Read and Process data using loops

Lab 5

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Problem:

Problem 1 – In problem 1 we had to first connect an Esplora to the computer and run ./explore.exe –p COM? –t –a. This returned 4 columns of numbers with the first column returning time in milliseconds and the other columns returning acceleration on the x, y, and z axis. After compiling and running a separate test the problem ask us to modify CODE SECTION 0 so that seconds are displayed as a real number in an 8 character area with 3 decimal digits of precision. Each acceleration should also have a 7 character area with 4 digit precision.

Problem 2 – problem 2 asked us to modify CODE SECTION 1 to compute the magnitude of the acceleration using the variables ax, ay, and az.

Problem 3 – We had to write in CODE SECTION 2 to return time in a more readable format. This means changing time to minutes, seconds and milliseconds left over.

Problem 4 – The final problem asked us to write a code to interpret the current acceleration of the Esplora and return if the acceleration is increasing, decreasing, or constant. When constant, slight change in acceleration should not change from constant.

Analysis:

Problem 1 – In this problem we needed to know the conversion factor to change the time given to us in milliseconds to just seconds. For every 1 seconds there is 1000 milliseconds. Using this we could modify a variable to find just seconds.

Problem 2 – For problem 2, after defining ax, ay, and az, we could set up a formula for the magnitude of the acceleration and plug in the values of ax, ay, and az into the formula. The output would be the magnitude of the acceleration.

Problem 3 – Changing the time was a little different. For each conversion we needed to know the conversion factor in order for the correct time to be printed. To change it to minutes you divide the milliseconds by 60000. To get seconds you take the remainder of the minutes and divide that by 1000, and for the remaining milliseconds you just print the mod of the seconds.

Problem 4 – For the acceleration print, I had to first make some new variables to find an average. Finding the average allowed us to add a slight wiggle room for change without changing the speed from constant to speeding up or slowing down. Next I used if statements to compare the magnitude, found in problem 2, to the average to see if the Esplora is at a constant speed, increasing or decreasing.

Design:

Problem 1 – For this step I set seconds equal to the time (t) in milliseconds times 0.001. This converts the time to seconds. seconds is now in seconds and is printed as such.

Problem 2 – To calculate the magnitude I set up the formula for accl to equal:

accl = Sqrt((pow(ax,2))+(pow(ay,2))+(pow(az,2)));

This set accl to equal the magnitude given the pointed, ax, ay, and az.

Problem 3 – For minutes I set minutes equal to the time (t) divided by 60000. This set minutes equal to the number of minutes since the Esplora was plugged in. for seconds, I took the remainder of minutes, which is mod of t divided by 60000, divided by 1000. That set seconds to be in seconds. The mod of seconds would print the last few numbers in milliseconds.

Testing:

Comments: