

MECHANICAL AND AEROSPACE ENGINEERING COLLOQUIUM SERIES

“Robotic Grasping and Single Image Depth Perception”

Professor Ashutosh Saxena
Cornell University

Friday, September 18, 2009

1:30PM

205 Thurston Hall

Refreshments: 2:30pm, 206 Thurston Hall

ABSTRACT

The ability to perceive the 3D shape of the environment is a basic ability for a robot. We present an algorithm to convert standard digital pictures into 3D models. This is a challenging problem, since an image is formed by a projection of the 3D scene onto two dimensions, thus losing the depth information. We take a supervised learning approach to this problem, and model the scene depth as a function of the image features. We show that, even on unstructured scenes of a large variety of environments, our algorithm is frequently able to recover accurate 3D models. We then apply our methods to robotics applications: (a) obstacle avoidance for autonomously driving a small electric car at high speeds through cluttered environments, (b) autonomous helicopter flight in indoor constrained environments, and (c) robot manipulation, where we develop learning algorithms for grasping novel objects. This enables our robot to perform tasks such as open new doors, clear up cluttered tables, and unload items from a dishwasher.

BIO

Ashutosh Saxena is an assistant professor in computer science department at Cornell University. His research interests include machine learning and robotics. He received his MS and Ph.D. from Stanford University in 2009, and his B.Tech. from Indian Institute of Technology (IIT) Kanpur in 2004. He has worked in Bose Corporation, CSIRO (Australia) and Microsoft in the past, and has founded Zunavision in 2008.

Ashutosh has developed Make3D (<http://make3d.stanford.edu>), an algorithm that converts a single photograph into a 3D model. Tens of thousands of users used this technology to convert their pictures to 3D. He has also developed algorithms that enable robots to perform household chores such as unload items from a dishwasher. His work has received substantial amount of attention in popular press, including the front-page of New York Times, BBC, ABC, New Scientist and Wired Magazine. He has won best paper awards in 3DRR and IEEE ACE. He was also a recipient of National Talent Scholar award in India.