| 03-IMVP-ROSD | **Real-time Operating Systems Development** |
|—|—|

Lehrform / Anzahl der SWS: 2VL + 2UE

Kreditpunkte: 6

Turnus: i.d.R. angeboten in jedem SoSe

Inhaltliche Voraussetzungen: Good programming skills in C are mandatory. A thorough understanding of basic operating systems concepts is very helpful for this lecture

Sprache: Englisch

Lehrende: Prof. Dr. Jan Peleska

Studiengang	(Primäre) Modul(e), ggf. Schwerpunkt(e)	Semester
Infornatik (Master)	IMVP, IMVP-SQ	ab 1.Sem.
Systems Engineering I/II (Master)	M07-PB-ESS	ab 1./2.Sem.
Infornatik (Bachelor)	(nur *Freie Wahl*)	

Lernziele / Learning Outcome: Students

- know how to program a real-time application from scratch on "bare-metal", that is, WITHOUT a supporting operating systems
- know how to design an elegant real-time operating system kernel from scratch
- understand the right balance between architectural beauty and optimised performance
- know about basic benchmarks assessing the real-time capabilities of an RTOS
- know how to do practical real-time application programming and RTOS development from scratch on a simple ARM-based computer architecture (BeagleBone Black)

Inhalte / Contents:

- Bare-metal programming on BeagleBode Black boards using the Code Composer Studio development environment (Eclipse-based)
- The State Machine programming paradigm with cooperative multi-tasking, scheduling, watchdog monitor
- Periodic time-controlled activities
- Simple context switching: Programming user threads and associated schedulers
- Inspiration from micro kernels: RTOS architecture with communication channels and ports
- Filtered and prioritised real-time port handling
- Real-time synchronisation mechanisms
- Time-triggered versus event-based RTOS paradigms
- RTOS Benchmarks

Unterlagen (Skripte, Literatur, Programme):

- 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: i.d.R. a) Übungsaufgaben und Fachgespräch oder b) mündliche Prüfung

Arbeitsaufwand:	180h
Präsenz	56h
Übungsbetrieb/Prüfungsvorbereitung	124h

Weitere Hinweise: KEINE