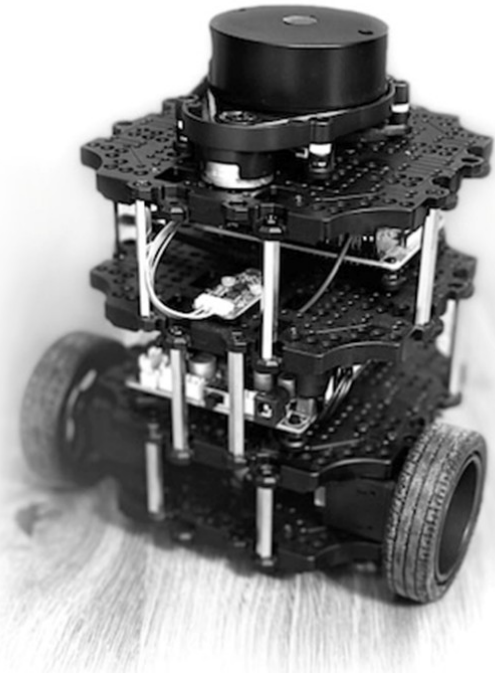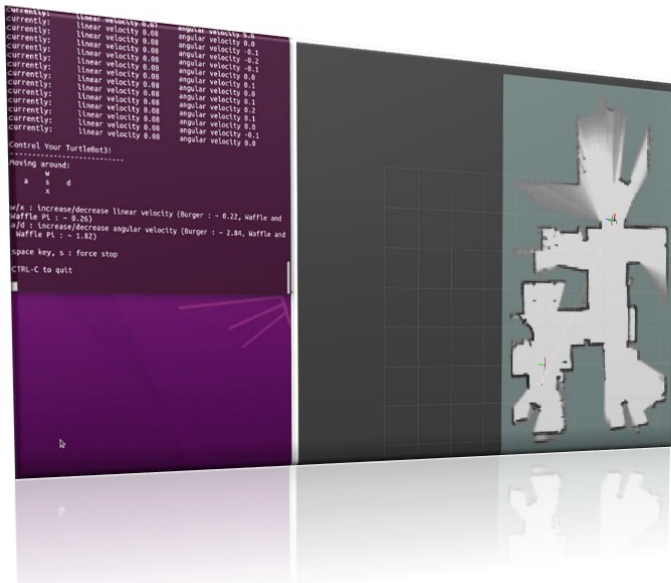# Workshop " Making mobile robotics tangible - autonomous mobile robots using ROS"

The workshop "Making mobile robotics tangible - autonomous mobile robots using ROS" offers you the opportunity to explore and actively learn the capabilities of a modern robotics platform and train them in a practical way.

The workshop introduces you to advanced navigation concepts for mobile robotics with focus on industrial applications in an easy way, enabling you to maintain and debug complex solutions yourself, without third-party assistance. In this way, you can put a complex system into operation in a short time without precise knowledge of the internal structures, thereby saving costs and waiting times.

Content

While many proprietary programming languages have been and are still widespread in industrial robotics over the last few decades, open-source operating systems such as ROS (Robot Operating System) are becoming more and more popular as shown for example by the growing count of 84 institutions being part of ROS Industrial, such as ABB, Yaskawa, Pilz, Siemens, Bosch, and Amazon, which extends the advanced capabilities of ROS software to industrial relevant hardware and application.

The advantages of ROS are the availability of many open and free-of-charge pre-configured packages that many robot manufacturers already offer that allow

- learning recent tools for robot control
- modular and scalable application design
- allows fast programming and debugging
- easy deployment and transfer
- easy porting to other hardware, also from various vendors

The workshop will be held by Dr. Gaël Écorchard at the Czech Institute of Informatics, Robotics, and Cybernetics (CIIRC), Team of Intelligent and Mobile Robotics, Prague, Czech Republic, as an expert in navigation of mobile robots.

The learning platform is an online platform from the European Union, Skills.move, and, as such, you will be granted access to the platform before and after the event, according to your wishes or in the case that you cannot attend the event at all.

For detailed information and registration please contact Gaël Écorchard, gael.ecorchard@cvut.cz.

The focus of the workshop is on demonstrating some features of ROS that you will practice yourself on a real robot, the TurtleBot3.

- You will learn what the advantages of ROS are.
- You will get to know free-of-charge and freely-accessible tools from ROS that you can directly set up and configure.
- You will learn about the possibilities of simulating a robot and its environment in order to be able to try out functions without using a hardware robot.
- You can work alone or in a small group on-site with a mobile robot we lend you, the Turtlebot3.
- You get the opportunity to acquire knowledge about innovative, digital teaching content with the support of the experts.

The tools and methods that we will present to you in the event can be applied directly by you and transferred to any ROS-compatible robotic system.

Topics

The workshop contains seven modules written in English that you can combine according to your own wishes

- Introduction to ROS2 (2 h)
- Navigation Stack in ROS2 (2 h)
- Distributed Control (2 h)
- Dynamic Window Approach (2 h)
- Model Predictive Control (2 h)
- Timed Elastic Band (2 h)
- Artificial Potential Fields (2 h)

Your advantage

- You proactively deal with the current and versatile robotics platform ROS.
- You have the opportunity to work directly on a robot.
- You can choose your ideal learning pace by using digital content.

The target group

The workshop is aimed at professionals in industry, robotics engineers, application developers and technicians. Moreover, the course brings the technological background also for students and young professionals in their industrial career in robotics.

Our partners

 The content of the event was created in cooperation with the CIIRC of the Czech Technical University and the partners of the EIT Manufacturing project RIEMANN: BIBA, Bremen Institute for Production and Logistics, Germany, The Institute of Technology of the University of Tartu (Estonia), and COMAU (Italy).
 The project RIEMANN (http://imr.ciirc.cvut.cz/riemann/) is a EIT Manufacturing Education project within which the digital learning content of this workshop was written.