Aerospace Seminar

Group Leader of the Navigation and Sensor Fusion Group at Draper Laboratory

Multiple Hypothesis Navigation

Friday, Nov. 30, 2018 | DLC | 12:00 P.M.

Abstract: The Global Positioning System (GPS) has been the dominant navigation source for over two decades. However, there have recently been multiple incidents that demonstrate the need for alternative approaches. Most alternative approaches lack the certainty and reliability that GPS once provided. This talk will cover a new approach for navigation under uncertain circumstances using a multiple hypothesis formulation. This formulation provides a means to navigation in cases where there is significant uncertainty in the validity or source of the measurements. The multiple hypothesis approach is demonstrated on two problems: 1) celestial navigation for ships and 2) visual navigation in a forest. In both cases the multiple hypothesis approach is used to determine an initial position with limited prior position information. The two problems demonstrate the approach for positioning but the extension to navigation is straightforward. The work being presented in this talk was part of Pat O'Shea's Master's thesis while he was a Draper Fellow and the Draper Fellow program has recently been expanded to include CU Boulder.

Bio: Dr. William Whitacre is a Principal Member of the Technical Staff and Group Leader of the Navigation and Sensor Fusion Group at Draper. His research interests include multi-target tracking, decentralized data fusion, and celestial navigation. Before joining Draper, Dr. Whitacre was an Engineering Systems Architect in the Advanced Concepts and Technologies Division of Northrop Grumman Electronic Systems. While there, he led a multi-year internally funded R&D project to create new sensor optimization and resource management approaches for distributed intelligence, surveillance, and reconnaissance applications; developed state-of-the-art multi-sensor, multi-target tracking algorithms to fuse data from networked radar sensors, infrared sensors, and electronic warfare sensors. He earned a PhD from Cornell University with his research on cooperative geolocation using UAVs with gimballing camera sensors. During his PhD research, Dr. Whitacre worked with Insitu Inc. to implement a square root sigma point information filter for cooperative vision based geolocation of a moving ground target using the ScanEagle UAV. He is a member of AIAA and serves on the Guidance Navigation and Control Technical Committee. He also serves as the Technical Area Chair for the SciTech Conference in the area of Novel Navigation, Estimation, and Tracking Methods.