Hochschule
Bonn-Rhein-Sieg
University of Applied Sciences

Software Development Project

Final Presentation

Wei-Chan Hsu, Torsten Jandt, Ramesh Kumar, Danning Wang

July 10, 2017

Introduction

Software Development Project

Basic Navigation Test

- Environment: Workspaces, waypoints and obstacles.
- Task specification: Sequence of poses.

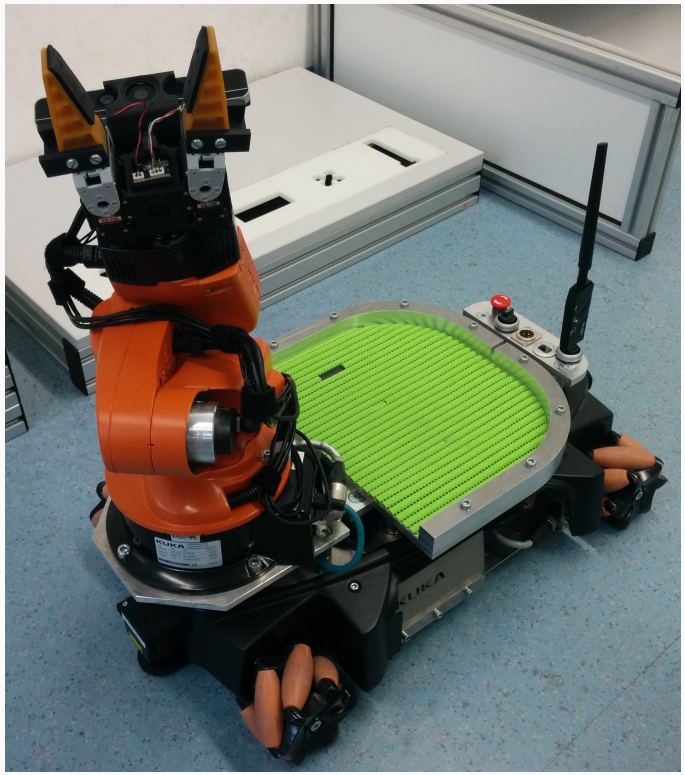
Challenges

- **Perception:** Accessing and processing sensor data.
- **Mapping:** Building map of the environment.
- **Localization:** Pose inside map.
- **Path planning:** Determine sequence of poses between waypoints.
- **Motion control:** Execution of path.

KUKA youBot

The youBot is a mobile manipulator designed for education and research purposes. It comes with fully open interfaces and API.

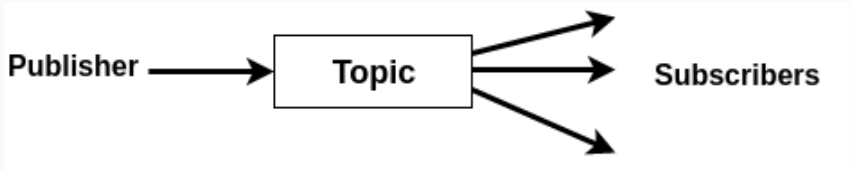
- Omnidirectional, four-wheeled
- 5-DOF manipulator with a two-finger gripper
- On-board PC with CPU, 2GB memory, 32GB SSD drive
- Sensors: vision sensors, rangefinders



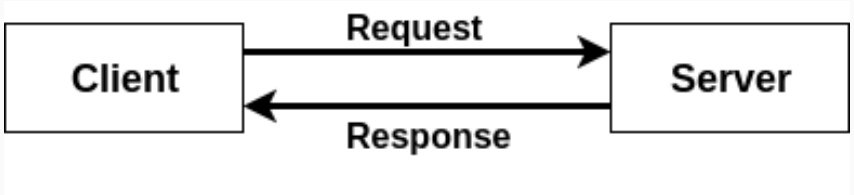
Robot Operating System (ROS)

Set of software and libraries.

- **Node**: A process using ROS.
- **Topic**: Message queue, used for communication between nodes.

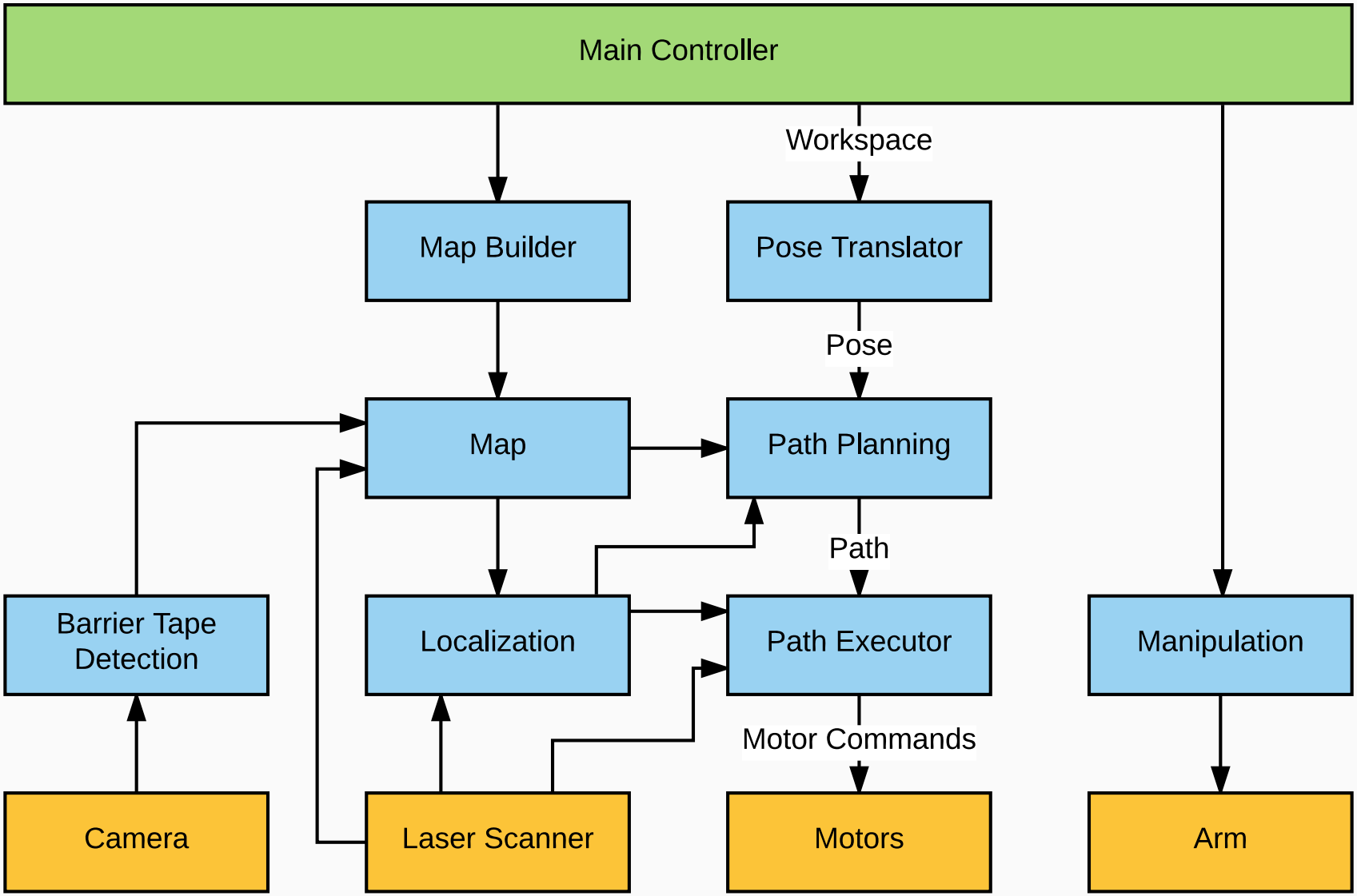


- **Service**: Offers synchronous service calls.



Approach

Software Modules



Realization

Simulation

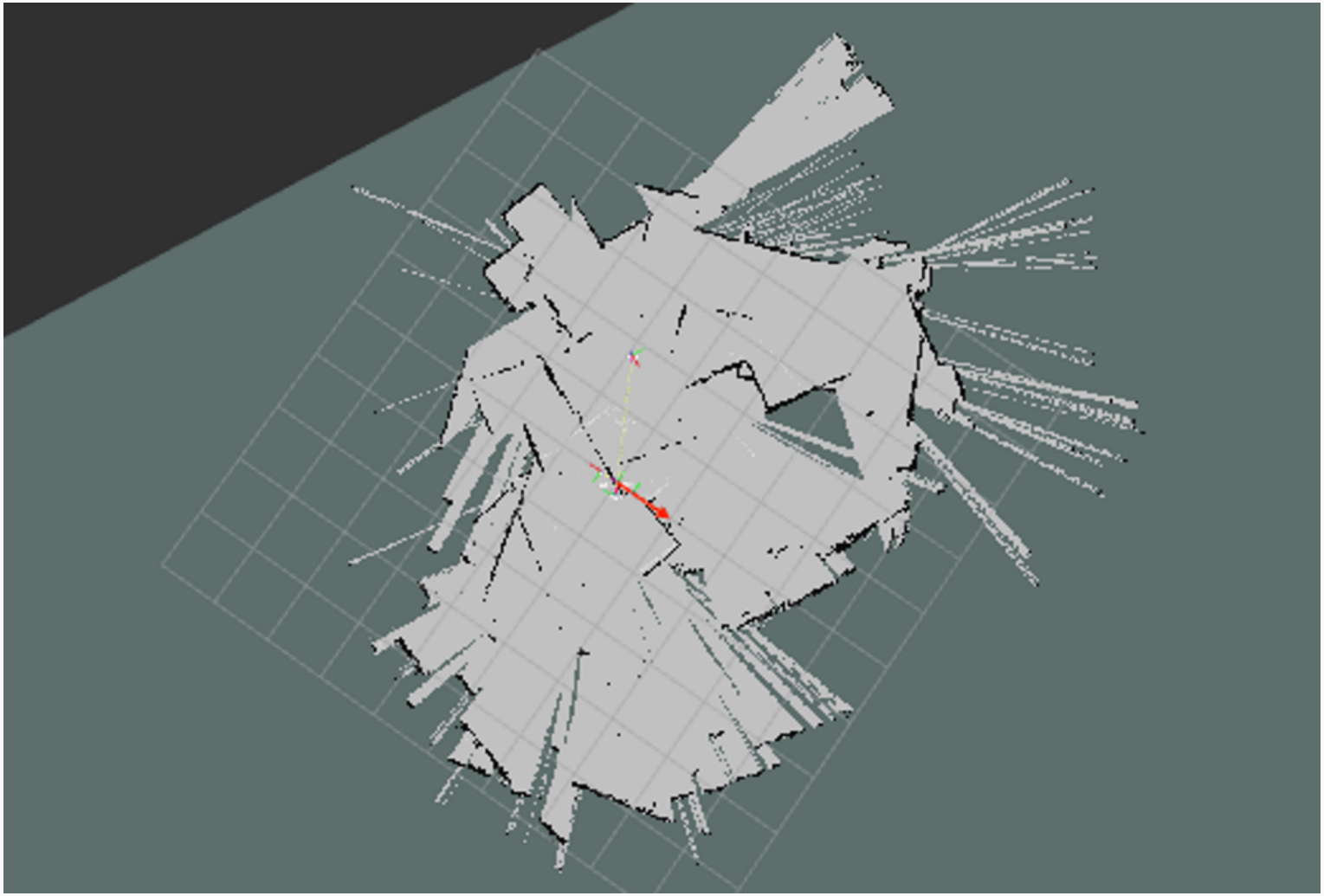
Map building I

Localization I

youBot Driver

Map building II

Map building III



Localization II

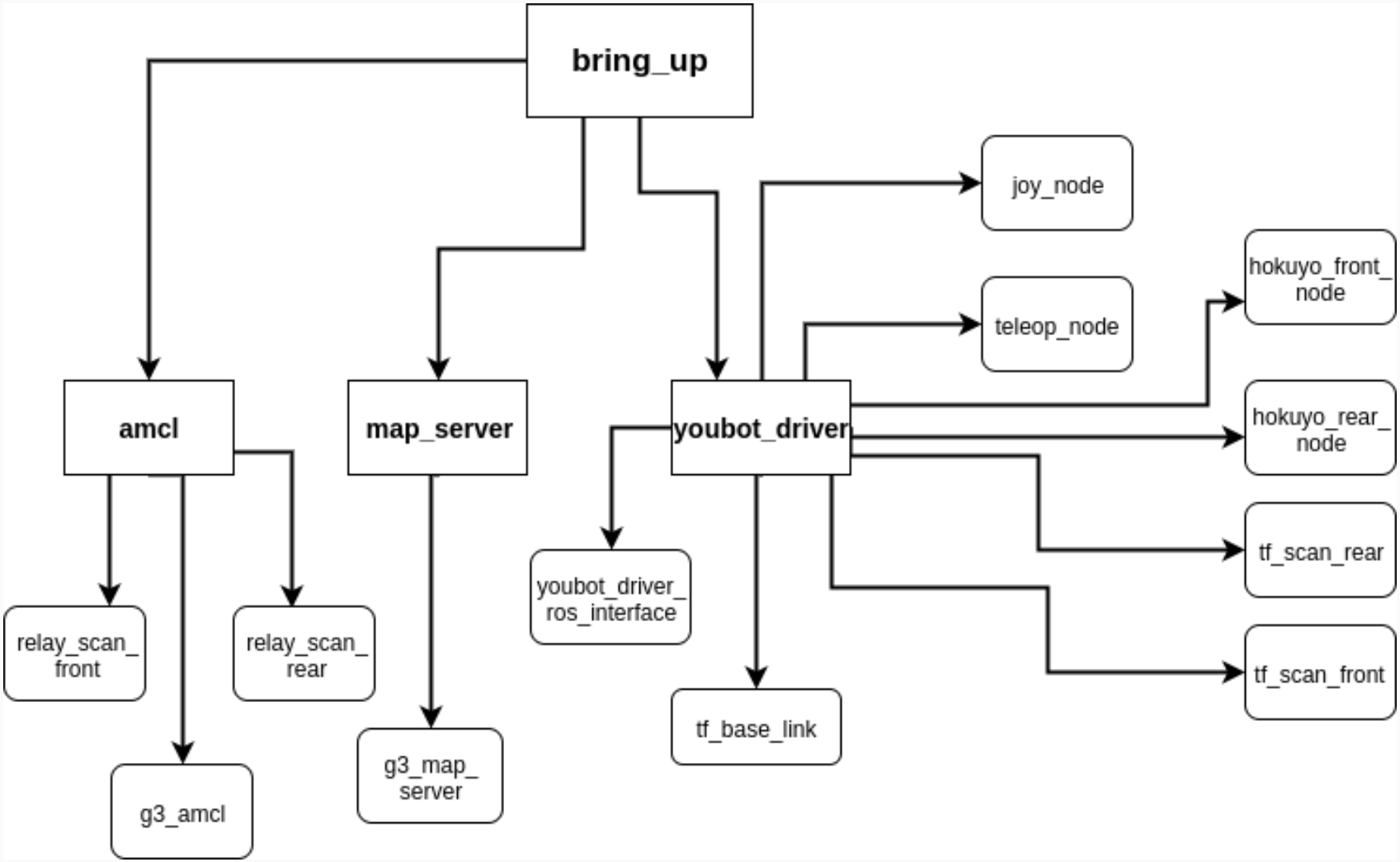
Navigation

Navigation - Local Planner

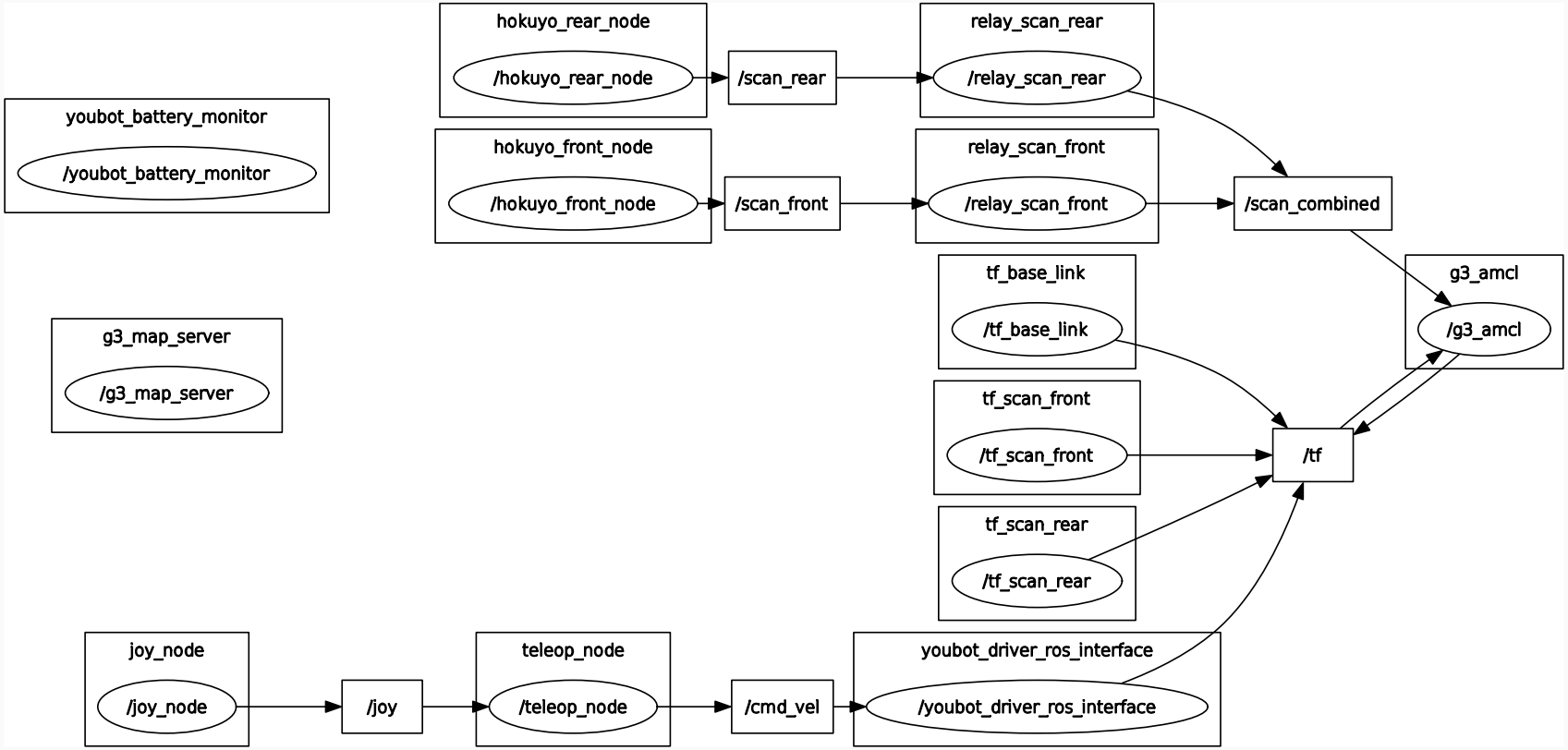
BNT.py

Results

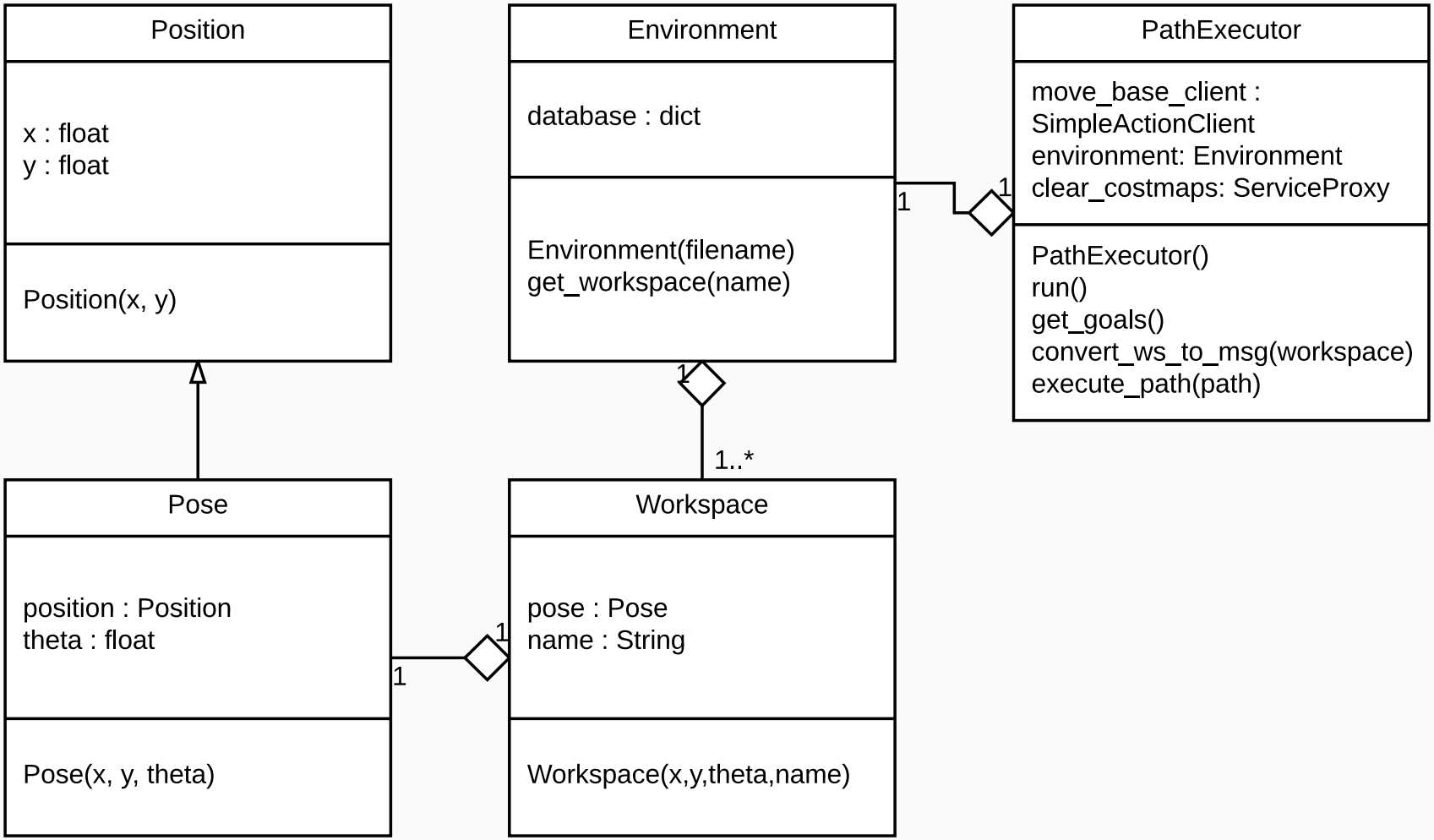
Launch Files



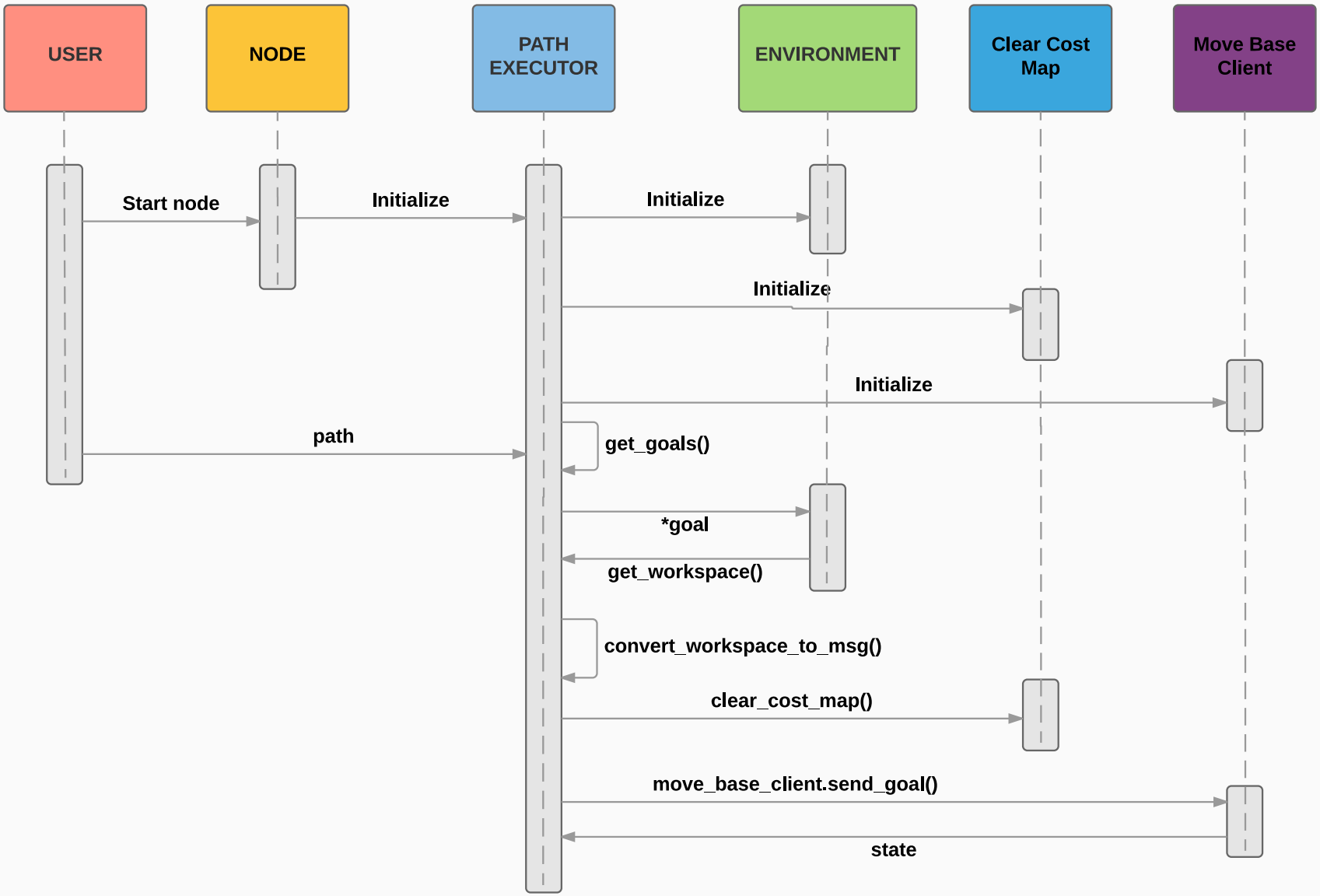
RQT Graph


hokuyo_rear_node
/hokuyo_rear_node
/scan_rear
relay_scan_rear
/relay_scan_rear
youbot_battery_monitor
/youbot_battery_monitor
hokuyo_front_node
/hokuyo_front_node
/scan_front
relay_scan_front
/relay_scan_front
/scan_combined
tf_base_link
/tf_base_link
g3_amcl
/g3_amcl
g3_map_server
/g3_map_server
tf_scan_front
/tf_scan_front
/tf
tf_scan_rear
/tf_scan_rear
joy_node
/joy_node
/joy
teleop_node
/teleop_node
/cmd_vel
youbot_driver_ros_interface
/youbot_driver_ros_interface

Class Diagram



Sequence Diagram



Conclusions

Conclusions

Future Work