

Term Project Proposal

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CSCI 598A: Human Centered Robotics

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1 Proposal

This paper will be a survey of three existing simultaneous localization and mapping (SLAM) approaches implemented in the Robotic Operating System (ROS) through a Kinect sensor on a Turtlebot. The Kinect sensor provides 3D point cloud matrices for both distance and RGB. We intend to implement Hector SLAM, gmapping SLAM, and RGBD SLAM. These approaches are distinct from one another as Hector SLAM uses only 3D distance information to determine localization and mapping, while G-mapping SLAM uses only 3D RGB information. RGBD SLAM makes use of both 3D distance information and 3D RGB information. We intend to use existing ROS packages to implement these three approaches. We will then compare the results of each approach using the following metrics:

1. Localization accuracy vs ground truth locations
2. Mapping quality - closing the loop
Find ourselves w/n a map
Does the map accurately reflect the environment?

The exploration of the various SLAM techniques will aid in the general understanding of SLAM as well as determining the most reliable SLAM methods currently implemented. This project will be implemented by the following students:

1. Chris Card
2. Marshall Sweatt - Team leader

2 Timeline

Table 1 presents the expected timeline for this project.

Table 1: Timeline of Work

Activity	Date
Proposal	10/17/14
Robot Control	10/24/14
SLAM approach 1(Hector)	11/04/14
SLAM approach 2(RGBD SLAM)	11/10/14
SLAM approach 3(gslamming)	11/14/14
Report	11/21/14

3 Workload Breakdown

We intend to pair program most of this project. The major parts of this project include: Robot Control, SLAM approaches, and SLAM testing. The expected workload percentages will be 50/50¹.

4 Reported Work

- 11/13/14: Plan to have HectorSLAM running.
- 11/11/14: Fixed openNI driver error for Indigo.
Brought up disparity view of Kinect camera.
- 11/07/14: Created control package for turtlebot.

¹This will be updated as the project progresses