

Illinois Center for Wireless Systems

ICWS Seminar Series



Bringing the Network Into the Loop

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141 Coordinated Science Laboratory

Sensor networks provide a fertile ground for information theorists to go looking for good problems to think about. Some of those problems, like relay channels, or distributed compression, are old and well known; the sensor networking application has led to renewed interest in them. Others are not so old, and less well known. In this talk, I will discuss some work we are doing in my group on problems of the latter kind.

My talk is organized as follows. I will first argue that for an important class of distributed sensing/control applications, the signals observed/controlled by the network are best modeled as solutions of a wave PDE, instead of the classical bandlimited model pervasive in signal processing. Then, I will formulate a new source coding problem, distributed compression of spatial waves. I will present solutions to two distributed DSP problems that come up in the study of coding strategies for our problem: reconstruction of the waves themselves out of measurements collected at a finite number of locations in space, as well as of the corresponding polyhedral spatial domains containing those waves. I will conclude with some general remarks about the class of "Network-in-the-Loop" problems, an abstraction that we believe captures the essence of an important class of systems we would like to be able to construct.

Most of this talk is based on joint work with Joseph M. Rosenblatt (UIUC/Math); parts of it are also joint work with Mingbo Zhao (Cornell/ECE) and Georgios N. Lilis (Cornell/ECE).

Prof. Sergio Servetto was born in Argentina, on January 18, 1968. He received a Licenciatura en Informática from Universidad Nacional de La Plata (UNLP, Argentina) in 1992, and the M.Sc. degree in Electrical Engineering and the Ph.D. degree in Computer Science from the University of Illinois at Urbana-Champaign (UIUC), in 1996 and 1999. Between 1999 and 2001, he worked at the École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland. Since Fall 2001, he has been an Assistant Professor in the School of Electrical and Computer Engineering at Cornell University, and a member of the fields of Applied Mathematics and Computer Science. He was the recipient of the 1998 Ray Ozzie Fellowship, given to "outstanding graduate students in Computer Science," and of the 1999 David J. Kuck Outstanding Thesis Award, for the best doctoral dissertation of the year, both from the Dept. of Computer Science at UIUC. He was also the recipient of a 2003 NSF CAREER Award. His research interests are centered around information theoretic aspects of networked systems, with a current emphasis on problems that arise in the context of large-scale sensor networks.