

Group: 65

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SLAMid

Autonomous Simultaneous Localization and Mapping with Object Identification

INTRODUCTION

The future of automation and robotics requires increasing independence from human assistance in the realm of navigation. Our capstone's goal with **SLAMid** is improve how robots autonomously produce labeled datasets of an environment utilizing computer vision with Simultaneous Localization And Mapping (SLAM) and object identification. We foresee **SLAMid** applications including disaster response aid in perilous situations, reconnaissance for military missions, and improved navigation for self-driving vehicles.

HARDWARE

The **SLAMid** prototype will use dedicated hardware for SLAM and object recognition that will be combined to produce a 3-dimensionally mapped and labeled environment in real-time. SLAM hardware we are considering include the Nvidia Jetson TK1, Parrot S.L.A.M. Dunk, LeddarTech LeddarVu, an RGBD camera, stereo cameras, or any suitable alternative to produce the point-cloud data for room mapping. A separate camera unit would be used for image recognition of objects. For our early prototype, a computer will receive and combine the data from both units to produce a 3-dimensional map with the location of identified objects. In the final product, we aim to use our a smaller embedded hardware system to join all platforms together into a single unit.

SOFTWARE

Our software will be built upon currently existing platforms and APIs available. For SLAM, we will investigate multiple existing algorithms and libraries such as ORB-SLAM2 and LSD-SLAM. Object recognition will offload image recognition work to cloud computing platforms in order to reduce computation load, using APIs such as Amazon's Rekognition. Our embedded system will use a modified embedded Linux system to join all systems together for our final product.