SAN DIEGO STATE UNIVERSITY
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SDSU
presents
a thesis defense for
Master of Science
degree in
Computer Science

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1:00pm
GMCS 555

Richard Vu

Investigating the Use of Microsoft Kinect 3D Imaging for Robotic Person Following

Abstract

This thesis evaluated overall effectiveness of utilizing Microsoft Kinect's marketed 3D tracking capabilities for applications of person detection and following. The advantage Kinect provided over traditional CCD image sensors was its marketed ability in reliable person detection without need for prior calibration. In addition, Kinect person detection was non-color based, proving useful in scenarios of similarity between a person's clothing color and their surrounding. The Kinect was given pan/tilt motion through servo control and mounted on the iRobot Create mobile robotic platform. Detection and extraction of skeleton joint position utilized SimpleOpenNI framework in conjunction with PrimeSense NITE library and implemented over Processing IDE. Mounted onto the robot was a laptop computer that processed extracted skeleton data into movement control commands to be sent via serial protocol. An Arduino microcontroller processed received serial movement commands into PWM for pan/tilt servo control. Movement commands sent via serial to the iRobot Create detailed speed and direction for physical navigation through an environment.

The person following robot was tested on different types of terrain and under varying lighting conditions. Evaluation of lighting conditions revealed Kinect person detection reliability was ideally suited for low indoor lighting scenarios with little to no illumination sources. In outdoor lighting scenarios of bright daytime sunlight, the Kinect was incapable of person detection. Evaluating different types of terrain revealed person detection faired well on soft shock-absorbent terrain while performing poor on rough uneven terrain. It was concluded that even under ideal lighting conditions and optimal terrain, the Kinect alone was ineffective and inadequate for practical applications of person following.

Thesis Committee

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