

Safety & reliability of software-controlled systems (SRES)

Dt.: Betriebssicherheit und Zuverlässigkeit softwaregesteuerter Systeme

Content

Software-controlled, embedded systems are ubiquitous. In cases where their behaviour and interaction with people, assets or the physical environment can lead to hazardous situations they are also safety critical: power steering and Electronic stability programs (ESP) in vehicles, the braking system of trains, medical devices, in-flight control of airplanes, to name just a few.

There are numerous examples where wrong or unforeseen software behaviour has put lives or values at risk and even damaged them. According to the Bundesinstitut für Arzneimittel und Medizinprodukte (Federal institute for drugs and medical devices), in the years 2005-06 software faults were responsible for more risk incidence reports (22%) than any other causal category such as design faults, physical faults, compatibility problems etc.

This lecture gives an introduction to dependability theory and to methods used in research and industry to assure, improve and assess the dependability and safety of software-controlled systems:

- Design and analysis methods supporting the dependability and safety of embedded systems
- Dependability/safety modelling
- Dependability/safety measures and analyses
- Software faults, software failure
- Mechanisms of HW/SW fault tolerance
- Risk analysis, risk acceptance criteria
- Safety norms

The lecture is held in English. Die Vorlesung wird auf Englisch gehalten.

Dates

- Tuesdays 10:15-11:45 hrs (AH III) (lecture)
- Fridays 14:15-15:45 Uhr (AH III) (lecture/tutorial)
- Written examination: 23 July, retake: 13 August

The first lecture of the semester takes place on Tuesday, 8 April 2014.

Announcements and course material

Announcements, slides, videos and other material can be found at [the L2P site of this course](#).

Campus

The Campus page of this course is at

<https://www.campus.rwth-aachen.de/my/rwth/all/event.asp?gguid=0x74B7D207422AC7419F008E95C3CC3E62> (in German).

Schedule 2014

Date	ID	Topic/slides
Tue 8.4.	L01	Introduction to the lecture
Fri 11.4.	L02	Terminology
Tue 15.4.	L03	Introducing the programming project
Fri 18.4.		- (Good Friday)
Tue 22.4.	L04	Reliability measures I
Fri 25.4.	L05	Elementary stochastics
Tue 29.4.	E01	Exercise 1
Fri 2.5.	L06	Reliability measures II & fault tolerance
Tue 6.5.		- (RWTH Dies)
Fri 9.5.		-
Tue 13.5.	L07	Risk & safety
Fri 16.5.	L08	Fault tree analysis
Tue 20.5.	L09	Redundance, SW reliability & FMEA
Fri 23.5.	E02	Exercise 2
Tue 27.5.	L10	Stochastic processes I
Fri 30.5.	E99	Programming project, question time
Tue 3.6.	L11	Stochastic processes II
Fri 6.6.	E03	Exercise 3
Tue 10.6.		- (Excursion week)
Fri 13.6.		- (Excursion week)
Tue 17.6.	L12	Laplace transform
Fri 20.6.	E99	Programming project, question time
Tue 24.6.	L13	IEC 61508
Fri 27.6.		- (Informatik summer fest)
Tue 1.7.	L14	Fault mitigation (replacement slides)
Fri 4.7.	E04	Exercise 4
Tue 8.7.		(Presentations shifted to 17.7.)

Fri 11.7.	L15	Closing session, question time
Tue 15.7.		-
Thu 17.7.	E99	Presentations of students' programming project (11:00-12:30 hrs)
Fri 18.7.		-

Tutor

- [Marc Förster, M.Sc.](#)

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