

# ECE 5283: Kalman Filtering

## Project 2

Fall 2005

Dr. Havlicek

Point your web browser to the URL `hotnsour.ou.edu/chuong` to obtain the file `longcoast.MOV`. This is an aerial video clip of a bicycle race as shot from a helicopter. Use Kalman filters to develop a multiple target tracking system for processing this video sequence. This includes:

- Develop signal processing to detect the targets and extract their centroids.
- Characterize the target motions and develop state space target models. Within the Kalman filtering framework, design appropriate and realistic covariance structures for the plant and measurement noises.
- Design and implement Kalman filters for tracking the targets.
- Your implementation must address practical issues including track initialization, track gating and association, coasting, track crossings, and merges.

Produce an instrumented version of the video clip that uses color to show your track products overlaid onto the original clip. This should look something like the “heads up display” (HUD) of an advanced tactical fighter aircraft. The track products you should display include the track gates, filtered centroids, and predicted velocity vectors. You may wish to implement more than one mode of operation. For example, there could be a second mode that displays products for only one track, but that traces out the track history (all past values of the filtered centroid are displayed; as time advances this traces out the target trajectory in image coordinates).

### Turn In:

1. A brief written report that explains your solution. Do not include source code. This should be 20 pages or less.
2. A CDROM containing all source code as well as executable or Matlab files that demonstrate your solution.
3. Each group will be expected to present and demonstrate their solution to the class on December 6.

**DUE: 12/6/05**