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ACM COUNCIL ON WOMEN HONORS LEADER IN RELIABILITY OF COMPUTER SYSTEMS

MIT's Lynch Named "Athena Lecturer" for Advances in Distributed Systems that Enable Dependable Internet and Wireless Network Applications

NEW YORK, April 18, 2012 – The Association for Computing Machinery's Council on Women in Computing (ACM-W) **http://women.acm.org** today named Nancy Lynch of the Massachusetts Institute of Technology as the 2012-2013 Athena Lecturer. She developed mathematical approaches to understanding the capabilities of distributed systems, which rely on multiple processors for computation and coordination. These systems include traditional wired networks, modern mobile communications, cloud computing systems, parallel computers, and embedded computers in factory machinery. Her contributions include modeling and proof techniques, algorithms, and impossibility results that are now in the toolbox of computer scientists who design distributed systems. The Athena Lecturer award celebrates women researchers who have made fundamental contributions to computer science. It includes a $10,000 honorarium provided by Google Inc. **http://women.acm.org/participate/awards/athena_announcement.cfm**

"Lynch's work has influenced both theoreticians and practitioners," said Mary Jane Irwin, who heads the ACM-W Athena Lecturer award committee. "Her ability to formulate many of the core problems of the field in clear and precise ways has provided a foundation that allows computer system designers to find ways to work around the limitations she verified, and to solve problems with high probability."

In a career spanning more than 30 years, Lynch identified the boundaries between what is possible and provably impossible to solve in distributed settings. She developed new distributed algorithms, created precise models for analyzing distributed algorithms and systems, and discovered limitations on what distributed algorithms can accomplish.

Lynch's breakthrough research with M.J. Fischer and M.S. Paterson produced the "FLP" result. It defined as a mathematical problem the challenge of establishing agreement in asynchronous distributed

systems (i.e. those with no timing assumptions) in the presence of failures. This innovation had a major impact on the design of fault-tolerant distributed data-management systems and communication systems.

Lynch's textbook, *Distributed Algorithms,* is the definitive reference on the basics of the field. It introduces readers to the fundamental issues underlying the design of distributed systems, including communication, coordination, synchronization, and uncertainty. It integrates the results of distributed algorithms research using a common mathematical framework.

Recent Work

In collaboration with A. Shvartsman and S. Gilbert, Lynch developed the RAMBO (Reconfigurable Atomic Memory for Basic Objects) algorithm, which maintains shared memory in rapidly-changing networks that cannot assure access to a central server for data storage. It was originally envisioned for military applications as a means to preserve vital information for teams of soldiers operating in hostile environments. It also has applications for first responders where a stable infrastructure is not available.

In another recent project, Lynch and her collaborators proposed a new approach to programming mobile networks used for communication and for control of robots, cars, and airplanes. It employs a new algorithm that allows actual mobile nodes to emulate some stationary Virtual Nodes, making the programming of mobile networks much easier. This emulation algorithm replicates the state of a Virtual Node at nearby mobile nodes, and enables the replicas to be transferred to different mobile nodes.

Background

Lynch is the NEC Professor of Software Science and Engineering at MIT. She heads the Theory of Distributed Systems Group at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL). Prior to joining MIT, she served on the faculty at Tufts University, the University of Southern California, Florida International University, and the Georgia Institute of Technology. A graduate of Brooklyn College with a B.S. in Mathematics, Lynch received a Ph.D. in Mathematics from MIT.

An ACM Fellow and a member of the National Academy of Engineering, Lynch and her co-authors received the 2001 and the 2007 Dijkstra Prizes in Distributed Computing. She was the first woman to win the ACM Knuth Prize, also in 2007. She was a co-winner of the first van Wijngaarden Prize in 2006 from the National Institute for Research in Mathematics and Computer Science in The

Netherlands. In 2010, she received the Emanuel R. Piore Award from the Institute for Electrical and Electronics Engineers.

The Athena Lecturer is invited to present a lecture at an ACM event. Lynch's lecture will be delivered at the 2013 joint meeting of the Symposium on Principles of Distributed Computing (PODC) and the Symposium on Parallel Algorithms and Architectures (SPAA). PODC is sponsored by the ACM Special Interest Group on Operating Systems (SIGOPS) and the ACM Special Interest Group on Algorithms and Computation Theory (SIGACT). SPAA is sponsored by SIGACT and the ACM Special Interest Group on Computer Architecture (SIGARCH). Each year, the Athena Lecturer honors a preeminent woman computer scientist. Athena is the Greek goddess of wisdom; with her knowledge and sense of purpose, she epitomizes the strength, determination, and intelligence of the "Athena Lecturers." The 2012-2013 Athena Lecturer award will be presented at the ACM Annual Awards Banquet, June 16, in San Francisco, CA.

More information on this award on the ACM Awards site:

http://awards.acm.org/homepage.cfm?srt=all&awd=166.

About ACM
ACM, the Association for Computing Machinery **www.acm.org,** is the world's largest educational and scientific computing society, uniting computing educators, researchers and professionals to inspire dialogue, share resources and address the field's challenges. ACM strengthens the computing profession's collective voice through strong leadership, promotion of the highest standards, and recognition of technical excellence. ACM supports the professional growth of its members by providing opportunities for life-long learning, career development, and professional networking.

About ACM-W
ACM-W is the ACM Council on Women in Computing **http://women.acm.org**. It celebrates, informs and supports women in computing, and works with the ACM-W community of computer scientists, educators, employers and policy makers to improve working and learning environments for women.

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