

**Distinguished Lecture Series**  
**IEEE Signal Processing Society Chapter of Gujarat Section**  
**November 30, 2018**

**The Event**

Signal Processing Society Chapter of IEEE Gujarat Section cordially invites all to attend the distinguished lecture talk by **Prof. Vivek Goyal of Boston University**.

**Title:** Computational Imaging with Few Photons, Electrons, or Ions

**Speaker:** Vivek Goyal

IEEE Fellow, IEEE Signal Processing Society Distinguish Lecturer  
Associate Professor of Electrical & Computer Engineering Dept.,  
Boston University

**Date:** November 30, 2018

**Time:** 11.00 AM Onwards

**Venue:**

AV Room  
Sarvajanik College of Engineering & Technology,  
Surat, Gujarat

**Abstract**

LIDAR systems use single-photon detectors to enable long-range reflectivity and depth imaging. By exploiting an inhomogeneous Poisson process observation model and the typical structure of natural scenes, first-photon imaging demonstrates the possibility of accurate LIDAR with only 1 detected photon per pixel, where half of the detections are due to (uninformative) ambient light. I will explain the simple ideas behind first-photon imaging. Then I will touch upon related subsequent works that mitigate the limitations of detector arrays, withstand 25-times more ambient light, allow for unknown ambient light levels, and capture multiple depths per pixel. The philosophy of modeling at the level of individual particles is also at the root of current work in focused ion beam microscopy.

**About the Speaker**



Dr. Vivek Goyal received the M.S. and Ph.D. degrees in electrical engineering from the University of California, Berkeley, where he received the Eliahu Jury Award for outstanding achievement in systems, communications, control, or signal processing. He was a Member of Technical Staff at Bell Laboratories, a Senior Research Engineer for Digital Fountain, and the Esther and Harold E. Edgerton Associate Professor of Electrical Engineering at MIT. He was an adviser to 3dim Tech, winner of the 2013 MIT \$100K Entrepreneurship Competition Launch Contest Grand Prize, and consequently with Nest Labs 2014-2016. He is now an Associate Professor of Electrical and Computer Engineering at Boston University.

He currently serves on the Editorial Board of Foundations and Trends and Signal Processing, the IEEE SPS Computational Imaging SIG, and the IEEE SPS Industry DSP TC. He previously served on the Scientific Advisory Board of the Banff International Research Station for Mathematical Innovation and Discovery, as Technical Program Committee Co-chair of Sampling Theory and Applications 2015, and as Conference Co-chair of the SPIE Wavelets and Sparsity conference series 2006-2016. He is a co-author of Foundations of Signal Processing (Cambridge University Press, 2014).