ECE 8540 Analysis of Tracking Systems

Lab 5 – Extended Kalman filter

In this lab, each student is to develop code to operate an extended Kalman filter. The code can be developed in Matlab, C, or any high level language. No graphics display is required, but plots of results are required. The lab should be done in 2 steps.

First, the data at www.cecas.clemson.edu/~ahoover/ece854/labs/sin-data.txt should be run through a sinusoid model (exactly like developed in class). Note that the data includes true state (first column) and measurements (second column). The filter should operate on the measurements only. The true state (simulated) is included so that you can compare your filter output against it. Show the filter result for three different ratios of dynamic noise to measurement noise. Discuss the differences between the outputs.

Second, the filter should then be applied to the signal of your choice. A good choice would be a process in a research problem you are currently working on. Another good choice would be some signal you can measure (e.g. temperature, or a bright spot in a camera image, or anything real you can set up). If you do not have any applicable data, you may also use simulated ballistic tracking data available at the class web site (forthcoming). The state variables, state transition equations and measurement equations will all be detailed soon. I want to see a graph plotting the measurements and estimated state. I also want to read a brief writeup describing the problem, the data source, and the tuning of the filter to get your results.

The lab due date is given at the class web site. You must submit your code (as an attachment) and report (as an attachment) to ece_assign@clemson.edu. Use as subject header ECE8540-1,#5. This email is due by midnight of the due date.