Announcing the Final Examination of Prince Gupta for the degree of Master of Science

Time & Location: April 16, 2010 at 10:30 AM in HEC 302
Title: Markerless Tracking Using Polar Correlation of Camera Optical Flow

We present a novel, real-time, markerless vision-based tracking system, employing a rigid orthogonal configuration of two pairs of opposing cameras. Our system uses optical flow over sparse features to overcome the limitation of vision-based systems that require markers or a pre-loaded model of the physical environment. We show how opposing cameras enable cancellation of common components of optical flow leading to an efficient tracking algorithm that captures five degrees of freedom including direction of translation and angular velocity. Experiments comparing our device with an electromagnetic tracker show that its average tracking accuracy is 80% over 185 frames, and it is able to track large range motions even in outdoor settings. We also present how opposing cameras in vision-based inside-looking-out systems can be used for gesture recognition. To demonstrate our approach, we discuss three different algorithms for recovering motion parameters at different levels of complete recovery. We show how optical flow in opposing cameras can be used to recover motion parameters of the multi-camera rig. Experimental results show gesture recognition accuracy of 88.0%, 90.7% and 86.7% for our three techniques, respectively, across a set of 15 gestures.

Major: Computer Science

Educational Career:
Bachelor’s of Computer Science and Engineering, BS, 2008, Uttar Pradesh Technical University

Committee in Charge:
Dr. Niels da Vitoria Lobo, Chair, Computer Science
Dr. Joseph J. LaViola Jr., Computer Science
Dr. Mubarak Shah, Computer Science

Approved for distribution by Dr. Niels da Vitoria Lobo, Committee Chair, on March 31, 2010.

The public is welcome to attend.