PhD School of Informatics, area

COMPUTER ENGINEERING
(TECHNISCHE INFORMATIK)

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2011/12
Computer Engineering once…

- Systems-on-Chip
- Networked Embedded Systems
- HW/SW Codesign
- Real-Time Systems
- System Architectures
- Fault-Tolerant Systems

Inside
Challenges

Interdisciplinarity:

- Computer science
- Mathematics
- Electrical engineering
- Physical/technical application knowledge

Integrative view:

- Hardware/Software
- Communications
- Fault-tolerance
- Real-time computing
- Security
- Energy/resource-efficiency
on booting do:
  send tick(0) to all; clock:= 0;
continuously do:
  If received tick(m) from at least f+1 remote nodes and m > clock:
    send tick(clock+1),…, tick(m) to all; clock:= m;
  If received tick(m) from at least 2f+1 remote nodes and m >= clock:
    send tick(m+1) to all; clock:= m+1;

Classic SoC clock generation:
- Cumbersome clock tree design
- High power consumption
- Clock is single point of failure!

Distributed clock generation
- Cumbersome clock tree design
- Clock is no single point of failure!
- High power consumption

Distributed clock generation project DARTS
CE at the Faculty of Informatics

http://ti.tuwien.ac.at/teaching/ti-research-presentations
Real-Time Systems Group (E182/1)
- Prof. N.N. (TBD)
- Prof. Herbert Grünbacher (systems-on-chip)
- Prof. Peter Puschner (time-predictable HW/SW architectures)

Embedded Computing Systems Group (E182/2)
- Prof. Ulrich Schmid (fault-tolerant distributed algorithms)
- Prof. Andreas Steininger (dependable asynchronous circuits)
Other Contributors to CE

- **Institute of Automation (E183/1)**
  - Prof. Johann Blieberger (real-time programming)
  - Prof. Wolfgang Kastner (automation)

- **Institute of Information Systems (E184/4)**
  - Prof. Helmut Veith (computer-aided verification)

- **Institute of Computer Languages (E185/1)**
  - Prof. Jens Knoop (program analysis and optimization, robotics)
  - Prof. Andreas Krall (compilation techniques)
CE Curricula of the Faculty

- Bachelor CE (6 semesters)
  - Mix of scientific and engineering/practical education
  - 60-90 students/year

- Master CE (4 semesters)
  - Primarily scientific, research-oriented education
  - 20-30 students/year

- PhD School primary area CE (6+ semesters)
  - Entirely scientific, research-oriented education
  - 2-4 students/year
Important Sources of Information

- CE web portal: ti.tuwien.ac.at
- CE online course mgmt.: ti.tuwien.ac.at/myTI
- CE PhD standards: ti.tuwien.ac.at/research/PhD_standards_TI.pdf
- TU Vienna course search: tiss.tuwien.ac.at/course
- How to get to locations: www.wegweiser.ac.at/tuwien
- Faculty: www.informatik.tuwien.ac.at
- TU Vienna: www.tuwien.ac.at
CE in the PhD School of Informatics
The major focus of Computer Engineering at TU Vienna is "Dependable Embedded Systems", with a spectrum ranging from network-coupled fault-tolerant distributed real-time systems to dependable systems-on-chip and VLSI architectures for mission-critical applications.
Comprehensive Exams

Comprehensive Exam I:

- 3 Master-level “Preparatory Courses” [12-15 ECTS]
- 2 in first semester, 1 in first or second semester
- Assigned individually (by tentative advisor)

Comprehensive Exam II

- [Info below only relevant for students with CE as primary area]
- Checks familiarity with some specific research topics in CE
- Exam consists of presentation + examination of 2 selected papers from collection of 10-15 seminal scientific CE papers
- Supported by course 195.001 PhD Primary Area Computer Engineering Introduction
PhD Primary Area Computer Engineering Introduction

- http://ti.tuwien.ac.at/ecs/teaching/courses/phdce/
- 2 semesters course
  - Semester 1: General overview of seminal CE research (paper reading, reporting and reviewing) [3 ECTS]
  - Semester 2: Comprehensive Exam II; Selection of PhD topic
- Semester 1 part can also be taken as secondary area course
- Includes TI research presentations:
  http://ti.tuwien.ac.at/teaching/ti-research-presentations
Overview of 1. Year (Recomm.)

1. semester
- Primary Area Course PhDCE
  (paper reading, reviewing, presentation)
- Compr.Exam.I Prep. Course
- Compr.Exam.I Prep. Course
- Primary or Secondary Area Course
- Prim. Area or Fundamental Course
- Prim. Area or Fundamental Course

2. semester
- Primary Area Course PhDCE
  (Compr.Exam.II, selection PhD topic)
- Compr.Exam.I Prep. Course
- Compr.Exam.I Prep. Course
- Primary Area Course
- Fundamental Course
- Fundamental Course
- Primary or Secondary Area Course
Some Next Semester Courses
Institute of Science and Technology Austria:

- IST Austria hosts top-level international researchers in all disciplines, including computer science:
  - Tom Henzinger (EPFL, Berkeley)
  - Krishnendu Chatterjee (Berkeley)
  - Herbert Edelsbrunner (Duke)
- Campus close to Vienna (Maria Gugging), see [www.ist.ac.at](http://www.ist.ac.at) for details
Collaboration with IST Austria (II)

- A particularly interesting CE-relevant IST course in WS 2011/12:
  - **Formal Methods**
    Krishnendu Chatterjee and Thomas Henzinger
    [http://ist.ac.at/fileadmin/user_upload/pdfs/Courses_announcements/2011_Courses/Fall/Invitation_Formalmethods.pdf](http://ist.ac.at/fileadmin/user_upload/pdfs/Courses_announcements/2011_Courses/Fall/Invitation_Formalmethods.pdf)

- Course takes place at IST Austria, with free shuttle service for TU students
- IST courses also announced in TUWIS
Thank you for your attention!