FIR Filter Analysis for Accelerometer

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To perform an analysis on which configuration of FIR filter would be optimal for this application, we collected raw accelerometers angles already converted to pitch and roll. We filled a buffer of 1000 elements and imported the data in Matlab. I there, we applied and different filter settings to the data and graphed the output. These are the results we obtained:

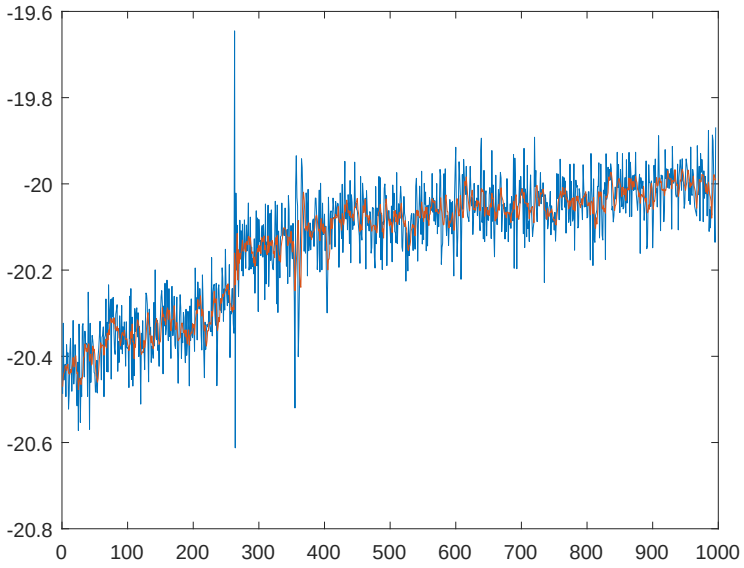

Figure 1: Comparison of raw data with size 5 moving average filter

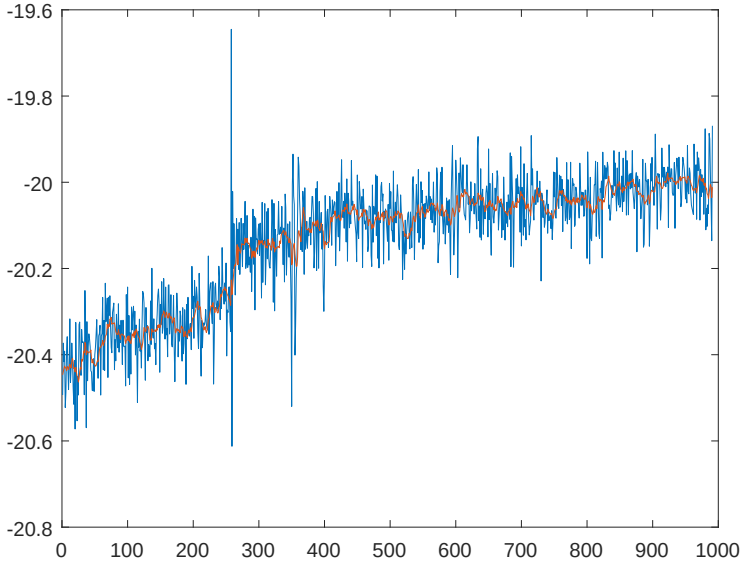

Figure 2: Comparison of raw data with size 10 moving average filter

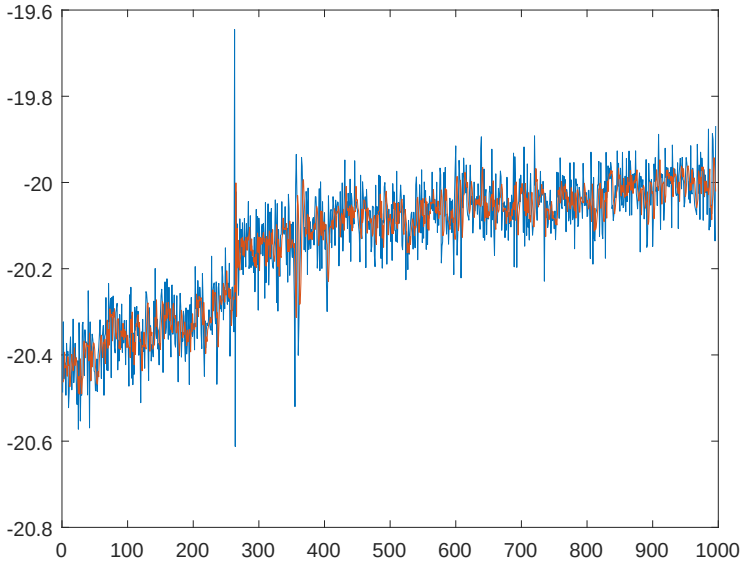

Figure 3: Comparison of raw data with size 5 weighted average filter

From the graphs above, we can see that the weighted average does a very poor job of filtering out the noise. When comparing the results obtained with the 5 and 10 wide window, we do not see a clear best result. The readings from the 10 wide filter are smoother, but there is a significant latency added. On the other hand, the 5 wide filter is faster to respond, but not that unstable.

For those reasons, we elected to use a moving average filter with a window size of 5 elements.