

# A SYSTEM FOR CHANGE DETECTION AND HUMAN RECOGNITION IN VOXEL SPACE USING STEREO VISION

Robert H. Luke III

Dr. James M. Keller, Dissertation Supervisor

## ABSTRACT

Image space change detection algorithms do not adequately address the complexities in real-world dynamic environments. With few exceptions, these algorithms rely on pixel-level information to detect proper foreground change. They have difficulty adapting the background model when objects are moved or when lighting changes abruptly. This dissertation proposes a world space system to detect change in the living quarters of a single elderly person in an assisted living community. Using stereo vision, this method discretizes the living space into volume elements (voxels) and determines the configuration of the scene using stereo vision. Voxel representations of the scene built over time are used to determine change. Further processing of this voxel change space using segmentation, shape and color determines the presence and location of humans. Experiments demonstrate the success of this change detection procedure in a range of real-world, dynamic test situations.