z=991 GYR_X=-18 GYR_Y=-46 GYR_Z=16 MAG_X=196 MAG_Y=-58 MAG_Z=-22
2
ACC_X=48 ACC_Y=-181 ACC_Z=976 GYR_X=-23 GYR_Y=-45 GYR_Z=16 MAG_X=205 MAG_Y=-58 MAG_Z=-22
0
ACC_X=41 ACC_Y=-179 ACC_Z=993 GYR_X=-3 GYR_Y=-40 GYR_Z=18 MAG_X=201 MAG_Y=-54 MAG_Z=-219
ACC_X=42 ACC_Y=-174 ACC_Z=984 GYR_X=-30 GYR_Y=-46 GYR_Z=16 MAG_X=193 MAG_Y=-66 MAG_Z=-22
6
ACC_X=50 ACC_Y=-186 ACC_Z=975 GYR_X=-11 GYR_Y=-44 GYR_Z=16 MAG_X=208 MAG_Y=-58 MAG_Z=-22
5
ACC_X=43 ACC_Y=-176 ACC_Z=983 GYR_X=-20 GYR_Y=-42 GYR_Z=17 MAG_X=214 MAG_Y=-75 MAG_Z=-22
6
ACC_X=47 ACC_Y=-177 ACC_Z=980 GYR_X=-15 GYR_Y=-45 GYR_Z=16 MAG_X=208 MAG_Y=-73 MAG_Z=-21
9
ACC_X=46 ACC_Y=-179 ACC_Z=978 GYR_X=-17 GYR_Y=-44 GYR_Z=16 MAG_X=205 MAG_Y=-72 MAG_Z=-22
3
ACC_X=42 ACC_Y=-174 ACC_Z=983 GYR_X=-14 GYR_Y=-43 GYR_Z=17 MAG_X=199 MAG_Y=-70 MAG_Z=-22
8
ACC_X=47 ACC_Y=-177 ACC_Z=981 GYR_X=-20 GYR_Y=-44 GYR_Z=17 MAG_X=202 MAG_Y=-72 MAG_Z=-22
2
ACC_X=49 ACC_Y=-175 ACC_Z=975 GYR_X=-18 GYR_Y=-44 GYR_Z=16 MAG_X=201 MAG_Y=-64 MAG_Z=-22
2
ACC_X=47 ACC_Y=-176 ACC_Z=985 GYR_X=-11 GYR_Y=-42 GYR_Z=16 MAG_X=208 MAG_Y=-67 MAG_Z=-21
9
ACC_X=45 ACC_Y=-175 ACC_Z=980 GYR_X=-23 GYR_Y=-46 GYR_Z=16 MAG_X=210 MAG_Y=-55 MAG_Z=-22
8
ACC_X=45 ACC_Y=-177 ACC_Z=979 GYR_X=-14 GYR_Y=-43 GYR_Z=16 MAG_X=208 MAG_Y=-76 MAG_Z=-22
2
ACC_X=45 ACC_Y=-176 ACC_Z=983 GYR_X=-18 GYR_Y=-44 GYR_Z=16 MAG_X=211 MAG_Y=-69 MAG_Z=-22
5
ACC_X=47 ACC_Y=-177 ACC_Z=978 GYR_X=-18 GYR_Y=-44 GYR_Z=16 MAG_X=202 MAG_Y=-73 MAG_Z=-21
9
ACC_X=49 ACC_Y=-173 ACC_Z=985 GYR_X=-11 GYR_Y=-42 GYR_Z=16 MAG_X=199 MAG_Y=-55 MAG_Z=-22
5
ACC_X=47 ACC_Y=-172 ACC_Z=986 GYR_X=-20 GYR_Y=-45 GYR_Z=16 MAG_X=205 MAG_Y=-81 MAG_Z=-22
9
ACC_X=45 ACC_Y=-178 ACC_Z=979 GYR_X=-17 GYR_Y=-44 GYR_Z=17 MAG_X=213 MAG_Y=-61 MAG_Z=-21
9
ACC_X=45 ACC_Y=-176 ACC_Z=986 GYR_X=-17 GYR_Y=-44 GYR_Z=16 MAG_X=213 MAG_Y=-70 MAG_Z=-23
2
ACC_X=45 ACC_Y=-180 ACC_Z=978 GYR_X=-16 GYR_Y=-43 GYR_Z=16 MAG_X=207 MAG_Y=-73 MAG_Z=-22
2
ACC_X=48 ACC_Y=-171 ACC_Z=981 GYR_X=-14 GYR_Y=-43 GYR_Z=16 MAG_X=199 MAG_Y=-69 MAG_Z=-23
5
--->Acc/Gyro/Mag= OFF
```



2. Save Requested Motion Data to Text File as in section 4 of the tutorial 8 and submit text file: motion\_data.txt

**The motion\_data.txt will be submitted separately.**