

Critical Embedded System

introduction, course requirements

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Department of Measurement and Information Systems

Fault Tolerant Systems Research Group

- Department of Measurement and Information Systems
 - Approx. 70 employees, 35 PhD students
 - Embedded Systems
 - Intelligent Systems
 - **Fault Tolerant Systems (FTSRG)- 24 person**
- Software engineer, electrical engineer, medical engineer
- Basic courses (software engineering)
 - Digital systems
 - Operating systems
 - Artificial intelligence
 - Embedded systems
 - Formal methods
 - Measurement laboratory
- Specialization (software engineering)
 - Integrated intelligent systems (BSc)
 - Systems design (BSc)

Education by the Research Group (FTSRG)

- Formal methods
- Specialization in system design (BSc)
 - Intelligent System Monitoring
 - System modeling
- Specialisation in dependable system design (MSc)
 - Design for dependability
 - Model-driven software development
 - Service integration
 - Autonomic and fault tolerant computing systems
 - Software verification techniques

Research

- Model-based system design
 - EMF-IncQuery framework
 - Transformation technologies
 - Automated system development
- Embedded systems
 - Modeling
 - Automated development
 - Verification
 - Testing
- System management
 - Virtualized environments
 - Automated intervention
- Designing dependable systems
- Service-oriented architectures

Relevant research projects

- Embedded systems
 - DECOS
 - Genesys
 - Mogentes
- Mobile, distributed systems
 - HIDENETS
- Model-based SOA
 - SENSORIA
- Dependable systems
 - RESIST
 - Amber
 - SafeDMI (railroad)
 - DIANA (avionics)
 - CECRIS
- System management
 - DESEREC
- Model based Development
 - MONDO

Critical Embedded Systems course

■ Aims

- Dependability is a critical aspect for the design of safety critical embedded systems (avionics, automotive, medical, etc.) where a system failure may result in severe losses or casualties. The course aims to overview the main development, verification and validation principles and technologies of critical embedded systems.
- Students completing the course requirements successfully will:
 - gain proficiency in the basics of safety and related issues
 - be able to understand **safety requirements** against critical systems, **model** their operation environment and **architecture**.
 - become familiar to the basics of **model-based architecture** design,
 - get to know the **certification standards** in the safety-critical embedded domain

Course Structure

- Basics of safety
 - Definition of safety
- Model-based desing in safety-critical systems
 - Requirement modeling
 - Structural modeling
 - Behavior modeling
- Verification and Validation techniques
 - Testing
 - Formal methods
 - Hazard Analysis
- Case-studies
 - Nuclear
 - Avionics
 - Invited talk from Critical Software

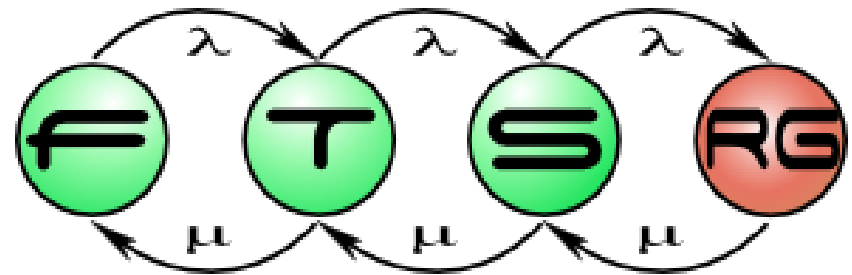
Contact

■ Homepage

- Course material
- <https://www.inf.mit.bme.hu/en/edu/courses/critembed>

■ Class:

- Monday, I.E. 224, 16:15-18:00
- Thursday, I.B. 413 14:15-16:00
- **Please arrive on time!**



Lecturers

- Dr. Ákos Horváth
 - Office hours:
 - 14:00-16:00, Monday
 - ahorvath@mit.bme.hu
- Dr. Zoltán Micskei
- András Vörös
- Tamás Tóth
- Csaba Debreceni



Course information

- Requirements
 - Homework
 - Modeling and requirements: 3rd week
 - Submission: 8th week
 - Formal modeling: 10th week
 - Submission: End of 13th week
 - Hw defense and Oral exam – 11th /12th of December
 - Defend your own work, questions about hows and whys!
 - HW is a significant part of the grade
 - Handout course material and everything you hear at class!
- Extra assignment for additional points
 - Presentation of selected scientific paper
 - Additional formal modeling
 - Complete case-study implementation
 - Etc.

Homework

- Two hand-ins
 - Formal modeling
 - Model-based design of critical system
 - Requirements modeling based on written specification
 - Structural models
 - Behavior models
 - Documentation

- Oral defense on the last week with an oral exam