Laboratory exercise 9

Autonomous mobile robot navigation in Stage

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Preparation and helpful instructions

- Review the lecture slides about mobile robot localization and navigation.
- Unpack the prepared archive which contains a `simple_rps.world` environment with related files for both tasks and the launch file with pertaining parameter files for the second task.

Assignments

Task 1: Mapping the environment with gmapping package

a) Following the steps presented in the lecture "Mobile Robot Localization and Navigation", run the Stage simulator with the `simple_rps.world` environment. Run the robot keyboard teleoperation and RViz. Try moving the robot around the environment via keyboard to make sure everything is working. Check the `gmapping` package documentation and run `gmapping` with correct arguments. In RViz, add `LaserScan`, `Map` and `TF` for visualization. Use your keyboard to manually move the robot around until you completely map the environment. Save the resulting map as `firstname_lastname` (look here for help).

Send us a screenshot of RViz with visualized `LaserScan`, `Map` and `TF` where the resulting map you obtained can be seen. Write the command you used to run `gmapping` in the following text box:

```
rosrun gmapping slam_gmapping scan:=base_scan
```

Task 2: Navigation with Move Base package

a) Following the steps presented in the lecture "Mobile Robot Localization and Navigation", run the Stage simulator with the `simple_rps.world` environment. Run the map server with the map you obtained in the Task 1 (`firstname_lastname.yaml`). Run the robot keyboard teleoperation, RViz and AMCL similarly to the lecture. Ensure that everything is running correctly and that the robot is properly localized. You will need to use the Move Base package to make the robot autonomously navigate in the environment. Your task is to fill in the required parameters in place of the question marks (???) in the provided parameter files. Launch the prepared `move_base_rps.launch` file which runs the required node and loads all of the necessary parameter files which you edited. In RViZ select the 2D Nav Goal and give the robot a destination. If everything is correct the robot should autonomously navigate in the environment using a map that you obtained in Task 1.

In RViz show the following and submit it as screenshots:

1) Costmap generated by the Move Base package.
2) Global and local planned path (both need to be clearly visible).

Exercise submission

Create a zip archive containing **this pdf with the filled out answer** and **all other exercise files**: screenshot of map in RViz for the first task, screenshot of costmap, screenshot of global and local planned path and parameter files with filled out parameters for the second task. Upload to Moodle.