

Real-time Operating Systems Development							Modulnummer:													
<i>Real-time Operating Systems Development</i>							ME-702.04													
Master Pflicht/Wahl <input type="checkbox"/> Wahl <input checked="" type="checkbox"/> Basis <input type="checkbox"/> Ergänzung <input checked="" type="checkbox"/> Sonderfall <input type="checkbox"/>				Zugeordnet zu Masterprofil <table style="width:100%; border:none;"> <tr> <td style="width:60%;"></td> <td style="text-align:center;">Basis</td> <td style="text-align:center;">Ergänzung</td> </tr> <tr> <td>Sicherheit und Qualität (SQ)</td> <td style="text-align:center;"><input type="checkbox"/></td> <td style="text-align:center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>KI, Kognition, Robotik (KIKR)</td> <td style="text-align:center;"><input type="checkbox"/></td> <td style="text-align:center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Digitale Medien und Interaktion (DMI)</td> <td style="text-align:center;"><input type="checkbox"/></td> <td style="text-align:center;"><input type="checkbox"/></td> </tr> </table>						Basis	Ergänzung	Sicherheit und Qualität (SQ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	KI, Kognition, Robotik (KIKR)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Digitale Medien und Interaktion (DMI)	<input type="checkbox"/>	<input type="checkbox"/>
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Modulbereich: Praktische und Technische Informatik																				
Modulteilbereich: 702 Betriebssysteme																				
Anzahl der SWS		V	UE	K	S	Prak.	Proj.	Σ	Kreditpunkte: 6	Turnus every year										
		2	2	0	0	0	0	4												
Formale Voraussetzungen: Keine																				
Inhaltliche Voraussetzungen: Good programming skills in C are mandatory. A thorough understanding of basic operating systems concepts is very helpful for this lecture.																				
Vorgesehenes Semester: ab 1. Semester																				
Sprache: Englisch																				
Ziele: Students 1) know how to program a real-time application from scratch on "bare-metal", that is, WITHOUT a supporting operating systems 2) know how to design an elegant real-time operating system kernel from scratch 3) understand the right balance between architectural beauty and optimised performance 4) know about basic benchmarks assessing the real-time capabilities of an RTOS 5) know how to do practical real-time application programming and RTOS development from scratch on a simple ARM-based computer architecture (BeagleBone Black)																				
Inhalte: . 1) Bare-metal programming on BeagleBode Black boards using the Code Composer Studio development environment (Eclipse-based) 2) The State Machine programming paradigm with cooperative multi-tasking, scheduling, watchdog monitor 3) Periodic time-controlled activities 4) Simple context switching: Programming user threads and associated schedulers 5) Inspiration from micro kernels: RTOS architecture with communication channels and ports 6) Filtered and prioritised real-time port handling 7) Real-time synchronisation mechanisms 8) Time-triggered versus event-based RTOS paradigms 9) RTOS Benchmarks																				
Unterlagen (Skripte, Literatur, Programme usw.): <ul style="list-style-type: none"> • Wang, K.C. Embedded and Real-Time Operating Systems. DOI 10.1007/978-3-319-51517-5_2. Springer 2017. • Kopetz, H. Real-Time Systems: Design Principles for Distributed Embedded Applications. Second edition. Springer 2011. • Walls, C. Building a Real-Time Operating system. Rtos from the ground up. Elsevier Science & Technology 2007. • Cooling, J. Real-time Operating Systems Book 1. The Theory. Lindentree Associates, 2017. • Cooling, J. Real-time Operating Systems Book 2. The Practice. Lindentree Associates, 2017. 																				
Form der Prüfung: Oral module examination or Exercises and oral technical discussion (Fachgespräch)																				

Arbeitsaufwand	Präsenz	0 h
	Übungsbetrieb/Prüfungsvorbereitung	180 h
	Summe	180 h
Lehrende: Jan Peleska		Verantwortlich: Jan Peleska