THE CHINESE UNIVERSITY OF HONG KONG
Department of Electronic Engineering

SEMINAR

Computational Imaging with Time-Resolved Sensors: Theory, Applications and Challenges

By

Ayush Bhandari
Massachusetts Institute of Technology

Date: 29 March, 2016 (Tuesday)
Time: 11:00 a.m.
Venue: Room 121 Ho Sin Hang Engineering Building

Abstract:

"A picture is worth a thousand words." However, a true and richer representation of the environment around us lives in a three dimensional or 3D space.

A growing number of tasks in imaging and vision exploit depth information acquired from 3D cameras. Time resolved sensors based on the Time-of-Flight (ToF) principle offer a cost effective and a real–time solution to the problem of 3D imaging—a theme that has revolutionized our scene-understanding capabilities and is a topic of contemporary interest across many areas of science and engineering.

The goal of this tutorial-style talk is to provide a thorough understanding of ToF imaging systems from a signal processing perspective that is useful to all application areas including radar, ultrasound, lidar and terahertz. Starting with a brief history of the ToF principle, we describe the mathematical basics of the ToF image formation process, for both time and frequency–domain and present an overview of important results within the topic. In particular, we examine case-studies of inverse problems: semi-reflective image mixture separation, ultra-fast imaging, imaging through scattering media and bio-imaging in context of cancer diagnosis.

Through this talk, we hope to establish that ToF sensors are more than just depth sensors; depth information may be used to encode other forms of physical parameters, such as, the fluorescence lifetime of a bio-sample or the diffusion coefficient of turbid/scattering medium.

Biography:

Ayush Bhandari is a doctoral researcher at the MIT where he develops signal processing algorithms for computational imaging. He was previously a visiting researcher at INRIA Rennes in France, Temasek Labs in Singapore, the Chinese University of Hong Kong (CUHK) and later, at EPFL, Switzerland. Before moving to MIT, his last employment was at the Biomedical Imaging Group of Prof. Michael Unser at EPFL, Switzerland.

He received the best student paper award at two IEEE conferences. He co-instructs the Mathematical Methods in Imaging class at the MIT and has been a tutorial speaker at various venues including the ACM Siggraph and the ICCV. He is mainly interested in the theoretical aspects of signal processing and its applications in imaging and vision.

ALL ARE WELCOME

For enquiries: Prof. T. Blu Tel: 39438288