The Field Robotics Center

Seminar Series

Thursday, 4th May **NSH 1305 4:30 – 5:30pm**

Lunch will be served

Kumar Shaurya Shankar
Ph.D. Student
Robotics Institute

Mutual Information for Robust Visual Odometry

Abstract: Off-the-shelf digital camera sensors often have limited dynamic range and real-world dynamic lighting changes adversely impact visual state estimation algorithms. This is because most conventional visual state estimation algorithms make the constancy of brightness assumption, wherein the intensity of a pixel is expected to be constant across small motions of a camera. However, this assumption is often fundamentally violated when looking forward while flying fast outdoors in natural environments, for instance due to intermittent observations of the sky.

In this talk we present a visual state estimation algorithm that utilizes a cost function other than the Sum of Squared Differences (SSD) in the Lucas Kanade (LK) tracking framework. The proposed algorithm utilizes a measure of the mutual information (MI) between a reference image and a given query image to obtain robust dense direct visual odometry with accuracy comparable to SSD based approaches for nominal conditions, and superior accuracy in variable lighting conditions. Finally, we present results demonstrating these claims

Speaker Bio: Shaurya is a Ph.D. student in the Robotics Institute at Carnegie Mellon University, advised by Prof. Nathan Michael. His primary research thrust is to build robust, tangible, real-world autonomous robotic systems that address the uncertainty in perception and controls together rather than treating them as separate entities. He previously received his MS degree from Carnegie Mellon under the supervision of Prof. Drew Bagnell and Prof. Martial Hebert where he worked on the BIRD multi-university research initiative to get robots to fly autonomously through cluttered forests.




For further information please contact: Michael Kaess, kaess@cmu.edu

www.frc.ri.cmu.edu