

Title: **Bending Out of the Box: The Marriage of Sensors and Computational Imaging**

Speaker:

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The era of Chemical Imaging arguably started in 1885 with George Eastman's introduction of "film" photography. Electronic Imaging next emerged in 1988 with the introduction of the filmless Nikons QV-100C electronic camera that utilized a 0.38Mpixel monochrome CCD sensor. While the demarcation to the current era of Computational Imaging is perhaps less distinct, it is clear that the data that comes out of a modern imaging sensor is far from what might be reasonably called an "image". In fact, the sensor output is just the input to a long and complex chain of processing that is required for high-quality consumer, commercial, and scientific tasks.

This talk reviews some recent trends in state-of-the-art computational imaging research and explores ideas about the future directions of the marriage of computational imaging with image sensor design and function. To do this, we present a variety of cutting-edge imaging applications ranging from digital holography to neutron and X-ray imaging, and we discuss the interplay between sensors and algorithms and speculate on future directions for computational sensor design. A key observation is that technology cannot easily change discontinuously, so that plausible future directions must likely find an evolutionary path to revolutionary change.

Biography:

Charles A. Bouman is the Showalter Professor of Electrical and Computer Engineering and Biomedical Engineering at Purdue University. He received his B.S.E.E. degree from the University of Pennsylvania, M.S. degree from the University of California at Berkeley, and Ph.D. from Princeton University in 1989. He is a member of the National Academy of Inventors, a Fellow of the IEEE, AIMBE, and SPIE, and an Honorary Member of the IS&T. He is the recipient of the 2021 IEEE Signal Processing Society, Claude Shannon-Harry Nyquist Technical Achievement Award, the 2014 Electronic Imaging Scientist of the Year award, and the IS&T's Raymond C. Bowman Award; and in 2020, his paper on Plug-and-Play Priors won the SIAM Imaging Science Best Paper Prize. He has served as the IEEE Signal Processing Society's Vice President of Technical Directions, Editor-in-Chief of the IEEE Transactions on Image Processing, Vice President of Publications for the IS&T Society, and he led the creation of the IEEE Transactions on Computational Imaging.