SECOND ROBOTICS PROJECT

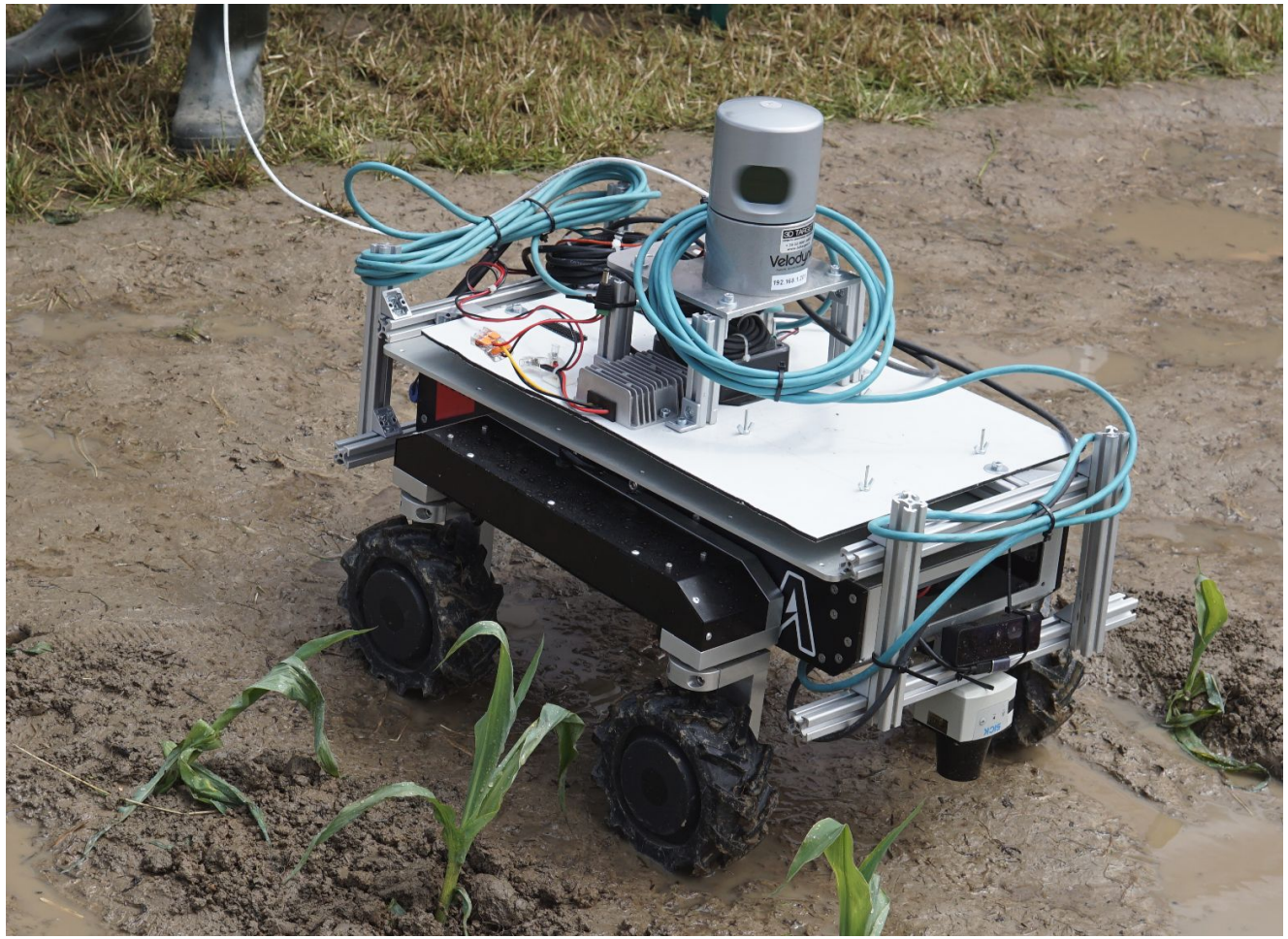
ROBOTICS

POLITECNICO
MILANO 1863

THE PROBLEM

Provided data:

- Odometry from the robot
- Laser scan data



DATA

Format: ROS Bag file

play the bag with the command:

rosbag play --clock robotics2.bag

Data:

- /odometry: odometry data from the robot (noisy)
- /scan_back: laserscan data from the back sensor
- /scan_front: laserscan data from the front sensor
- /tf: dynamic tf
- /tf_static: static tf, like sensors position

THE PROJECT (Task 1: mapping)

- Use the bag to create a map of the environment
  - Use the preferred mapping package
  - Write a launch file that starts:
    - all required nodes to perform data conversion
    - the mapping node
    - rviz with config file to show the map, the lidar and the tf, set global frame to map

THE PROJECT (Task 1: mapping)

- To build a map you need tf and laserscan:
  - **convert the odom to tf**
  - **combine the two laserscan** into a single one to have 360 degree coverage
  - the laserscan sees part of the robot, while you combine you should also **filter points** which belongs to the robot to avoid putting them in the map, or seeing them as obstacles

THE PROJECT (Task 2: navigation)

- Setup a **realistic** simulation of the robot using stage
- Robot size: 0.54m x 0.40m
- Robot kinematics: Akermann, Skid-Steering, Omnidirectional (pick one)
- Setup the navigation stack to receive goals and move the simulated robot avoiding obstacles in the generated map
- Write a goal-publisher node that reads a sequence of goals from a csv and send them to the robot. A new goal is sent when the robot reach the previous one or it's aborted
- csv file will be in the folder: second_project/csv/goals.csv
- an example csv file is provided

THE PROJECT (Task 2: navigation)

- Provide a launch file that starts:
  - stage simulation with the robot and the map you build during task 1
  - movebase configured to localize in the provided map and drive autonomously the robot avoiding obstacles
  - the controller node that publish the goal after reading them from csv, **using action**
  - csv structure: x,y,theta
  - rviz configured to visualize the map, the tfs, the particle cloud (if amcl is used), the laser scanner, the paths and the goals

THE PROJECT (Task 2: navigation)

- Also provide a map folder with:
  - png file of the reconstructed map (**mandatory**)
  - serialized map if slam toolbox is used

Deadlines and requested files

-Upload **only** a tar.gz file to webeep (**only one team member upload the files**)

-Inside the archive:

- info.txt file (details next slide)
- folders of the nodes you created (with inside CmakeLists.txt, package.xml, etc...)
- map folder
- **do not upload** the entire environment (with build and devel folders)
- **do not upload** the bag files

Deadlines and requested files

File txt must contain only the group names with this structure

codice persona;name;surname

You can add another file called readme.txt with additional info. I will not always look for it. But if something goes wrong I'll check for explanations.

Some more requests

Name the archive with your codice persona

Name the package second_project

Don’t use absolute path

The project need to be written using c/c++

Deadlines and requested files

Deadline: 22 June (1 month)

Max 3 student for team

N.B.: If the grading is needed earlier you can submit the project before the deadline. Then write us a mail and specify the need for earlier grading in the message and mail title

Questions:

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

- do not write only to Prof. Matteucci

Additional info

- Set the simulated time in the launch files
- rosparam set use_sim_time true
- <param name="/use_sim_time" value="true"/>
- You can first test the navigation of the robot sending goals manually
- **Use actions** to send goals, not publishers
- **Minimal changes** to the map generated to use it in the simulation are allowed, mostly to clear noise and unrealistic obstacles

How to get less points

- The project do not compile -> 0 points
- The project has absolute paths -> 0 points
- The archive has build and devel folder -> -1 points
- The archive has bag files -> -1 points
- The project do not open rviz -> - 0.5 points
- Two members upload the project -> ½ points
- Three members upload the project -> ⅓ points