XX in the Loop Systems

Code: MK5XXLRR6R217-EN

ECTS Credit Points: 6

Evaluation: exam

Year, Semester: 1st fall semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The put together, in real time, during the testing of the embedded critical systems the so called hardware in the loop (HIL) testing technique was used. The HIL makes troubleshooting more efficient, and makes the product's waiting time to get on the market shorter, and lessens the improvement costs. The goal of these proceedings, that the examined tool used during testing, to be in a similar physical environment and to function. The making of the HIL system is complex and is about integration the systems and simulations into the environment. Real time simulations to be done in a simulation environment, and measurement of virtual telemetry data and make meaning of them. To apply changes on the given simulation system, to make it more efficient.

Literature:

Recommended:

- Encyclopedia of Automotive Engineering, Discrete Engineering to Configure the ECU and Components (2014), Susanne Köhl, Markus Plöger, DOI: 10.1002/9781118354179.auto193
- Hardware-in-the-Loop Simulation, (2015) Ron T. Ogan, ISBN 978-1-4471-5633-8

Schedule

1st week Registration week	
2nd week: **Lecture:** cRIO and configuration. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).	**3rd week:** **Lecture:** Use of simulation toolkit on cRIO system. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).
4th week: **Lecture:** Inter-process communication. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).	**5th week:** **Lecture:** Communication with computer. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).
6th week: **Lecture:** Programming of FPGA. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).	**7th week:** **Lecture:** Theoretical test writing. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).
8th week: 1st drawing week	
9th week: **Lecture:** Communication with the FPGA core.	**10th week:** **Lecture:** Use of PWM.

Practice: Make a hardware and software demonstrative HIL environment (National instruments or on other tools).	**Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).
11th week: **Lecture:** Servo and step motor usage. **Practice:** Make a hardware and software demonstrative HIL environment (National instruments or on other tools).	**12th week:** **Lecture:** Temperature control. **Practice:** Hand in assignment.
13th week: **Lecture:** Implementation of HIL. **Practice:** HIL rating.	**14th week:** **Lecture:** Theoretical test writing. **Practice:** HIL rating.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation on practice, according to Rules and Regulations. The correct solution of the homework and submission before deadline.

B, for grade:

Oral exam on theoretical part.