Cohesive Autonomous Navigation System: Image Processing and Data Management
Master of Science Thesis Defense

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Chair of Advisory Committee: Dr. Gregory Chamitoff
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Abstract

The ability for a robotic system to fully and autonomously interact with its environment is key to the future of applications such as commercial package delivery services, elderly robotic assistants, agricultural monitoring systems, natural disaster search and rescue robots, civil construction monitoring systems, robotic satellite servicing, and many more. An architecture that is conducive to Simultaneous Localization And Mapping (SLAM), path planning, and mission planning is a critical element of a system to be robust enough to handle such applications with true autonomy.

In this work, I discuss an architecture that lends itself to such cohesive operation of all the aforementioned goals through the implementation of a common core database to represent the environment. I present the overall architecture followed by a description of the key components of the architecture that I developed. I discuss in detail the image processing techniques and the database management tools using k-vector. An outline of the SLAM approach and a description of the path planning algorithm employed will be briefly discussed. End-to-end system results will be presented and concluded with insight for future developments.

Derek James Kuether is an MS candidate in the Aerospace Engineering Department working under the supervision of Professor Gregory Chamitoff. His research interests are in the areas of Computer Vision, Robotics and