Robot Localization and Mapping: Project Proposal

1 Topic Name

Tracking and Mapping building enclosures using a Velodyne Lidar on a Kobuki Base

2 Team Members

1. Akash Sambrekar (Andrew ID: asambrek)
2. Shreyans Kushwaha (Andrew ID: skushwah)
3. Akshay Hinduja (Andrew ID: ahinduja)

3 Goals and Expected Achievements

We plan to use a kobuki base equipped with VLP-16 Velodyne Lidar as a primary sensor for performing localization and mapping in common building enclosures. The project will be essentially broken down into tracking and mapping modules. We will implement the pose estimation as mentioned in [1] and modify the implementation as per [2] to suit our sensor. We will implement the mapping module as mentioned in [1]. We will try our best to implement both tacking and mapping modules. However, we will focus more on the tracking part and try to achieve it as the primary goal of this project. We will try to implement mapping module as well to make the system complete.

4 Work Content

For prototyping, we plan to use Matlab. After suitable testing we will implement this method in ROS and C++. We plan to use OpenCV, PCL, Eigen and SuiteSparse libraries along with rviz for map visualization.

References

[1] Keller, Maik, et al. “Real-time 3D reconstruction in dynamic scenes using point-based fusion.” International Conference on 3D vision (3DV), 2013

[2] Frank Moosmann, Christoph Stiller et al. "Velodyne SLAM" IEEE Intelligent Vehicles Symposium (IV), 2011

[3] Newcombe, Richard A., et al. “KinectFusion: Real-time dense surface mapping and tracking.” 10th IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2011