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THE DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE, CS DIVISION

Presents the Fall 2013 EECS Seminar Series

Dr. Habib M. Ammari

University of Michigan-Dearborn

"Mobility-Assisted k-Coverage and Geographic Forwarding in Sparse Heterogeneous Wireless Sensor Networks"

Thursday, October 3, 2013 • 11:30 a.m. • HEC 450

Wireless sensor networks can be used in a wide variety of civilian, environmental, natural, and military applications, such as health monitoring, environmental monitoring, seism monitoring, and battlefields surveillance, respectively. One of the fundamental tasks in the development of wireless sensor networks is coverage, which measures the network effectiveness and accuracy in event detection. Most existing studies on coverage focus on homogeneous and static wireless sensor networks, where the sensors have the same features, such as sensing range, communication range, and energy. In this talk, we consider sensor heterogeneity and mobility, which provide a more realistic view of the network design for real-world sensing applications. Specifically, we address the joint problem of mobile k-coverage and geographic forwarding in heterogeneous wireless sensor networks, where each point in a field of interest is covered by at least k active heterogeneous sensors. First, we exploit Helly's Theorem as well as certain geometric properties to solve the k-coverage problem. Second, we introduce our four-tier architecture to ensure on-demand k-coverage of a region of interest in a field using sensor mobility. Third, we suggest a geographic forwarding protocol based on the concept of mobile proxy sink, which helps build a forwarding chain between the source sensors and the sink. To this end, we determine the minimum transmission distance between pairs of consecutive mobile proxy sinks forming the forwarding chain. Also, we compute the optimum number of mobile proxy sinks in this chain. We corroborate our analysis with simulation results.

Biography

Habib M. Ammari is an Associate Professor and the Founding Director of Wireless Sensor and Mobile Ad-hoc Networks (WiSeMAN) Research Lab, in the Department of Computer and Information Science at the University of Michigan-Dearborn, since September 2011. He obtained his second Ph.D. degree in Computer Science and Engineering from the University of Texas at Arlington, in May 2008, and his first Ph.D. in Computer Science from the Faculty of Sciences of Tunis, in December 1996. He published his first Springer book "Challenges and Opportunities of Connected k-Covered Wireless Sensor Networks: From Sensor Deployment to Data Gathering," in August 2009. His two new books, "The Art of Wireless Sensor Networks: Fundamentals" and "The Art of Wireless Sensor Networks: Advanced Topics and Applications" will be published by Springer in October 2013. He received several prestigious awards, including the Certificate of Appreciation Award at IEEE DCoSS 2013 and ACM MobiCom 2011, the Outstanding Leadership Award at IEEE ICCCN 2011, the Best Symposium Award at IEEE IWCMC 2011, the Lawrence A. Stessin Prize for Outstanding Scholarly Publication from Hofstra University in May 2010, the Faculty Research and Development Grant Award from Hofstra College of Liberal Arts and Sciences in May 2009, the Best Paper Award at EWSN in 2008, and the Best Paper Award at IEEE PerCom 2008 Google Ph.D. Forum. He is the recipient of the Nortel Outstanding CSE Doctoral Dissertation Award in February 2009, and the John Steven Schuchman Award for 2006-2007 Outstanding Research by a PhD Student in February 2008. He received a three-year National Science Foundation (NSF) Research Grant Award, in June 2009, and the NSF CAREER Award, in January 2011. He serves as Associate Editor of several international journals, including ACM TOSN, IEEE TC, and Elsevier PMC. Also, he has served as Program Chair of numerous IEEE and ACM conferences, symposia, and workshops.

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