מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building
on Monday, Sep 26, 2016
at 14:00

NOTE UNUSUAL DAY AND TIME

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From the Optics Lab to Computer Vision

Abstract:

Computer science and optics are usually studied separately -- separate people, in separate departments, meet at separate conferences. This is changing. The exciting promise of technologies like virtual reality and self-driving cars demand solutions that draw from the best aspects of computer vision, computer graphics, and optics. Previously, it has proved difficult to bridge these communities. For instance, the laboratory setups in optics are often designed to image millimeter-size scenes in a vibration-free darkroom.

This talk is centered around time of flight imaging, a growing area of research in computational photography. A time of flight camera works by emitting amplitude modulated (AM) light and performing correlations on the reflected light. The frequency of AM is in the radio frequency range (like a Doppler radar system), but the carrier signal is optical, overcoming diffraction limited challenges of full RF systems while providing optical contrast. The obvious use of such cameras is to acquire 3D geometry. By spatially, temporally and spectrally coding light transport we show that it may be possible to go "beyond depth", demonstrating new forms of imaging like photography through scattering media, fast relighting of photographs, real-time tracking of occluded objects in the scene (like an object around a corner), and even the potential to distinguish between biological molecules using fluorescence. We discuss the broader impact of this design paradigm on the future of 3D depth sensors, interferometers, computational photography, medical imaging and many other applications.