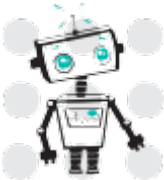
TUT ROS Summer School 2018

In collaboration with MASCOR

Mobile Autonomous Systems and Cognitive Robotics



ROS – Robot Operating System

What is ROS?

The Robot Operating System (ROS) is a flexible framework for writing robot software. It is a collection of tools, libraries, and conventions that aim to simplify the task of creating complex and robust robot behaviour across a wide variety of robotic platforms.

Why ROS?

Creating truly robust, general-purpose robot software is hard. From the robot's perspective, problems that seem trivial to humans often vary wildly between instances of tasks and environments. Dealing with these variations is so hard that no single individual, laboratory, or institution can hope to do it on their own.

As a result, ROS was built from the ground up to encourage collaborative robotics software development. The main idea of ROS is to avoid continuously reinventing the wheel, and to offer standardised functionalities performing hardware abstraction.

There has been remarkable progress in the field of mobile robotics over the last couple of years due to advanced hardware like 3D sensors and powerful embedded systems for processing.

However, the software has been upgraded as well: when Willow Garage launched the first version of ROS (Robot Operating System) in 2010, they started a standardization of the „middleware“ which drives the world of mobile robotics.

ROS is open source and offers the required services of an operating system. It is fine-grained and consists of numerous reusable modules. It also provides tools and libraries for obtaining, building, writing, and running code across multiple computers with a powerful communication engine.

ROS offers solutions for the main problems in mobile robotics: localization, mapping, path planning, locomotion and perception.

ROS.org ubuntu

ROS.org

ROS Summer School @ Tshwane University of Technology

The first ROS Summer School was offered in 2012 at FH-Aachen University of Applied Sciences, Germany. Since then it has grown and the first duplication of the ROS Summer School outside of Germany was presented at Tshwane University of Technology in 2016. It started mainly as an in-house course but has grown over the past two years and is now offered outside of TUT.

The ROS Summer School provides a good starting platform using simple robot hardware and - of course - ROS software.

The course starts on the first and second day with building a foundation in the basics of ROS, navigation in Linux, how ROS operates and then from the third day the main tasks of mobile robotics, i.e. perception, localization, mapping and path planning is introduced, investigated and applied.

The philosophy of the ROS summer School is:

"*Learning by doing*

to get hands-on experience".

Besides acquiring the necessary theoretical knowledge, all topics are taught in small groups on real mobile robots.

One of the highlights of the summer school is a competition (an urban challenge) on the last day of the summer school. Participants form different teams that have the task to design a typical mobile robotic application like indoor/outdoor exploration. They all use the same hardware, powered by their learnt ROS skills.

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TUT ROS Summer School program

Day 1	*Registration, ROS Basics: Navigation in Linux, ROS File system, develop executables for robots (ROS nodes)*
Day 2	*ROS Communication: Publisher/Subscriber principle, develop a program to tele operate a robot*
Day 3	*Robot model description: ROS TF / Gazebo, describe robot kinematics and sensor locations, transform coordinate frames*
Day 4	*Robot environment perception: Simultaneous Localization and Mapping in a real environment, identification and position estimation of Augmented Reality Tags*
Day 5	*Robot Challenge: Navigate your robot through a defined path*

Information and registration

Date	26 November to 30 November 2018, Every day from 9:00 till 16:00
Venue	Tshwane University of Technology, Pretoria West campus, Building 13, room 242
Cost	R 3,000.00 per participant (approx... Euro 250) Includes all course material, beverages, and lunches. Excludes accommodation and travel expenses.
Requirements	*Attendees should have a basic knowledge of at least one programming language such as Python or C++.*
Registration	*TUT ROS Summer School* *(Click on this link will take you to the registration page)*
Enquiries	*Johan Benade, benadejg@tut.ac.za or (012) 382 5177 or 082 855 5680*

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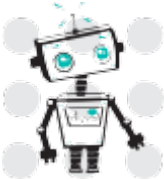

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