**PS7**

**SLAM and Path-Planning With a Known Map**

***(Using the ROS Navigation Stack)***

***Out: Thursday, November 3***

***Due: Thursday, November 12***

**Required Reading**

* <http://wiki.ros.org/navigation>
* http://wiki.ros.org/amcl
* <http://wiki.ros.org/move_base>
* <http://wiki.ros.org/base_local_planner>
* <http://wiki.ros.org/rviz/DisplayTypes>
* <http://wiki.ros.org/gmapping>

**Introduction**

For part 1 of this assignment you will be configuring existing ROS packages to generate a map using SLAM. For the second part, you will then use various path-planning algorithms to navigate the map. You will also be using RViz to dynamically visualize your robot’s performance.

**Setup**

**Installing the Robots**

cd ~/catkin\_ws/src

git clone github-uml-install-url

**Starter Code**

cd ~/catkin\_ws/src

git clone github-uml\_nav-url

*When you are using nodes in the install directory, source install/setup.bash instead of devel/setup.bash.*

**Using the gmapping SLAM Package**

roscore

rosrun uml\_nav init\_slam\_world.launch

rosrun uml\_nav slam\_gmapping.launch

**Navigating an Existing Map**

roscore

rosrun map\_server map\_server map.yaml

roslaunch uml\_nav init\_nav\_world.launch

roslaunch uml\_nav move\_base.launch

roslaunch uml\_nav amcl.launch

./send\_goal.bash number

**What You Need To Do**

**SLAM**

Use the gmapping package to generate a map using SLAM.

**Navigating an Existing Map**

* Modify the five YAML configuration files in uml\_nav/share/nav\_config for each of the following robots.
* Set ***at least*** two different recovery behaviors
* Configure RViz to display relevant data

**Submission**

Zip your uml\_nav directory. It should contain at minimum the following files:

* base\_local\_planner\_params.yaml
* costmap\_comon\_params.yaml
* global\_costmap\_params.yaml
* global\_planner\_params.yaml
* local\_costmap\_params.yaml
* A .rviz RViz configuration file
* Your map generated using SLAM

**Questions**

1. What does AMCL stand for?
2. What does SLAM stand for?
3. What does URDF stand for?
4. What functionality does each of the following packages provide?
   1. amcl
   2. move\_base
   3. base\_local\_planner
   4. gmapping
   5. map\_server
5. What were some of the primary differences in your configuration files for using the two different robots?

**Debugging**

rosrun xacro xacro /home/cs/robot\_sim/mobile\_ws/src/jackal/jackal\_description/urdf/jackal.urdf.xacro