



**The Center for Control, Dynamical Systems, and Computation
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Presents**

Networked Directional Sensors for Object Tracking

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Abstract:

Sensor networks are networks formed by small and inexpensive sensors with wireless communication capability. They can be deployed in large numbers to perform tasks such as collecting environmental data, monitoring air or water quality, for surveillance applications, etc. Surveillance applications require detecting, classifying, and tracking objects or phenomena.

We explore the application of directional sensors in a wireless sensor network to track objects moving at constant velocity. We model the field of vision of each directional sensor as a line, and the measured data are the times at which sensors detect objects crossing their lines. The network is initially deployed by scattering nodes, and the locations and directions in which the sensor point are also unknown a priori, in addition to the trajectories of the objects.

The estimation problem involves the solution of a highly non-convex optimization problem. However we develop a novel three phase algorithm to solve the problem. It first chooses a coordinate basis adapted to the motions of the first two objects, then localizes the sensors with respect to that basis, then refines it as new objects arrive, and finally transforms the basis if the GPS positions of six of the deployed nodes are known.

About the Speaker:

Kurt Plarre received the degree of Electronics Engineer from Universidad Tecnica Federico Santa Maria, Chile in 1996. He received the M.S. and PhD degrees in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 2001 and 2006, respectively. In 2005 he obtained the M.S. degree in Mathematics from the same university. He is currently a Postdoctoral Research Associate in the Mechanical Engineering Department, University of California at Santa Barbara, where he works with Professor Francesco Bullo. His research interests are in decentralized estimation and Kalman filtering in robot teams and sensor networks, sensor selection, and the convergence of control, communication, and computing.
