

## Robotics-Lab

### Exercise Sheet

**Due: Tuesday, November 8th, 2011**

#### Exercise 1 (ROS Introduction)

Setup a working ROS system on your computer or obtain an account for the lab machines.

Follow all introductory tutorials at <http://www.ros.org/wiki/ROS/Tutorials>. If there is a Python and C++ tutorial for the same task, you can skip the Python tutorial.

For a better understanding the start guide at <http://www.ros.org/wiki/ROS/StartGuide> might be helpful, especially the Concepts section.

#### Exercise 2 (TF Introduction)

Follow the tutorials 1. - 3. for the TF library at <http://www.ros.org/wiki/tf/Tutorials>. If there is a Python and C++ tutorial for the same task, you can skip the Python tutorial.

#### Exercise 3 (Sample Messages)

Create a new ROS package for a sample project and define a new custom message for your project:

Project 1: First define a `MatchedFeature` message that describes a feature as image coordinates in the original image and the matched image. Then define a `MatchedFeatureList` that should contain a vector of `MatchedFeatures`.

Project 2: First define a `Line` message containing start and endpoint using `geometry_msgs/Point`. Then define a `LineList` message that should contain a vector of lines.

Project 3: Define a custom message `ImuAndHeight` that contains a `sensor_msgs/Imu` and a height with covariance. Choose appropriate types for height and its covariance.

#### Exercise 4 (Sample Package)

- (a) In the previously created package create a simple library that only has one function `process()` that returns an instance of a message created in the previous task. The message should be filled with appropriate dummy values.
- (b) Write an executable that uses the library to continuously (with 5 Hz) generate a message and publishes it to a topic.
- (c) Write a subscriber that subscribes the message and outputs it as a warning to the ROS system.

**The programming solutions should be submitted via eMail to [dornhege@informatik.uni-freiburg.de](mailto:dornhege@informatik.uni-freiburg.de) on the day before the practical.**