SECOND ROBOTICS PROJECT

ROBOTICS

POLITECNICO
MILANO 1863

THE PROBLEM

Map creation

Autonomous navigation

Multiple sensors

Skid steering robot, with footprint: 0.6m x 0.4m

DATA

Format: ROS Bag files

play the bags with the command:

rosbag play --clock first.bag

Data:

- /scan: data from a single plane scanner
- /t265/odom: odometry data
- /velodyne_points: data from 3d laser

THE PROJECT

- Create a ROS package called ***second_project***
- Create a ROS node to convert the odometry topic into tf:
  - node called ***tf_publisher***
- Convert the 3D lidar data to a 2D laser scanner:

- Create a map of the environment with 2D laser data
- Create a map of the environment with 3D laser data, converted to 2D

- Use the map to setup a “realistic” stage simulation (similar size/fov)
- Navigate the simulation

THE PROJECT

- Navigate the simulation:
  - node called ***navigation***
  - write a node that given a set of waypoint from a csv file read them and publish the first goal, movebase handle the movement to it, when reached the next goal is published, etc.

- If additional nodes are needed you can add them

Allowed minimal manual post-processing of the computed map to use it for the simulation (remove noisy points)

Provide also the original maps

THE PROJECT

Launch file to start the mapping process:

- start all the required nodes + rviz (with proper config file). Do not start bag file (these are started autonomously)

Launch file to start the autonomous navigation:

- start all the required nodes + rviz (with proper config file)

File structure

- second_project
  - cfg
  - launch
  - src
  - srv
  - map_raw -> map from the mapping pipeline without postprocessing
  - stage -> stage simulation
  - waypoints.csv -> the list of waypoints
  - config_mapping.rviz
  - config_nav.rviz

Maps, waypoints

Provide all 4 reconstructed maps:

- 2 maps with single plane
- 2 maps with multi plane

Waypoints csv file:
pose1.x, pose1.y,heading1

pose2.x, pose2.y,heading2

...

Other info

assume tf 0 0 0 between odometry and lasers

File txt must contain only the group names with this structure

codice persona;name;surname

File readme with info on the employed node/plugins (what have you used for mapping, which local planner, which global planner, etc.)

Deadlines and requested files

Deadline: 30 June (1 month)

Max 3 student for team

Questions:

-write to me via mail (simone.mentasti@polimi.it)

- do not write only to Prof. Matteucci