AUSFÜLLHILFE: BEWEGEN SIE DEN MAUSZEIGER ÜBER DIE ÜBERSCHRIFTEN. AUSFÜHRLICHE HINWEISE: LEITFADEN MODULBESCHREIBUNG

Robotics

Module Code	Workload	Credits/CP	Semester	Frequency of module	Duration
	60 h	2	4-7	WS, SS	1 Semester

1	Module	Teaching Language	Contact hours	Self-study	Class size
	Robotics	English, German (optional)	2 SWS / 30 h	30 h	max. 20

2 Learning outcomes

You know the basics of robotics from modeling and design of the mechanics, sensors and actuators, path planning and control of robots. You understand the functionality of a robot and you are able to configure and design a robot and its components respectively. With these skills you are prepared to develop and implement robot based automation systems.

3 Individual component content

Robots are the typical element of flexible automation systems. Its flexibility is the base for the economic production of smallest batch sizes and it offers manifold applications, from automotive industry, component supplier and machine building industry up to health and service applications. Robotics is the classical application of mechatronics – the integration of mechanics, electronics and software engineering to build dynamic and "intelligent" systems. Therefore robotics methods are used more and more in other areas like machines and devices as well. Part of the course will be the implementation of a robot.

1 Introduction
applications, specifications, work space, payload, accuracy, velocities
challenges

2 Robot Kinematics
Homogenous Transformations, Denavit-Hartenberg-Parameter
Inverse Kinematics
Velocities, Jacobi-Matrix, Static forces and torques

3 System-Integration
Endeffectors und Grippers, (external) Sensors
Peripherals,Safety Aspects

4 Robot dynamics and Control
Dynamic Equations, Robot Control

5 Trajectory Planniing
Trajectories in Joint- and Worldkoordinates

Fig: Hyundai Heavy Industries

Version	Erstellt von	Freigabe (Datum/Kürzel)	Gültig ab
1.3	jr	QM-Board 11.4.2012, 16.01.2013 04.06.2013/jr	04.06.2013

4	**Teaching methods** Lecture, Seminar
5	**Prerequisites** Basic knowledge of mechanics and electronics
6	**Methods of assessment** Assignments
7	**Applicability of module** Required elective course, prerequisite
8	**Person responsible for module/ lecturer** Prof. Dr. sc. techn. Christoph Uhrhan
9	**Reading list (Core texts and recommended texts)** [1] John J. Craig; Introduction to robotics : mechanics and control, Pearson/Prentice Hall, 2005 [2] Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo; Robotics : Modelling, Planning and Control, Springer, 2009 (e-book) [3] Tadej Bajd, Matjaz˘ Mihelj, Marko Munih, Introduction to Robotics, Springer, 2013, (e-book) [4] Bruno Siciliano, Oussama Khatib; Handbook of Robotics, Springer, 2008 (e-book) [5] Peter Corke; Robotics, vision and control : fundamental algorithms in MATLAB, Springer, 2011