Homework #7 Kalman Filtering
(due Monday, Nov. 25, 2002)

Build the KALMAN.M in the Adaptive Signal Processing toolkit.

Experiments

1. Download the Kalman_Demo.m file shown in class from

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http://www.ece.nmsu.edu/~pdeleon/Teaching/EE594/Related_Links/
Kalman_Demo.m
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(a) (Measurement noise effects) Plot the MSE of Kalman demo for $\sigma_v^2 = 10^3$, $\sigma_v^2 = 10^4$, and $\sigma_v^2 = 10^5$. Use at least 100 runs. Comment.

(b) (Initialization effects) Construct a simple experiment (using the supplied code) to demonstrate that the Kalman filter is not sensitive to the initial state estimates, $\hat{\mathbf{x}}_x(0|0)$ and $\hat{\mathbf{x}}_y(0|0)$. Comment

(c) (Non-stationary effects) In the Kalman demo, we assumed the clown (projectile) was only accelerating in the y-direction, i.e. acceleration due to gravity. Obviously clowns with jetpacks positively accelerate in both directions for at least some period of time. Modify the code to allow the clown to accelerate (any amount you want) in both the x- and y-directions for a brief period of time (any duration you want) followed by zero acceleration in the x-direction and –9.8 m/s^2 in the y-direction. Describe your experiment and provide all relevant figures.