AUE-893 Autonomy: Science and Systems

Repository: https://github.com/rmerco-clemson/AuE893Autonomy.git

Commands for launching the applications

Robot Cleaner – grid logic

The following command will run the turtle simulation in order to execute the Robot Cleaner application following a grid patter to cover all the room:

```
> roslaunch assignment_01 turtlesim_grid_cleaner.launch
```

A rosbag file able to replay the Twist messages is in the folder bagfiles. A readme file is also provided. Figure 1 shows the results of the simulation.

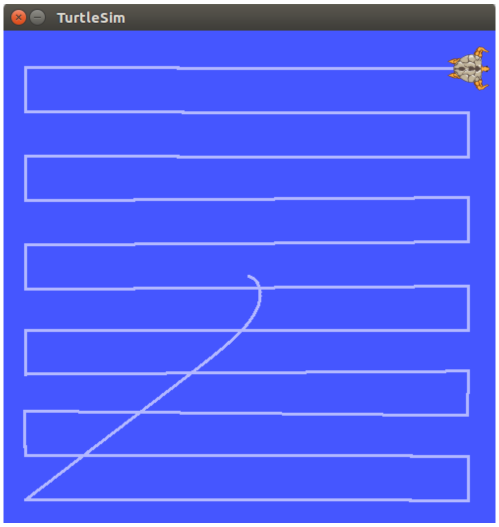


Figure 1: Robot Cleaner application: grid pattern

Robot Cleaner – spiral logic

The following command will run the turtle simulation in order to execute the Robot Cleaner application following a spiral patter to cover all the room:

```
> roslaunch assignment_01 turtlesim_spiral_cleaner.launch
```

A rosbag file able to replay the Twist messages is in the folder bagfiles. A readme file is also provided.

Figure 2 shows the results of the simulation.

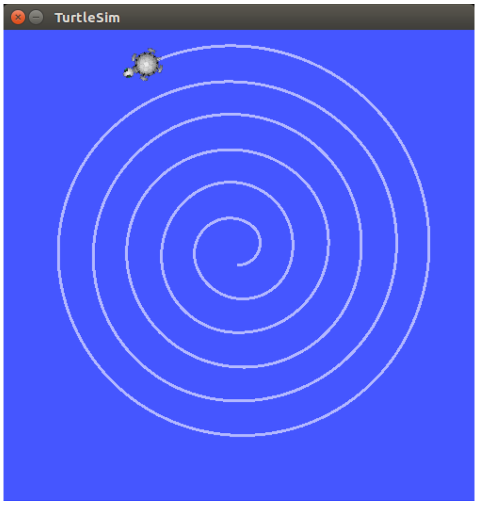


Figure 2: Robot Cleaner application: spiral pattern

Robot Cleaner – Gazebo grid logic

The following commands will run the same application of the turtle simulation in Gazebo. In particular in Gazebo has been reproduced the Robot Cleaner application following a grid patter to cover all the room. In this case two closed loop controllers are implemented:

- PD controller for controlling the forward speed of the robot during the cruse to the next point
- PD controller for controlling the orientation of the robot during the cruse to the next point

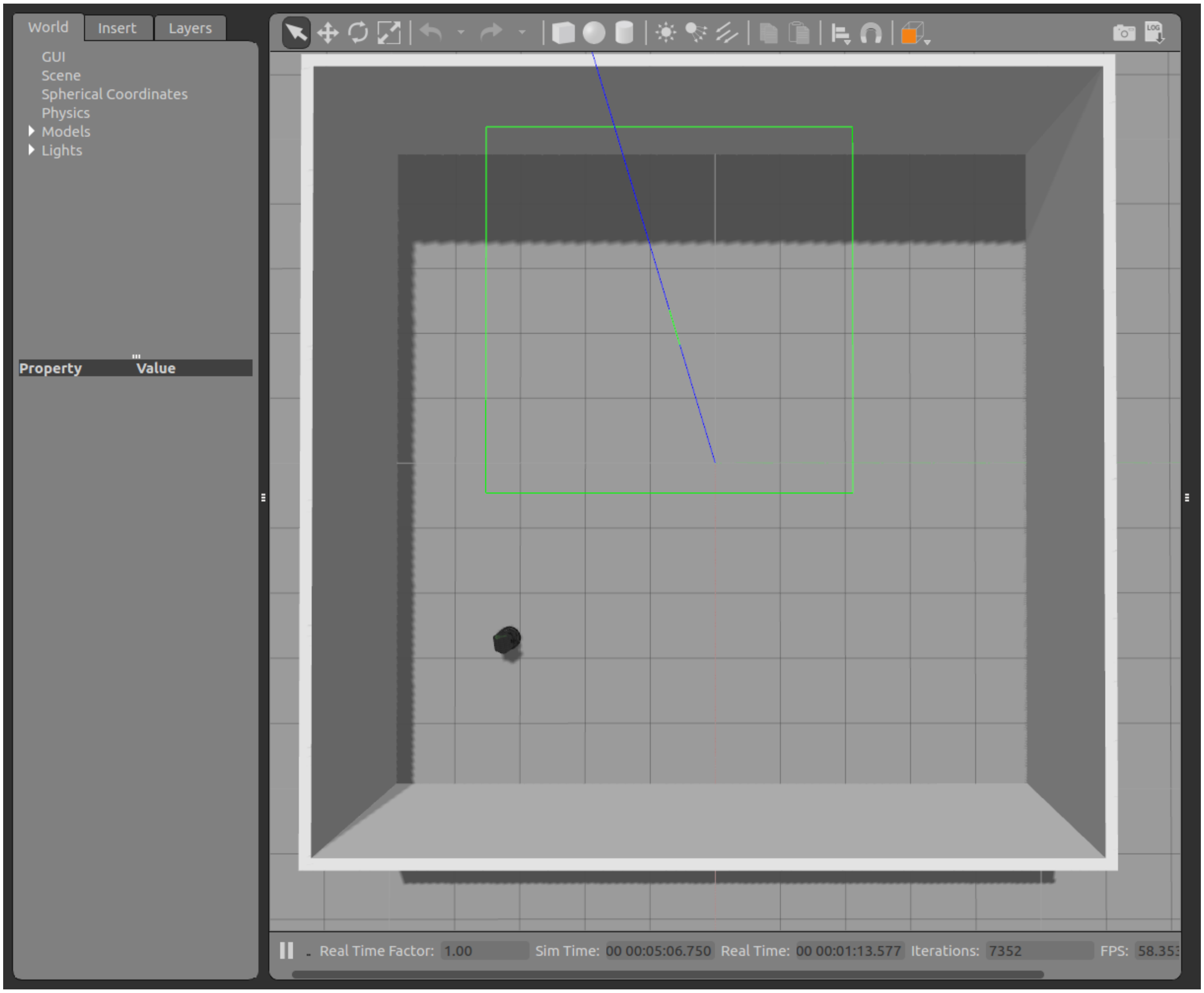
First of all the Gazebo world has to be launched:

```
> roslaunch assignment_01 ten_squares_gazebo_world.launch
```

After that the previous command is completely executed and Gazebo is correctly running, use the following command:

```
 > roslaunch assignment_01 ten_squares_grid_cleaner.launch
```

Figure 3 shows a screen-shot of the simulation while it is running.



Real Time Factor: 1.00 Sim Time: 00 00:05:06.750 Real Time: 00 00:01:13.577 Iterations: 7352 FPS: 58.353

Figure 3: Robot Cleaner application simulated in Gazebo

Robot Cleaner – Real Turtlebot

The following commands will run the application in the real Turtlebot. This application will run the Turtlebot forward for 2 meters, then it will turn of 180 degree and then it will run back for 2 meters.

First of all the the roscore has to be started:

```
> roscore
```

Then the connection with the Turtlebot has to be created using:

```
> roslaunch turtlebot_bringup minimal.launch
```

After that the previous command is completely executed and a melody coming from the robot is heard in order to give you the feedback of the established connection, use the following command:

```
> rosrun assignment_01 turtlebot_real_back_and_forth.py
```