



THE WEIZMANN INSTITUTE OF SCIENCE  
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building  
on Thursday, Nov 20, 2014  
at 12:00

Marina Alterman  
Technion

Vision Through Random Refractive Distortions

Abstract:

Random dynamic distortions naturally affect images taken through atmospheric turbulence or wavy water. We show how computer vision can function under such effects, and even exploit them, relying on physical, geometric and statistical models of refractive disturbances. We make good use of distortions created by atmospheric turbulence: distorted multi-view videos lead to tomographic reconstruction of large-scale turbulence fields, outdoors. We also demonstrate several approaches to a 'virtual periscope', to view airborne scenes from submerged cameras: (a) multiple submerged views enable stochastic localization of airborne objects in 3D; (b) the wavy water surface (and hence distortion) can be passively estimated instantly, using a special sensor, analogous to modern astronomic telescopes and (c) we show how airborne moving objects can be automatically detected, despite dynamic distortions affecting the entire scene. In all these works, exploiting physical models in new ways leads to novel imaging tasks, while the approaches we take are demonstrated in field experiments.