

# *MAE Graduate Studies Seminar Series*

## Opportunities with AFRL & Estimation with Multi-Temporal Measurements

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US Air Force Research Laboratory

### **Opportunities with the Air Force Research Laboratory (AFRL)**

The AFRL Space Scholar Program provides an opportunity for graduate and undergraduate students to spend a summer working on cutting edge spacecraft research for one of many government engineers. If a system or component is on a spacecraft, there is likely someone performing research on it. Topics cover disciplines of aerospace, mechanical, electrical and computer engineering. There are opportunities in Albuquerque NM and Boston MA with the Space Vehicles and Directed Energy Directorates. For additional information, visit the website: <http://www.vs.afrl.af.mil/SpaceScholars>

The National Research Council Post-Doctoral Program provides opportunities for students graduating with a PhD to work at one of 32 different government research labs including AFRL, Naval Postgraduate School and the Army Research Laboratory. Tenures are 1-3 years depending on interest of the post-doc and the participating agency. Research covers a wide range of engineering topics. For additional information, visit the website: <http://www7.nationalacademies.org/rap>

### **Estimation with Multi-Temporal Measurements**

Consider a simple laser rangefinder. It uses the speed of light and time of flight of a light pulse to compute a range between two objects. When a filter processes these measurements, it creates an estimate based on current information. Mathematically, this isn't correct. The existence of a non-zero time-of-flight means that the estimate should be based on information from two different times: the time that the signal is sent, and the time that the signal is received. This scenario is what results in a multi-temporal measurement. Now consider a situation where two satellites receive a ranging signal from each other at the same time instant. Due to the motion involved, the signals won't have been sent at the same time. This means that these two measurements contain state

information from three time instances. The problems here are that the times of these past states are a function of the states themselves, and each set of position states shows up in the measurement set at more than one time instant. Standard estimation algorithms aren't designed to process multi-temporal measurements. This research looks to develop new algorithms that can.

## **Biography**

Dr. Adam Fosbury received his PhD from the University at Buffalo in 2006. He spent one year as a National Research Council Post-Doctoral fellow with the Space Vehicles Directorate of the Air Force Research Laboratory before transitioning to a full-time civilian position. His primary work involves spacecraft estimation and control for the Responsive Space Program, where the goal is to have a seven day mission-conception-to-launch timeline. Other research interests include system identification, path planning, nonlinear estimation and data fusion.

**110 Knox Hall  
Thursday, January 15th, 2009  
3:30 pm - 4:30 pm**

**Please contact Dr. Puneet Singla at [psingla@eng.buffalo.edu](mailto:psingla@eng.buffalo.edu)  
for more information or to request a meeting with  
Dr. Fosbury.**