

## **Module: Control Systems Basics**

Level	Bachelor	Short Name	CSB	
Responsible Lecturers	Korff, Alexander Prof. Dr.			
Department, Facility	Electrical Engineering and Computer Science			
Course of Studies	Elektrotechnik - Kom	munikationssysteme, Bachelor		
Compulsory/elective	Compulsory	ECTS Credit Points	5	
Semester of Studies	5	Semester Hours per Week	4	
Length (semesters)	1	Workload (hours)	150	
Frequency	WiSe	Presence Hours	60	
Teaching Language	English	Self-Study Hours	90	
The following section is filled on	ly if there is <b>exactly or</b>	ne module-concluding exam.	1	
Exam Type	Written Exam	Exam Language	English	
Exam Length (minutes)	120	Exam Grading System	One-third Grades	
	able to:		s" the students are	
	<ul> <li>and evaluate the series of their behaviour.</li> <li>are able to independent and evaluate and evalua</li></ul>	ependently orientate theirselfes ind classify new research and te amental high level methods and development of for example a si	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation	
Participation Prerequisites	<ul> <li>assess the bas and evaluate their behaviour</li> <li>are able to ind and evaluate a apply the fundimplement the robotic/mechtres</li> <li>assess which a result from for</li> </ul>	the influence of certain elements/ r ependently orientate theirselfes in and classify new research and teamental high level methods and development of for example a signic systems advantages/disadvantages and cexample mobile systems/mobile and which obligations derive from	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation	
	<ul> <li>assess the bas and evaluate their behaviour.</li> <li>are able to ind and evaluate a apply the fundamplement the robotic/mechtre.</li> <li>assess which a result from for to our society at Knowledge of lecture.</li> </ul>	the influence of certain elements/ r ependently orientate theirselfes in and classify new research and teamental high level methods and development of for example a sionic systems advantages/disadvantages and dexample mobile systems/mobile and which obligations derive from the sin 1. – 3. semester	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation	
The previous section is filled onl  Consideration of Gender	<ul> <li>assess the bas and evaluate their behaviour.</li> <li>are able to ind and evaluate at apply the funding implement the robotic/mechtr.</li> <li>assess which a result from for to our society at their is exactly or</li> </ul>	the influence of certain elements/ r ependently orientate theirselfes in and classify new research and teamental high level methods and development of for example a sionic systems advantages/disadvantages and dexample mobile systems/mobile and which obligations derive from the sin 1. – 3. semester	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation	
The previous section is filled onl	<ul> <li>assess the bas and evaluate their behaviour.</li> <li>are able to ind and evaluate a apply the funding implement the robotic/mechtr.</li> <li>assess which a result from for to our society a Knowledge of lecture.</li> <li>y if there is exactly on</li> <li>Use of gender-needs</li> </ul>	the influence of certain elements/ r ependently orientate theirselfes in and classify new research and teamental high level methods and development of for example a sionic systems advantages/disadvantages and devample mobile systems/mobile and which obligations derive from the influence of the module-concluding exam.	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation in this	
The previous section is filled onl  Consideration of Gender	<ul> <li>assess the bas and evaluate their behaviour.</li> <li>are able to ind and evaluate a apply the fundatimplement the robotic/mechtr.</li> <li>assess which a result from for to our society at there is exactly on the use of gender-new arguments.</li> <li>Target group specification.</li> </ul>	the influence of certain elements/ rependently orientate theirselfes in and classify new research and teamental high level methods and development of for example a significant systems advantages/disadvantages and devample mobile systems/mobile and which obligations derive from the influence of the module-concluding exam.  The entertail language (THL standard)	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation in this	
The previous section is filled onl  Consideration of Gender	<ul> <li>assess the bas and evaluate their behaviour.</li> <li>are able to ind and evaluate a apply the fundatimplement the robotic/mechtr.</li> <li>assess which a result from for to our society at there is exactly on the use of gender-new arguments.</li> <li>Target group specification.</li> </ul>	the influence of certain elements/ r ependently orientate theirselfes in and classify new research and termental high level methods and development of for example a sitionic systems advantages/disadvantages and devample mobile systems/mobile and which obligations derive from the influence of the module-concluding exam.  The module-concluding exam.  The cutral language (THL standard) cific adjustment of didactic methods.	hatronic systems /components on in the field taught chnologies tools to plan/ imple mobile opportunities/risks robotics in relation in this	



## **Module Course: Control Systems Basics (Lecture)**

(of Module: Control Systems Basics)

Course Type   Lecture   Form of Learning   Presence						
Participation Limit Group Size 12 Workload (hours) 90 Teaching Language English Presence Hours Self-Study Hours ("Studienleistung", SL) SL Length (minutes) SL Grading System The following section is filled only if there is a course-specific exam.  Exam Type Exam Language Exam Language Exam Length (minutes) Learning Outcomes Participation Prerequisites The previous section is filled only if there is a course-specific exam.  Contents The lecture gives an overview of the main challenges, approaches and methods in the field of mobile systems and mobile robotics. After an introduction (classification, overview of the different mobile systems), the following topics will be covered: Sensors and actuators and manipulation for mobile systems, localization and navigation, the specifics of communication as well as energy supply for mobile systems, aspects of security, the Robotic Operating System ROS and its possibilities, and the architecture of mobile systems.  Literature  [1] Peter Corke. Robotic Vision: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [2] Peter Corke. Robotics and Control: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [3] https://clearpathrobotics.com/turtlebot-4/ [4] https://www.ros.org/	Course Type	Lecture	Form of Learning	Presence		
Teaching Language English Presence Hours 45  Study Achievements ("Studienleistung", SL)  SL Length (minutes)  The following section is filled only if there is a course-specific exam.  Exam Type  Exam Language  Exam Language  Exam Language  Exam Grading System  The previous section is filled only if there is a course-specific exam.  Contents  The previous section is filled only if there is a course-specific exam.  Contents  The lecture gives an overview of the main challenges, approaches and methods in the field of mobile systems and mobile robotics. After an introduction (classification, overview of the different mobile systems), the following topics will be covered:  Sensors and actuators and manipulation for mobile systems,  localization and navigation,  the specifics of communication  as well as energy supply for mobile systems,  aspects of security,  the Robotic Operating System ROS and its possibilities,  and the architecture of mobile systems.  Literature  [1] Peter Corke. Robotic Vision: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022  [2] Peter Corke. Robotics and Control: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022  [3] https://clearpathrobotics.com/turtlebot-4/  [4] https://www.ros.org/	Mandatory Attendance	yes	ECTS Credit Points	3		
Teaching Language English Presence Hours 45  Study Achievements ("Studienleistung", SL)  SL Length (minutes)  The following section is filled only if there is a course-specific exam.  Exam Type Exam Language Exam Language Exam Learning Outcomes  Participation Prerequisites  The previous section is filled only if there is a course-specific exam.  Contents The lecture gives an overview of the main challenges, approaches and methods in the field of mobile systems and mobile robotics. After an introduction (classification, overview of the different mobile systems), the following topics will be covered:  Sensors and actuators and manipulation for mobile systems,  localization and navigation,  the specifics of communication  as well as energy supply for mobile systems,  aspects of security,  the Robotic Operating System ROS and its possibilities,  and the architecture of mobile systems.  Literature [1] Peter Corke. Robotic Vision: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [2] Peter Corke. Robotics and Control: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [3] https://clearpathrobotics.com/turtlebot-4/ [4] https://www.ros.org/	Participation Limit		Semester Hours per Week	3		
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Remarks	Literature	Springer-Verlag, 2022 [2] Peter Corke. Robotics and Control: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [3] https://clearpathrobotics.com/turtlebot-4/				
	Remarks					

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## **Module Course: Control Systems Basics (Lab)**

(of Module: Control Systems Basics)

Course Type	Practical Training	Form of Learning	Presence	
Mandatory Attendance	no	ECTS Credit Points	2	
Participation Limit		Semester Hours per Week	1	
Group Size		Workload (hours)	60	
Teaching Language	English	Presence Hours	15	
Study Achievements ("Studienleistung", SL)		Self-Study Hours	45	
SL Length (minutes)		SL Grading System		
The following section is filled on	ly if there is a course-s	specific exam.		
Exam Type		Exam Language		
Exam Length (minutes)		Exam Grading System		
Learning Outcomes				
Participation Prerequisites				
The previous section is filled on	y if there is a course-s	pecific exam.		
Contents	In the practical course, the methods learned in the lecture are applied practically within the framework of a design of a mobile robot system. The partial/results are regularly presented and discussed in the group.			
Literature	[1] Peter Corke. Robotic Vision: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [2] Peter Corke. Robotics and Control: Fundamental Algorithms in MATLAB, Springer-Verlag, 2022 [3] https://clearpathrobotics.com/turtlebot-4/			
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Remarks				

3 21.09.2023