Electrical & Computer ENGINEERING

SEMINAR

DISTINGUISHED LECTURE

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JEHOSHUA BRUCK

PROFESSOR
CALTECH

Jehoshua (Shuki) Bruck is the Gordon and Betty Moore Professor of Computation and Neural Systems and Electrical Engineering at the California Institute of Technology. His research combines work on the design of distributed information systems and the theoretical study of biological circuits and systems.

Dr. Bruck founded the Information Science and Technology (IST) program at Caltech and served as its first director. IST is the first integrated research and teaching activity in the country that investigates information from all angles: from the fundamental theoretical underpinnings of information to the science and engineering of novel information substrates, biological circuits, and complex social systems

He received the B.Sc. and M.Sc. degrees in electrical engineering from the Technion, Israel Institute of Technology, in 1982 and 1985, respectively and the Ph.D. degree in Electrical Engineering from Stanford University in 1989.
Dr. Bruck has an extensive industrial experience, including working with IBM Research where he participated in the design and implementation of the first IBM parallel computer. He was a co-founder and chairman of Rainfinity, a spin-off company from Caltech that focused on software products for management of network information storage systems.

He is an IEEE fellow, and his awards include the National Science Foundation Young Investigator award and the Sloan fellowship. He published more than 200 journal and conference papers and he holds 26 US patents. His papers were recognized in journals and conferences, including, winning the 2005 S. A. Schelkunoff Transactions prize paper award from the IEEE Antennas and Propagation society and the Best Paper Award in the 2003 Design Automation Conference.

The Logic of Biological Networks

Motivated by the intriguing functionality of gene regulatory networks we study chemical reactions (biological) circuits. We observe that those circuits are vastly different when compared to existing computing structures like logic circuits. In particular, the two strikingly different ingredients in biological circuits are feedback in memoryless computation and the stochastic behavior of devices in deterministic systems. Are these two biologically inspired concepts useful in improving the design of existing computing structures? I will provide a positive answer to this question and argue that progress in our understanding of biology depends on the development of new abstractions for reasoning about computation.

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