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Tutorials 8 and 9

**Part 1**

1.

True! GATT is used after connection between two BLE devices has been established

2.

Answer: A/Server

3.

Answer: b/Client

4.

GATT stands for: Generic Attributes

5.

For the gyroscopic data, we are using a gain factor of 10. This provides additional resolution for

indicating the physical signal with the corresponding integer data value.

**Part 2**

1.

Figure 8

A screenshot of a cell phone

Description automatically generated

Figure 13

A picture containing window, sitting, table, large

Description automatically generated

Figure 15

A screenshot of a computer

Description automatically generated

For some reason, it is not printing into the terminal window for the sensor. **Tried troubleshooting and double checking the code, but not working**

2.

Submitted with this report

**Part 3**

1.

I ran the project in Debug mode, but it says in the instructions, you could go either way.

2.

A screenshot of a cell phone

Description automatically generated

3.

A screenshot of a cell phone

Description automatically generated

4.

If we sampled at 10Hz instead of 100Hz, there would not be adequate resolution for the displacement computation.

5.

An anti-aliasing filter is used before the signal sampler to restrict the signal’s bandwidth to satisfy the sampling theorem over the interested band. So the restriction of the signals from the samples is possible when the power above the frequencies above the Nyquist theorem is zero. More specifically, it is used avoid aliasing during signal acqusition.

Resource: <https://en.wikipedia.org/wiki/Anti-aliasing_filter>

6.

A high-pass filter is probably being used to avoid drift in displacement sensing.

7.

Basically, what the trapezoidal rule is that instead of using rectangles to calculate the area under the curve (aka displacement), we are using trapezoids. This is done by adding the area of all the trapezoids and is equal to:

A screenshot of a cell phone

Description automatically generated

Eventually, this becomes

A picture containing knife

Description automatically generated

Resource: <https://www.intmath.com/integration/5-trapezoidal-rule.php>

8.

About 960 bytes per second are being sent

The communication needs to be reduced to at most 2 integers because less than 10 char may be transmitted at the rate of 9600 baud and at 10 bits per character in a 10ms period. Due to this, comm payload must be reduced to, at most, 2 integers.

9.

The two functions used to provide integers are:

floatToInt((accel\_x\_direct), &d1\_ax, &d2\_ax, 4(;

and

floatToInt((displacement\_filter, &d1\_df, &d2\_df, 4);

10.

Video submitted with assignment

Units for the two variables are mm (displacement) and acceleration (mg)

Please look at voice over in video for direction of sensor