# SECOND ROBOTICS PROJECT

ROBOTICS

POLITECNICO
MILANO 1863

# THE ROBOT


Oyster 64 plane lidar
Optitrack Markers
STM IMU
Intel T265
AIRLAB

# DATA

Format: ROS Bag file

Data: **Two** bag file

Topics:

- Pointcloud (/os1_cloud_node/points)
- Visual Odometry (/camera/odom/sample)
- Optitrack Odometry (/Robot_1/pose)
- IMUs (/mavros/imu/data_raw, /os1_cloud_node/imu)
- tf (/tf)

# THE PROJECT

- Choose **one bag**
- use the data to create maps using gmapping

- Configure move_base with amcl and the computed map
- Test the navigation stack with the **second bag**

# Map Creation

- Convert 3D PointCloud to laserscan to use with gmapping:

  http://wiki.ros.org/pointcloud_to_laserscan

- Configure the correct tf tree to work with gmapping
- Create one map using the Optitrack odometry (Robot_1/base_link)
- Create a second map with the visual odometry (camera_pose_frame)

# move_base configuration

- Setup the navigation stack to work with the provided data

  correct tf-tree, topics, parameters

  use the **visual odometry**, not the optitrack odometry
- Utilize the **map created with the visual odometry** for localization

# tf-tree

- tf-tree is not complete from the bag

- yaw offset from **optitrack** to **lidard**: 3.14 rad

- x offset from **camera** to **lidar:** 0.675 m
- y offset from **camera** to **lidar:** 0.008 m
- z offset from **camera** to **lidar:** -0.96 m

# Optional (improve visual odometry)

Improve the visual odometry (both for map creation process and navigation):

- visual odometry is noisy

Fuse visual odometry with IMUs data

- use the robot pose ekf (http://wiki.ros.org/robot_pose_ekf)
- or the robot localization package

(http://wiki.ros.org/robot_localization)

# Tips for map creation

gmapping **does not use** odometry topic but tf

Use the turtlebot3 example as a reference for correct tf-tree configuration

start with optitrack data, which has no drift, but works only for a small part of the bag file (stop the map creation process when optitrack data are not available)

# THE FILES

https://polimi365-my.sharepoint.com/:f:/g/personal/10458351_polimi_it/EtF6L7pw5odBsRbZi1QfWFMBKpHX7DNw1J5054WK5C7Wlg?e=YERns5

# Deadlines and requested files

-Send **only** a tar.gz file (put the .txt file with info inside the archive)

-Send via e-mail both to Simone Mentasti and Matteo Matteucci

-name the e-mail “SECOND ROBOTICS PROJECT 2020”

-Inside the archive:

- -txt file (details next slide)
- -folders of the nodes you created (with inside CmakeLists.txt, package.xml, etc...)
- -folder with the two created map (optitrack and visual odom)
- **-do not send** the entire environment (with build and devel folders)

# Requested launch files

- Launch file for gmapping to compute the map with optitrack data
- Launch file for gmapping to compute the map with visual odometry data
- Launch file for move_base/amcl

I should be able to create a map and start the navigation stack with the launch file, include everything in there (i.e., static tf, use_sim_time, etc.). You can assume I will start the bag file in a new terminal

# Deadlines and requested files

File txt must contain (at least):

-ID, name, surname of all team members

-small description of the files inside the archive

-structure of the tf tree

-name of the bag used to create the map and bag to test move_base

-description of how to start/use the nodes

-info you think are important/interesting

# Some more requests

Insert in the archive all the file you think are important, i should be able to properly recreate your workflow

Name the archive with your ID

**Don’t use absolute path**

**DO NOT SEND THE BAG FILE**

# Deadlines and requested files

Deadline: 5 July

Max 3 student for team

Questions:

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

- do not write only to Prof. Matteucci

-ask on Teams/Slack