UiO : Department of Technology Systems
University of Oslo

Mandatory assignment 3

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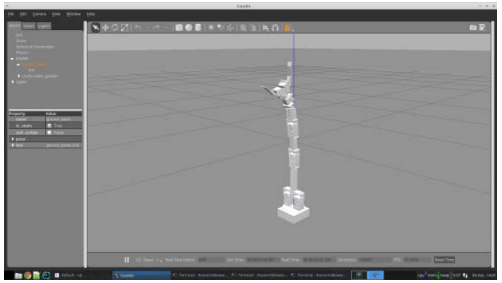
- 2 week project
- Group project with 3 (to 4) students per group (~4 groups)
- One or two groups may select the same topic
- Some topics can only be selected by one or two groups due to hardware availability
- Some topics involve both simulation and implementation on hardware, while other topics will only do simulation
- Manipulator forward kinematics, Jacobian and simplified model are available
- Kim and Eirik will be available week 47 and 48 in group sessions and lecture times
- Estimated 20-25 hours of work per student

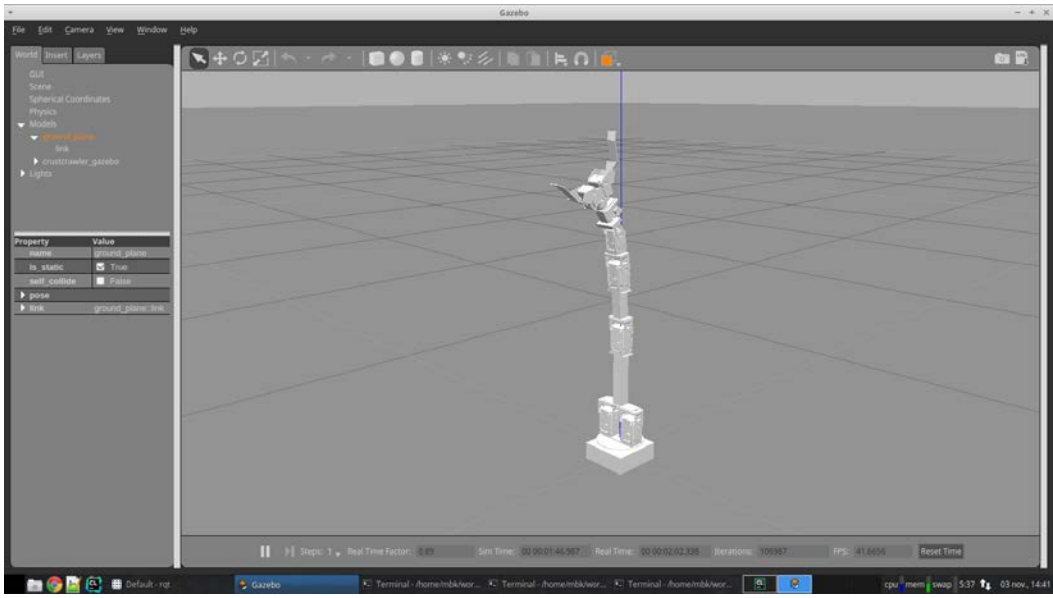
1 - Motion control

- Implement joint space PD control with gravity compensation on the CrustCrawler
- Main components
  - Improve existing framework
  - Test on simulated robot
  - Test on real robot
  - Tune control parameters



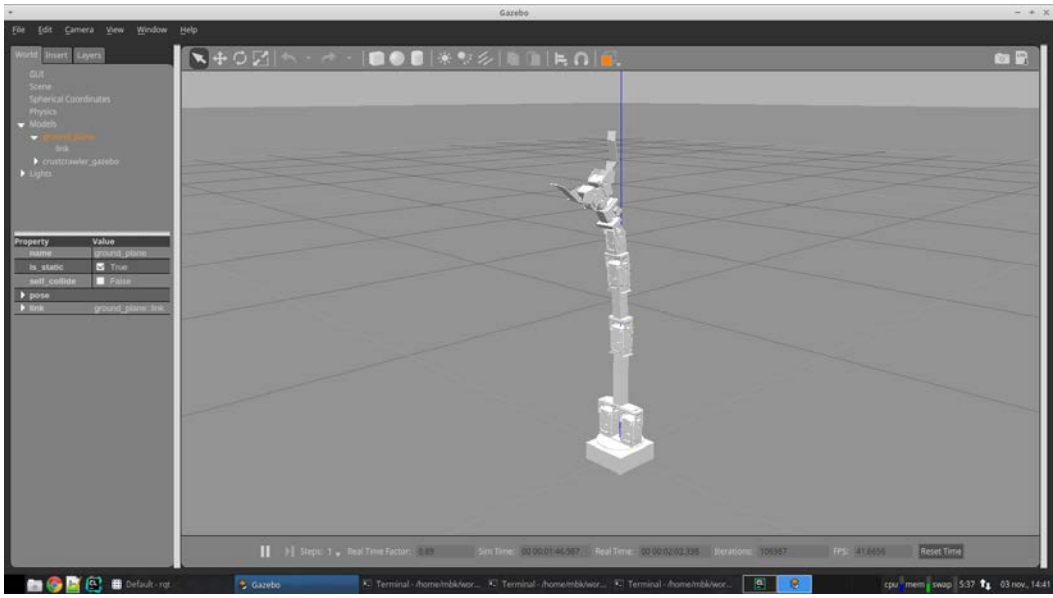
2 - Force control

- Implement one of the force control methods in Chapter 9
- Main components
  - Extend the simulator with a force sensor
  - Add compliant object to the simulator
  - Test the force control by interacting with the compliant object



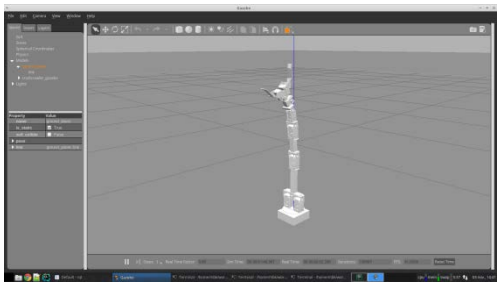
3 - Visual servoing

- Implement image-based visual servoing on simulated robot
- Main components
  - Add a camera to gazebo that can be velocity controlled
  - Add a object and extract visual features
  - Implement resolved velocity image-based visual servoing control



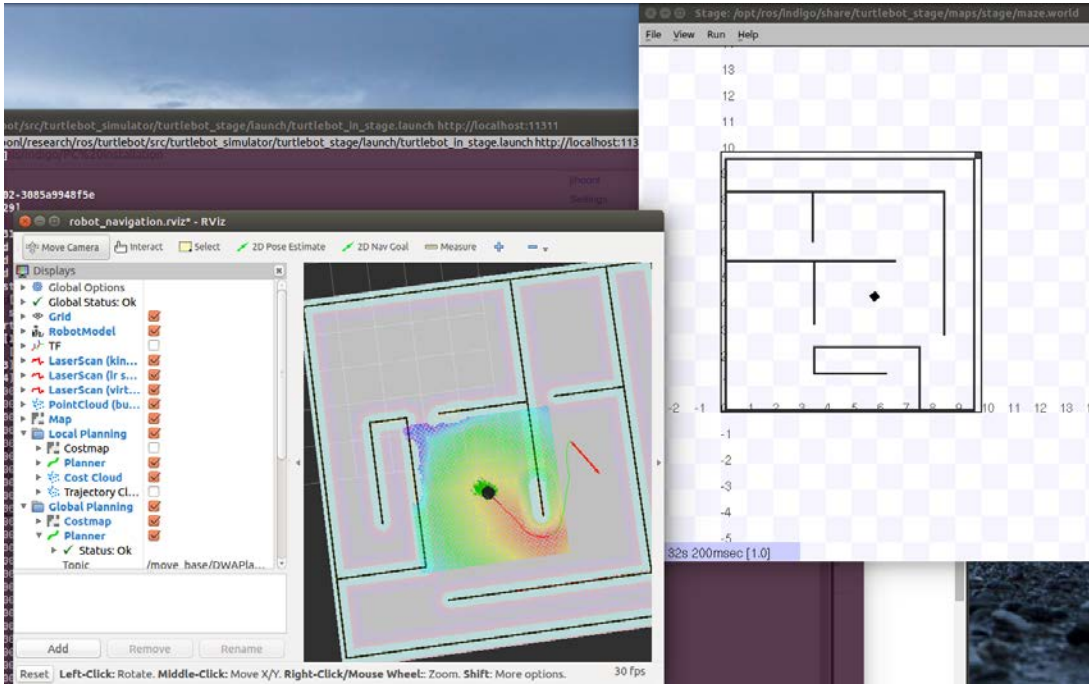
4 - Tele-operation

- Implement unilateral tele-operation with the real robot as the master and the simulated robot as the slave
- Main components
  - Implement a position controller on the simulated robot
  - Connect the master robot to the slave robot to control it



5 - Mobile robots - simulation

- Setup Turtle bot stage simulator, then plan and move to a pose
- Main components
  - Get the simulator up and running
  - Plan a trajectory to a pose
  - Implement a trajectory tracking method
  - Simulate moving the robot to a pose



6 – Mobile robots – real robot

- Move the robot to a pose
- Main components
  - Implement odometric localization
  - Implement motor control for each wheel
  - Implement posture regulation motion control
  - Test the system where the robot drives to a given pose