Electrical & Computer ENGINEERING **SEMINAR**

Thursday, February 26

Scaife Hall Auditorium
Room 125
4:30 p.m.
Refreshments at 4:00 p.m.

Professor Charles A. Bouman

Purdue University
Electrical and Computer Engineering

Charles A. Bouman received a B.S.E.E. degree from the University of Pennsylvania in 1981 and a MS degree from the University of California at Berkeley in 1982. From 1982 to 1985, he was a full staff member at MIT Lincoln Laboratory and in 1989 he received a Ph.D. in electrical engineering from Princeton University. In 1989, he joined the faculty of Purdue University where he is the Michael J. and Katherine R. Birck Professor of Electrical and Computer Engineering. He also holds a courtesy appointment in the School of Biomedical Engineering and is co- director of Purdue's Magnetic Resonance Imaging Facility located in Purdue's Research Park Professor Bouman's research focuses on the use of statistical image models, multiscale techniques, and fast algorithms in applications including tomographic reconstruction, medical imaging, and document rendering and acquisition. Professor Bouman is a Fellow of the IEEE, a Fellow of the American Institute for Medical and Biological Engineering (AIMBE), a Fellow of the society for Imaging Science and Technology (IS&T), a Fellow of the SPIE professional society. He is also a recipient of IS&T's Raymond C. Bowman Award for outstanding contributions to digital imaging education and research, has been a Purdue University Faculty Scholar, and received the College of Engineering Engagement/Service Award, and Team Award. He is currently the Editor-in-Chief for the IEEE Transactions on Image Processing, a member of the Board of Governors and a Distinguished Lecturer for the IEEE Signal Processing Society. (For More info. Please visit ECE seminar website.)

Model Based Imaging: In Search of the Free Lunch

Over the last two decades, digital imaging applications have evolved from a niche application into a huge commercial enterprise; and along the way, model-based imaging techniques have evolved into a core set of theoretical tools that form a major component of the field's theoretical foundation. The primary goal in model-based techniques is to construct a model of the image and the imaging system, and then to use this framework to infer information that is not directly available. This unifying framework can be used to solve a wide array of imaging problems ranging from image segmentation and analysis to image reconstruction and representation.

We present examples in applications ranging from medical to desktop imaging, and show how in each case model-based methods can be used to substantially improve quality or reduce cost of the imaging system. In the field of desktop imaging, we show how model-based methods have been used to increase resolution of images, efficiently store documents, and correct image distortion in low-cost imaging systems. At the other end of the cost spectrum, we give examples of how model-based methods have the potential to dramatically increase the quality of medical computed **tomography (CT) images**, while simultaneously reducing dosage. Finally, we conclude by presenting some emerging analytical methods in the use of sparse techniques for the modeling and analysis of images, and show how these methods can improve model accuracy and/or dramatically reduce computation and storage.

ECE Seminar Hosts

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