



Issues and Approaches to Management and Application of Sensor Networks

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Monday, August 15, 2005; 05:00 PM Presentation (Refreshments provided after the presentation's Question and Answer session)

Rochester Institute of Technology, **Golisano Building's First Floor Auditorium (70-1400)**

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Abstract

Under the auspices of DARPA, NSF, ONR and industry, we have been developing middleware for securely managing sensor networks for environment monitoring. This talk will begin with the generic aspects of sensors networks, and then describe details of our current research that covers adaptive query processing (AQP), minimum-cost routing, and security. Sensor networks, built with thousands of small and smart sensor nodes, may be deployed for various applications, which usually require a certain pre-specified network lifetime. I will first describe a hierarchical architecture for query processing in such sensor networks, and then focus on energy-aware adaptive query processing. Especially, I will present (1) a cost-based query allocation algorithm that minimizes the total power consumption by maximizing cost sharing among different queries; and (2) an energy-aware Quality-of-Service (QoS) adaptation algorithm that gracefully makes tradeoff between total power consumption and total QoS of all queries when node availability or workload changes. Among many others, efficient routing between sensor nodes and protection sensor nodes and information exchanged between them are essential to support applications like AQP. Hence, the second part of my talk will deal with these two issues.

Speaker Biography

Dr. Kang G. Shin is the Kevin and Nancy O'Connor Professor of Computer Science and Founding Director of the Real-Time Computing Laboratory in the Department of Electrical Engineering and Computer Science, The University of Michigan, Ann Arbor, Michigan. His current research focuses on QoS-sensitive networking and computing as well as on embedded real-time OS, middleware and applications, all with emphasis on timeliness and dependability. He has supervised the completion of 46 Ph.D. theses, and authored/coauthored over 500 technical papers and numerous book chapters in the areas of distributed real-time computing and control, computer networking, fault-tolerant computing, and intelligent manufacturing. He has co-authored (jointly with C. M. Krishna) a textbook "Real-Time Systems," McGraw Hill, 1997.

He has received a number of best paper awards, including the IEEE Communications Society William R. Bennett Prize Paper Award in 2003, the Best Paper Award from the IW QoS '03, and an Outstanding IEEE Transactions of Automatic Control Paper Award in 1987. He has also coauthored papers with his students which received the Best Student Paper Awards from the 1996 IEEE Real-Time Technology and Application Symposium, and the 2000 UNSENIX Technical Conference. He has also received several institutional awards, including the Research Excellence Award in 1989, Outstanding Achievement Award in 1999, Service Excellence Award in 2000, and Distinguished Faculty Achievement Award in 2001 from The University of Michigan; and a Distinguished Alumni Award of the College of Engineering, Seoul National University in 2002.

He received the B.S. degree in Electronics Engineering from Seoul National University, Seoul, Korea in 1970 and both the M.S. and Ph.D. degrees in Electrical Engineering from Cornell University, Ithaca, New York in 1976 and 1978, respectively. From 1978 to 1982 he was on the faculty of Rensselaer Polytechnic Institute, Troy, New York. He has held visiting positions at the U.S. Air Force Flight Dynamics Laboratory, AT&T Bell Laboratories, Computer Science Division within the Department of Electrical Engineering and Computer Science at UC Berkeley, and International Computer Science Institute, Berkeley, CA, IBM T. J. Watson Research Center, Software Engineering Institute at Carnegie Mellon University, and HP Research Laboratories. He also chaired the Computer Science and Engineering Division, EECS Department, The University of Michigan for three years beginning January 1991.

He is Fellow of IEEE and ACM, and member of the Korean Academy of Engineering, was the General Chair of the 2000 IEEE Real-Time Technology and Applications Symposium, the Program Chair of the 1986 IEEE Real-Time Systems Symposium (RTSS), the General Chair of the 1987 RTSS, the Guest Editor of the 1987 August

special issue of IEEE Transactions on Computers on Real-Time Systems, a Program Co-Chair for the 1992 International Conference on Parallel Processing, and served numerous technical program committees. He also chaired the IEEE Technical Committee on Real-Time Systems during 1991-93, was a Distinguished Visitor of the Computer Society of the IEEE, an Editor of IEEE Trans. on Parallel and Distributed Computing, and an Area Editor of International Journal of Time-Critical Computing Systems, Computer Networks, and ACM Transactions on Embedded Systems.

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