Universität für angewandte Kunst Wien
University of Applied Arts Vienna

Call for Seminar

on

Cross-Disciplinary Aspects of Cyber-Physical System Design for Winter Semester 2018/19

Course Objectives

In our modern society we depend on computer-controlled and computer-assisted systems. A substantial number of such systems are cyber-physical systems (CPS), as for example automobiles, airplanes, duty vehicles, industrial robots and other sophisticated machineries, in which a computer directly controls a physical process. These cyber-physical systems are inherently complex, and complexity rapidly increases as various cyber-physical systems interact with each other, sometimes even over the Internet, to form systems-of-systems (SoS).

The boundaries of such systems are often blurred, and it becomes infeasible to fully define these systems by a complete set of formal requirements. Autonomous driving, Industry 4.0, and the Industrial Internet of Things are examples of such systems. Although techniques have been developed to design such systems, these techniques are not sufficiently concrete to allow a straight-forward procedural application. Thus, already the application of these techniques requires significant acts of creativity. In this seminar we explore these acts of creativity on the intersection of the arts, sciences, and engineering. Students will be asked to define a topic for a presentation and joint discussion.

Seminar organizational details

The attendance is limited to ten students from University of Applied Arts Vienna. Interested students are asked to apply per email to: Jürgen Gschiel, rektorat@uni-ak.ac.at. The application shall include the subject „CPSD-Seminar“, name, short biography and presentation topic

Application start: 4.6.2018, application end: 22.6.2018. A jury will select a maximum of ten students from the entries. In case of confirmation by the corresponding professors, the participation in the seminar and/or the resulting project, ECTS points can be credited.

The seminar is organized in four parts: (a) pre-seminar preparation, (b) introduction, (c) student presentations, and (d) joint conclusion.

a) Pre-seminar preparation: the students are expected to study the books and papers listed in the reading list below.
b) Introduction (Oct. 2018): Prof. Kopetz will give a lecture of about 45 minutes, followed by each student presenting her/his proposed presentation topic.
c) Student Presentations (Nov – Dec 2018): each student will present her/his topic in a 20 minutes presentation followed by 10 minutes of discussion. We will meet Thursday every second week from 15:00-17:00. (We expect about three meetings / 2h each)
d) Conclusion (Jan. 2019): we will reflect on the lecture and lessons learned.

Reading List

- Herbert A. Simon, "The Sciences of the Artificial", The MIT Press, 3 edition 1996
- Christopher Jones, "Design Methods: Seeds of Human Futures", John Wiley & Sons Ltd
- Christopher Alexander, "A Pattern Language", Oxford University Press
- NASA Study on Flight Software Complexity
  https://www.nasa.gov/pdf/418878main_FSWC_Final_Report.pdf

The seminar will be held together with TTTech Computertechnik AG and Prof. Hermann Kopetz, co-founder of TTTech and Prof. Emeritus from TU Vienna

TTTech Computertechnik AG is the technology leader in robust networked safety controls. TTTech's solutions and best-in-class products improve the safety and reliability of networked computer systems and are used in various industries such as automotive, aerospace, off-highway, energy production, railway and industrial. For more details please visit TTTech's website at: www.tttech.com

Prof. Hermann Kopetz received his PhD in physics "sub auspiciis praesidentis" from the University of Vienna, Austria in 1968. After a two-year period as a Post Doc and Assistant Professor at the University of Georgia in Athens, Ga, USA, he joined industry in Austria in 1970, serving as a manager of the computer process control department at Voest Alpine in Linz, from 1972-1978. In 1978 he accepted an appointment as a Professor for Computer Process Control at the Technical University of West-Berlin. From 1982 to 2011 he has been Professor for Software Engineering and Real-Time Systems at the Vienna University of Technology. Dr. Kopetz is one of the three founders of the spin-off company TTTech, established in 1998 in Vienna, Austria. He has published a widely used textbook on Real-Time Systems and more than two-hundred papers on the topic of dependable embedded systems.

https://www.tttech.com