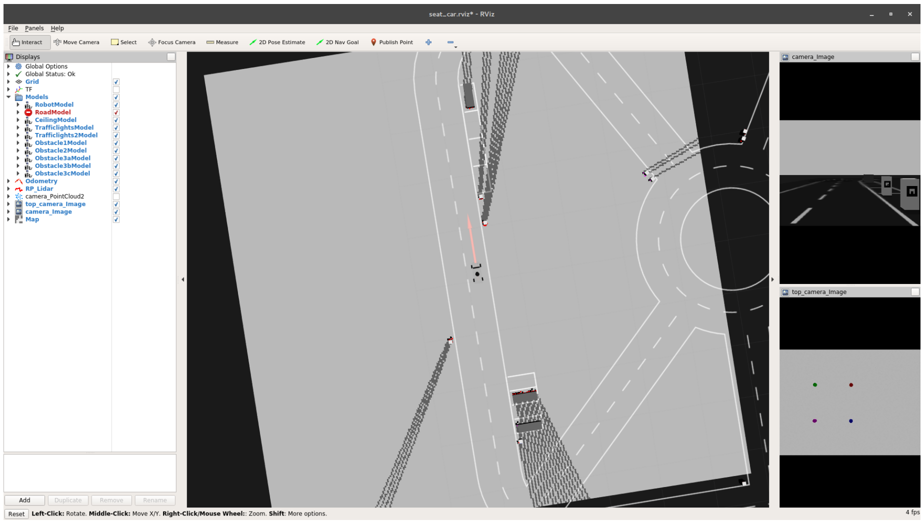
InternetExplorer - Boyan Hristov

Homework 4

Exercise 1

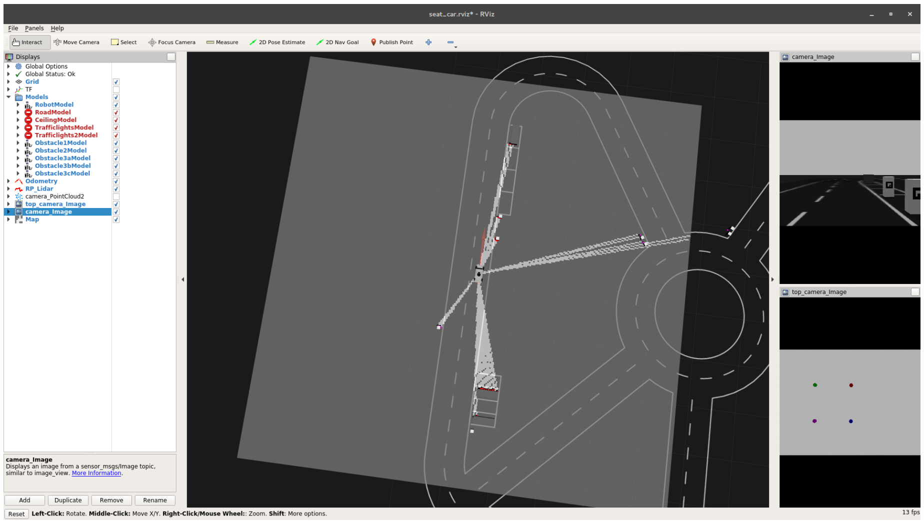
What I find better is to assume everything is free until we find an obstacle, everything behind the obstacle is unknown



Global Options
Global Status: Ok
Grid ☑
TF ☐
Models ☑
RobotModel ☑
RoadModel ☑
CeilingModel ☑
TrafficlightsModel ☑
Trafficlights2Model ☑
Obstacle1Model ☑
Obstacle2Model ☑
Obstacle3aModel ☑
Obstacle3bModel ☑
Obstacle3cModel ☑
Odometry ☑
RP_Lidar ☑
camera_PointCloud2 ☐
top_camera_Image ☑
camera_Image ☑
Map ☑

Left-Click: Rotate. **Middle-Click:** Move X/Y. **Right-Click/Mouse Wheel:**: Zoom. **Shift**: More options.

But an alternative approach (from what I remember discussed in tutorium) is also available.



camera_Image
Displays an image from a sensor_msgs/Image topic, similar to image_view. More Information.

Left-Click: Rotate. **Middle-Click:** Move X/Y. **Right-Click/Mouse Wheel:**: Zoom. **Shift**: More options.

One can simply toggle the flag FLAG_NO_OBSTACLE_MEANS_FREE in the python code to switch between the 2 versions.

Link to git repository with code + screenshots + bags (main repo) -> https://github.com/BoyanH/FU-Robotics-WS17-18 Link to catkin_ws_user repository -> https://github.com/BoyanH/catkin_ws_user

Exercise 2

I wasn't able to complete the exercise in the lab, so I brought 7 bag files home which I used to complete the exercise. Although the output seems really bad, I think it is quite similar to the behavior of the car (somehow it had problems turning one way).

Table

This is the JSON output of the program (also input for the mapper function). Of course, as it is JSON generated from a dictionary, the keys aren't really ordered that way. I reordered them for better readability, reformated the JSON a bit by hand

```
{
    "0": 30.277643233954862,
    "30": 29.38100247745021,
    "60": 48.934635590751135,
    "90": 73.59105680295431,
    "120": 84.95944850718526,
    "150": 75.46084026905402,
    "179": 104.04333005742643,
}
```

For debugging purposes, all bags are available in the git repository.

Mapper

As I didn’t have much time, the mapper implementation is quite simple

```
def prepare_mapping_function():
    global expected_vs_received, map_steering

    # can also read from saved json
    if len(expected_vs_received.keys()) == 0:
        with open('calibration.json') as json_data:
            expected_vs_received = json.load(json_data)

    rospy.loginfo(expected_vs_received)
    lm = LinearRegression()
    y_train = list(map(lambda x: float(x), expected_vs_received.keys()))
    X_train = list(map(lambda x: [float(expected_vs_received[x])], expected_vs_received.keys

    rospy.loginfo(y_train)
    rospy.loginfo(X_train)
    lm.fit(X_train, y_train)

    map_steering = lambda x: lm.predict(x)[0]
```

We use an already implemented version of linear regression from sklearn, train it with the data we calculated in the previous exercise. The mapper is simply a linear regression prediction. I studie the algorithm in the “Mustererkennung” course a couple of weeks ago, is still in my GitHub account, didn’t want to copy the whole code here.