מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building
on Thursday, Jun 07, 2018
at 12:15

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Technion

Leveraging Hidden Structure in Unstructured Illumination

Abstract:

Artificial illumination plays a vital role in human civilization. In computer vision, artificial light is extensively used to recover 3D shape, reflectance, and further scene information. However, in most computer vision applications using artificial light, some additional structure is added to the illumination to facilitate the task at hand. In this work, we show that the ubiquitous alternating current (AC) lights already have a valuable inherent structure that stems from bulb flicker. By passively sensing scene flicker, we reveal new scene information which includes: the type of bulbs in the scene, the phases of the electric grid up to city scale, and the light transport matrix. This information yields unmixing of reflections and semi-reflections, nocturnal high dynamic range, and scene rendering with bulbs not observed during acquisition. Moreover, we provide methods that enable capturing scene flicker using almost any off-the-shelf camera, including smartphones.

In underwater imaging, similar structures are added to illumination sources to overcome the limited imaging range. In this setting, we show that by optimizing camera and light positions while taking the effect of light propagation in scattering media into account we achieve superior imaging of underwater scenes while using simple, unstructured illumination.