Deborah Estrin

Embedded Networked Sensing systems are an exciting and important class of computing systems that combine distributed sensing, computation, and (often wireless) communication. They are attracting increasing attention from researchers in computer science and engineering. Much of the importance and excitement surrounding this research agenda stems from the vast potential for embedding computation and communication everywhere, in commercial and national infrastructure applications from contaminant flow monitoring, to biocomplexity mapping, to homeland defense. However the importance of the research area is not based solely on the importance of the applications; research in this space will drive the development of truly self-configuring, autonomous, distributed systems technology. Example research challenges include:

· How do we program/task collections of 1000s of low-power, wireless, physically-embedded, nodes to carry out autonomous tasks without global state or control (e.g., identify patterns of interest such as isotherms or steep gradients, and report specific observations from those regions).

· How do we exploit constrained actuation/mobility to build physically-self configuring (or repairing) systems (e.g., robots augment or modify physical node placement to achieve better multhop coverage; or recharge system energy)

· How do we exploit the spatial diversity afforded by small form factor embeddable sensing to make previously intractable problems such as multi-target tracking, tractable

· What are the critical densities for such systems and how can we exploit redundancy (high density) to achieve quantifiable improvements in reliability and security.

These are just some of the research challenges posed by this fascinating new area.

http://lecs.cs.ucla.edu/estrin

Estrin Biography

Professor Deborah Estrin is a Professor of Computer Science at UCLA. She received her Ph.D. (1985) in Computer Science from the Massachusetts Institute of Technology, her M.S. (1982) from M.I.T. and her B.S. (1980) from U.C. Berkeley. She was a member of the University of Southern California Computer Science Department from 1986 through the mid-2000. She is also a member of the Computer Networks Division at the USC Information Sciences Institute.

In 1987, Professor Estrin received the National Science Foundation, Presidential Young Investigator Award for her research in network interconnection and security. During the subsequent 10 years much of her research focused on the design of network and routing protocols for very large, global, networks, such as: scalable multicast routing and transport protocols, self-configuring protocol mechanisms for scalability and robustness, and tools and methods for designing and studying large scale networks.

More recently, Professor Estrin has been collaborating with her colleagues and students at UCLA and USC/ISI to develop protocols and systems architectures needed to realize rapidly-deployable and robustly-operating networks of many thousands of physically-embedded devices, e.g., sensor networks. She is particularly interested in the application of spatially and temporally dense embedded sensors to environmental monitoring.

Professor Estrin is a co-PI on the DARPA funded SCADDS, SAMAN, and SCAN projects, and the NSF funded SCOWR project. She was previously PI on The VINT (Virtual Internet Testbed), NSF Routing Arbiter, and RSVP-II projects at ISI. She was an active participant in the Inter-Domain Multicast Routing WG and End-to-end research group and a member and study-chair for DARPA's ISAT advisory board. She recently chaired an NRC study on Networked Embedded Computing, resulting in the report Embedded, Everywhere: A Research Agenda for Networked Systems of Embedded Computers NRC/CSTB Report.

Professor Estrin is a fellow of the ACM and AAAS and a Senior member of the IEEE. She has served on numerous panels for the NSF, National Academy of Sciences/NRC, DARPA, and Office of Technology Assessment. She has also served as an editor for the ACM/IEEE Transactions on Networks, and as a program committee member for many networking related conferences, including Sigcomm, Mobicom, Infocom, SOSP, and OSDI.

Selected Publications in the area:

*   An Energy-Efficient MAC Protocol for Wireless Sensor Networks
Wei Ye, John Heidemann and Deborah Estrin
In Proceedings of the 21st International Annual Joint Conference of the IEEE
Computer and Communications Societies (INFOCOM 2002), New York, NY,
USA, June, 2002.

*   ASCENT: Adaptive Self-Configuring Sensor Networks Topologies
Alberto Cerpa and Deborah Estrin
In Proceedings of the Twenty First International Annual Joint Conference of
the IEEE Computer and Communications Societies (INFOCOM 2002), New
York, NY, USA, June 23-27 2002.

*   Robust range estimation using acoustic and multimodal sensing
Lewis Girod and Deborah Estrin
In Proceedings of the IEEE/RSJ International Conference on Intelligent
Robots and Systems (IROS 2001), Maui, Hawaii, October 2001.

*   Building efficient wireless sensor networks with low-level naming
John Heidemann, Fabio Silva, Chalermak Intanagonwiwat, Ramesh Govindan,
Deborah Estrin and Deepak Ganesan.
In Proceedings of the Symposium on Operating Systems Principles (SOSP
2001). Lake Louise, Banff, Canada. October 2001.

*   Geography-informed Energy Conservation for Ad-hoc Routing
Ya Xu, John Heidemann, Deborah Estrin,
In Proceedings of the Seventh Annual ACM/IEEE International Conference on
Mobile Computing and Networking (ACM MobiCom), Rome, Italy, July 16-21,
2001.

*   Habitat monitoring: Application driver for wireless communications
technology
Alberto Cerpa, Jeremy Elson, Deborah Estrin, Lewis Girod, Michael Hamilton
and Jerry Zhao
2001 ACM SIGCOMM Workshop on Data Communications in Latin America and
the Caribbean, Costa Rica, April 2001.

* SCalable Object-tracking through Unattended Techniques (SCOUT)
Satish Kumar, Cengiz Alaettinoglu and Deborah Estrin
In Proceedings of the 8th International Conference on Network
Protocols(ICNP), Osaka, Japan, November 2000.

*   Directed Diffusion: A Scalable and Robust Communication Paradigm for
Sensor Networks

Chalermek Intanagonwiwat, Ramesh Govindan and Deborah Estrin
In Proceedings of the Sixth Annual International Conference on Mobile
Computing and Networks (MobiCOM 2000), August 2000, Boston,
Massachusetts.

*   Next Century Challenges: Scalable Coordination in Sensor Networks
Deborah Estrin, Ramesh Govindan, John Heidemann and Satish Kumar
In Proceedings of the Fifth Annual International Conference on Mobile
Computing and Networks (MobiCOM '99), August 1999, Seattle, Washington.