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SDSU
presents
MS Computer Science
THESIS DEFENSE

Friday,
October 28, 2016
11:00am GMCS 555
Intelligent Machines and Robots Lab

Michal Pasamonik

Robotic Person Following
Using Stereo Depth Sensing and Person Recognition

Abstract

This thesis tested the viability and effectiveness of using stereoscopic imaging with cheap components for the purpose of person detection and following. Stereoscopic cameras can produce a depth map, much like active imaging systems such as the Microsoft Kinect can, but are not subject to the same environmental limitations and may be configured to work in all types of lighting. A stereoscopic imaging rig was built from two wide angle USB cameras and was driven by a low power compute platform.

The Histogram of Oriented Gradients algorithm was used as the primary means of person detection due to its low false positive rate, invariance to color and lighting, and ability to detect humans in various poses. Each frame was further processed with a circle Hough transform to detect the head position, which was used to fine tune the person's location and aid in removing false positives. Finally, a feature vector describing the subject's shirt and pants color was constructed, which was used to identify the primary tracking subject within a group.

The robot was tested in indoor and outdoor environments, under varying lighting conditions, and with a varying number of people in the scene. Testing revealed that the robot was able to work in both environments with a simple lens swap and without changes to the software. Differences in terrain type proved to have no effect on performance. The results showed that stereoscopic imaging can be a cheap, robust and effective solution for person following.

Thesis Committee

Mahmoud Tarokh, Thesis Chair, Department of Computer Science
Xiaobai Liu, Department of Computer Science
Ashkan Ashrafi, Department of Electrical and Computer Engineering