



The Institute for Pure and Applied Mathematics,
University of California, Los Angeles presents

Mathematical Challenges and Opportunities in Sensor Networking

January 8-12, 2007

Organizing Committee: Richard Baraniuk (Rice University, Electrical and Computer Engineering), Mark Hansen (UCLA, Department of Statistics), Robert Nowak (University of Wisconsin-Madison, Electrical and Computer Engineering)

Scientific Overview:

Sensor networking is an emerging technology that promises an unprecedented ability to monitor our world via spatially distributed networks of sensor nodes. The nodes may sense the physical environment in a variety of modalities, including acoustic, seismic, thermal, and infrared, or may be deployed throughout engineered systems such as the Internet for the purposes of monitoring or surveillance. A wide range of applications of sensor networks have been envisioned, including environmental monitoring, homeland security, and medical diagnostics. While the practically unlimited range of applications of sensor networks is quite evident, our current understanding of their design and management is far from complete. Since sensor networks collect data in a spatially distributed fashion, data analysis problems in sensor networks present a distinct new challenge. In addition to all the common issues associated with data analysis and modeling, limited energy and/or bandwidth resources place a very high cost on the sharing and fusing data within the network. Consequently, new theories and methods for data analysis, modeling, and communication will play a central role in the development of this exciting new field.

There will be two explicit goals of the IPAM workshop. The first goal is to introduce sensor networking to mathematicians and scientists who work in the related areas but are not currently involved in the field. The nascent research community in sensor networking has already drawn heavily on a variety of mathematical theories and techniques originating from areas such as signal processing, statistics, stochastic modeling, machine learning, and computer science, and we anticipate that the future directions and successes in this field will be largely shaped by a healthy and vibrant interdisciplinary approach to the research. The second goal is to outline future directions for the mathematical and statistical development in the theory and methods employed in sensor networking. Since sensor networking is still a very new field, with only a handful of fielded systems in existence, now is an ideal time to attract mathematical experts from all areas to shape and contribute to the future of this unique application domain. IPAM is uniquely positioned to host this workshop due to its tradition of bringing together mathematicians and technologists, and especially due to the presence of the Center for Embedded Networked Systems (CENS) at UCLA, which is one of the premier sensor networking research groups in the world.

Confirmed Speakers:

Nigel Boston (University of S.Carolina), Jim Clark (Duke), Mark Coates (McGill), Hugh Durrant-Whyte (University of Sydney), Michelle Effros (CalTech), John Fisher (MIT), Michael Gastpar (UC Berkeley), Alan Gelfand (Duke University), Mark Hansen (UCLA), Tom Harmon (UC Merced), Alfred Hero (University of Michigan), P. R. Kumar (University of Illinois Champaign-Urbana), Mingyan Liu (Michigan), Zhi-Quan Luo (University of Minnesota), Upamanyu Madhow (UC Santa Barbara), Barbara Minsker (University of Illinois Champaign-Urbana), Urbashi Mitra (USC), Randolph Moses (Ohio State University), Jose Moura (CMU), Richard Murray (California Institute of Technology), Robert Nowak (University of Wisconsin-Madison), Greg Pottie (UCLA), Kannan Ramchandran (UC Berkeley), Venkatesh Saligrama (Boston University), Akhbart Sayeed (University of Wisconsin-Madison), Anna Scaglione (Cornell), Sergio Servetto (Cornell), Mani Srivastava (UCLA), John Stankovic (University of Virginia), Venu Veeravalli (University of Illinois – Urbana Champaign), Lin Xiao (Microsoft Research), Bin Yu (UC Berkeley)

Participation:

Applications for financial support are due November 27, 2006. For the fullest consideration we urge you to apply as early as possible. Successful applicants will be notified as soon as funding decisions are made. Others may register online.

We have funding to support the attendance of recent PhD's, Graduate students, and researchers in the early stages of their career. Mathematicians and scientists at all levels who would like to learn more about this area are encouraged to apply for funding. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission and we welcome their applications.

For more information: www.ipam.ucla.edu/programs/sn2007

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