TERRINet Training – Intro to Robotics

Training Outline
This 3-days course offers possibility to (i) obtain insight into most basic background of robot algorithms. Lab practice part is (ii) including work with Epson, ABB, UR, Fanuc, Yaskawa and Franka robots.

Course Robotics gives an overview over the entire field of robotics. Topics are selected according to the needs of engineers who introduce or maintain robotic cells or production lines in industry.
(i) In the theoretical part of the course students learn the geometric model of the robot, which is essential for programming robots.
(ii) In the practical part of the course, students in small groups learn programming of industrial robots.

Learning Outcomes
After completion of the course, students will be able to:
- describe the operation of robot systems,
- describe robot pose with homogeneous transformation matrices,
- design a geometric model of robot mechanism,
- implement a control scheme specific to robotics,
- link theoretical knowledge of geometric models with programming of industrial robots, -- use of knowledge for development of robotic production cells.

Structure of Training
Day 1: Introduction
General introduction (degrees of freedom, robotic manipulator, robot arms, introduction of robots in industrial processes). Homogeneous transformation matrix (translation, rotation,

Day 2: Robotic sensors
- principles of sensing,
- sensors of movement (placing of sensors, potentiometer, optical, magnetic, inertial measurement unit),
- contact (tactile sensor, limit switch and bumper, force and torque, joint torque sensor, proximity and ranging, ultrasonic, laser rangefinder and laser scanner).

Day 3: Robot control
- position control,
- trajectory planning in internal coordinates,
- control of the contact force.

Pre-requisites
- Basic mathematical knowledge (incl. matrix computation)
- basic programming using command line.