

Cyber-physical systems: linking sensing, networking, computation, and people

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Cyber-physical systems integrate sensing, networking, and computation to observe, understand, predict and respond to phenomena in both technological and naturally-occurring systems. We begin this talk with a broad discussion of such cyber-physical systems. As a case study, we then “dive deep” into the CASA (Collaborative Adaptive Sensing of the Atmosphere) project - an NSF Engineering Research Center investigating the design and implementation of a dense network of low-power meteorological radars whose goal is to collaboratively and adaptively sense, understand, predict and respond to hazardous weather occurring in the lowest few kilometers of the earth's atmosphere. We describe its computing and networking challenges, overview the software/network architecture and testbed implementations, and our experiences in using user-specified preferences to drive the optimization of the network's sensing behavior. In the second part of the talk, we consider sense-and-response control loops in smart grids, and their control plane requirements. Throughout the talk, we'll discuss a number of interesting on-going and open research issues, both in CASA and in the larger context of cyber-physical systems, including smart grids.

Speaker Bio:

Jim Kurose received a B.A. degree in physics from Wesleyan University and his Ph.D. degree in computer science from Columbia University. He is currently Executive Associate Dean of the College of Natural Sciences and Distinguished Professor of Computer Science at the University of Massachusetts. Professor Kurose has been a Visiting Scientist at IBM Research, INRIA, Institut EURECOM, the University of Paris, LIP6, and Thomson Research Labs. He is a member of the CRA Board of Directors and the NSF CISE Advisory Council.

His research interests include network protocols and architecture, network measurement, sensor networks, multimedia communication, and modeling and performance evaluation. Dr. Kurose has served as Editor-in-Chief of the *IEEE Transactions on Communications* and was the founding Editor-in-Chief of the *IEEE/ACM Transactions on Networking*. He has been active in the program committees for IEEE Infocom, ACM SIGCOMM, and ACM SIGMETRICS conferences for a number of years, and has served as Technical Program Co-Chair for these conferences. He has won several conference best paper awards and received the ACM Sigcomm Test of Time Award. He has also received a number of teaching awards including the IEEE Taylor Booth Education Medal. He is a Fellow of the IEEE and the ACM. With Keith Ross, he is the co-author of the textbook, *Computer Networking, a top down approach* (5th edition) published by Addison-Wesley Longman.