Welcome

On behalf of the organizers, TUM (Technische Universität München) and Willow Garage, welcome to the first ROS (Robot Operating System) Fall School on Cognition-enabled Mobile Manipulation! This school takes place at the CoTeSys (Cognition for Technical Systems) excellence cluster Central Robotics Laboratory at TUM, where over 100 scientists from different research institutions work on collaborative projects every day. We hope the school will be an excellent opportunity for students from all over the world to dive into the exciting research area of autonomous mobile manipulation using ROS.

The focus of the school is everyday manipulation in human living environments, an area which plays an essential role in personal robotics. By investing in open source, we aim to lay the groundwork for the use of personal robotics applications in everyday life. ROS is an important catalyst for developing research projects and applications that will push the boundaries of personal robotics as we know it.

We wish to thank all our sponsor (Willow Garage, Cotesys, KUKA, Metra, Robotics Equipment Corporation, Schunk and Tecnalia), for their generous support. On behalf of the organizing committee we would like to welcome you again to Munich and wish you all an inspiring and successful time!

Speakers:
Pieter Abbeel, UC Berkeley
Tamim Asfour, Karlsruhe University
Michael Beetz, Technische Universität München
Herman Bruyninckx, Katholieke Universiteit Leuven
Mihai Dolha, Technische Universität München
Victor Eruhimov, Itseez and Willow Garage
Brian Gerkey, Willow Garage
Gil E. Jones, Willow Garage
Maxim Likhachev, University of Pennsylvania
Kei Okada, University of Tokyo
Martin Riedmiller, University of Freiburg
Radu Bogdan Rusu, Willow Garage
Jürgen Sturm, University of Freiburg

ROS Cheat Sheet – more info at www.ros.org

Filesystem Command-line Tools

Tool	Description & Sample Usage
rospack/rosstack	A tool for inspecting packages/stacks. `$ rospack find [package]`
roscd	Changes directories to a package or stack. `$ roscd [package[/subdir]]`
rosls	Lists package or stack information `$ rosls [package[/subdir]]`

roscreate-pkg / roscreate-stack	Creates a new ROS package/stack
	 `$ roscreate-pkg [package name]`
	 `$ roscreate-stack [stack name]`

rosmake	Builds a ROS package `$ rosdep install [package]`
roswtf	Displays errors and warnings about a running ROS system or launch file `$ roswtf or roswtf [file]`
rxdeps	Displays package structure and dependencies `$ rxdeps [options]`

Common Command-line Tools

roscore is the central server in a ROS system (master, parameter server, rosout).

rosmsg/**rossrv** display Message/Service (msg/srv) data structure definitions.

rosrun executes nodes or programs in a given package without having to cd there first.

roslaunch starts ROS nodes specified in a .launch file locally and remotely via SSH, and sets their parameters.

rosnode shows information about running nodes.

rostopic displays information about advertised and subscribed topics, their publishing rate and the transmitted messages.

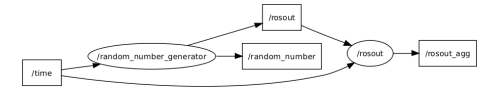**rosparam** allows to read and set parameters on the central parameter server.

rosservice is a tool for listing and querying ROS services.
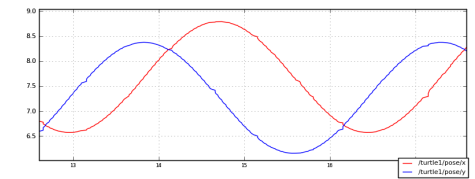
Logging Command-line Tools

rosbag is a tool to record or playback bag files.
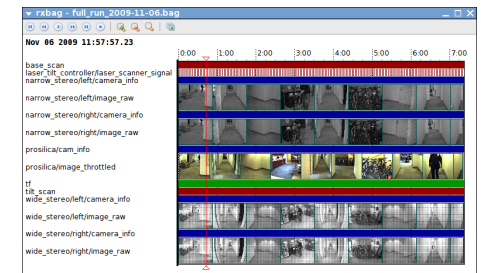
Graphical Tools

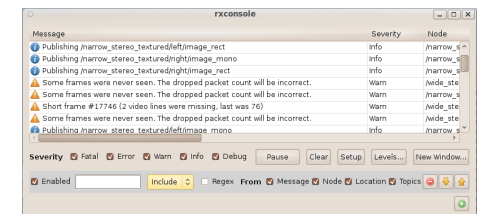**rxgraph** displays a graph of the ROS nodes that are currently running, as well as the ROS topics that connect them.

rxplot is a tool for plotting data from one or more ROS topic fields using matplotlib.

rxbag is a tool for visualizing, inspecting, and replaying histories (bag files) of ROS messages.

**rxconsole** is a tool for displaying and filtering messages published on rosout.

CoTeSys ROS Fall School on
Cognition-enabled Mobile Manipulation
Munich, 1.-6. November 2010

Schedule

Time	Monday — Opening, ROS Intro	Tuesday — From Sensors to Data and Processing	Wednesday — Industrial Day	Thursday — Planning & Control	Friday — Knowledge Processing & Learning	Saturday — Perception of Scenes
LECTURES						
9:00	Welcome. Cognition Enabled Control — Michael Beetz	Presentations: Willow Garage, Kuka, Schunk, MetraLabs, Tecnalia, REC		3D Simulation — Mihai Dolha	Learning Articulation Models — Jürgen Sturm	Supervised/Reinforcement Learning — Martin Riedmiller
9:30		OpenCV — Victor Eruhimov				
10:00						
10:30	ROS Introduction — Radu Bogdan Rusu, Brian Gerkey			Object-Action Complexes — Tamim Asfour	Task Guided Attention Control and Visual Verification — Kei Okada	Search-based Planning for Manipulation — Maxim Likhachev
11:00						
11:30		Point Cloud Library — Radu Bogdan Rusu	Company Exhibitions	Manipulation and Grasping in ROS — Gil E. Jones	Inverse Reinforcement Learning — Pieter Abbeel	ITASC — Herman Bruyninckx
12:00						
12:30						
13:00	**LUNCH BREAK**					
TUTORIALS						
14:00	Getting to know ROS — Radu Bogdan Rusu, Brian Gerkey	OpenCV/PCL object recognition — Radu Bogdan Rusu, Victor Eruhimov	Presentations - Participants; Demo at CCRL Lab	Plan-based Control — Lorenz Mösenlechner, Thomas Ruehr, Niko Demmel	Knowledge Processing — Moritz Tenorth, Lars Kunze	Inferring Missing Objects — Dejan Pangercic, Nico Blodow, Zoltan Marton
16:00	Gone for the day / Free Hacking	Gone for the day / Free Hacking	Hofbräuhaus	Gone for the day / Free Hacking		
19:00						

www.ros.org/wiki/ROS/Tutorials www.ros.org/wiki/tf/Tutorials www.ros.org/wiki/actionlib/Tutorials

pcl.ros.org www.ros.org/wiki/opencv2

www.ros.org/wiki/cram

ias.cs.tum.edu/kb/wiki/index.php/Main_Page

www.ros.org/wiki/prolog_perception

Important Fall School Locations

1 PTS – Papiertechnische Stiftung
Hess-Strasse 134
80797 München

2 CCRL – Cotesys Central Robotics Lab
Barer Strasse 21
80290 München

3 Hofbräuhaus
Platzl 9
80331 München
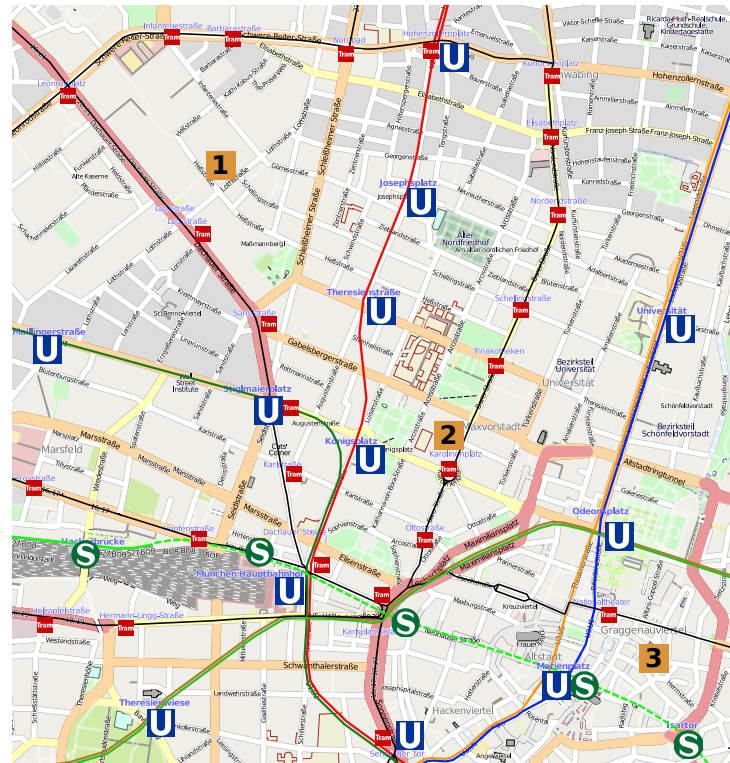
About the IT Infrastructure
www.ros.org/wiki/Events/CoTeSys-ROS-School/it

Emergency Phone Numbers
112   Fire Department & Ambulance
110   Police