

INDOOR MAPPING ROBOT (IMR)

There are several industries exploring solutions to quickly and accurately digitize unexplored indoor environments, into useable three-dimensional databases. Unfortunately, there are inherent challenges to the indoor mapping process that require a specific application of tools to map an environment precisely with low cost and high speed.

This project successfully demonstrates the design and implementation of a low cost mobile robotic computing platform with laser scanner, for quickly mapping with high resolution, urban and/or indoor environments using GPS and selectable levels of detail. In addition, a low cost alternative solution to three-dimensional laser scanning has been developed, via a standard two dimensional SICK proximity laser scanner mounted to a custom servo motor mount and controlled by a microcontroller.

A software system to control the robot has also been developed that incorporates and adheres to widely accepted software engineering guidelines and principles. Results of various open source software algorithms, as they apply to scan data and image data, are also compared; including evaluation of data correlation and registration techniques. In addition, laser scanner mapping tests, specifications, and capabilities are presented and analyzed. A design for converting the final scanned point cloud data to polygonal databases is presented and assessed. The results suggest the overall project yields a

relatively high degree of accuracy and lower cost over most other existing systems surveyed, as well as the potential for application of the system in other fields.

IMR Working Prototype



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