Fault Tolerant Computer Systems

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Recommended Reading:

T. Bräunl **Embedded Robotics,** Springer 2003
B. Broekman, E. Notenboon Testing Embedded Software, Addison-Wesley, 2003
P. Jalote Fault Tolerance in Distributed Systems, Prentice Hall, 1994
D. Pradhan Fault-tolerant Computer System Design, Prentice Hall, 1996
S. Levi, A. Agrawala Fault Tolerant System Design, McGraw-Hill, 1994
B. Johnson Design and Analysis of Fault-Tolerant Digital Systems, A.W., 1989

Info:

`http://robotics.ee.uwa.edu.au/courses/faulttolerant/`

Contents

Topics:

- application-specific computer system design
- advanced embedded systems
- sensor-actuator systems
- intelligent systems
- industrial applications
- reliable systems/fault-tolerant systems
- real-time requirements
- watch-dogs
- redundancy in hardware, information, time, and software
- triple modular redundancy
- dependability analysis
- reliable software design
- effective testing and debugging of hardware and software, test suites
- system programming in C and C++

Contents

Announcements

- Tutorials: start week 2
- Labs: start week 3
  finish week 12
  total of 10 labs, individual and in groups of 2, venue EE 3.09
- Assessment:
  - Labs 50%
  - Mid-term 20%
  - Report 20%
  - Presentation 10%

Announcements

- Semester Schedule
  - Week 1 - 9: lectures
  - Week 9: industry guest lecture, mid-term
  - --- mid-semester break ---
  - Week 10-13: student presentations
  - Week 11: report submission

Announcements

- Lab marking (50 = 10 * 5 marks)
  - Lab marks for individuals / groups of 2 students
  - According to marking scheme for each task
  - One weeks to finish each lab
  - Free lab access at other times
  - Marking at end of every session

Announcements

- Report and Presentation
  - Each students to select one topic
  - Submit written report
  - Give oral presentation

Announcements

- Report
  - Individual report submitted by each student
  - Prepare in style similar to scientific paper
  - See: *Handbook of Technical Writing for Engineers and Scientists*, Undergraduate Library
  - See: Handout

Announcements

- Report Marking (20% total)
  - Technical contents 10
  - Presentation (structure, etc.) 10

Announcements

- Presentation
  - 15 min. + 5 min. Q&A
  - See: *Handbook of Technical Writing for Engineers and Scientists*, Undergraduate Library
  - See: Handout

Announcements

- Presentation marking (10% total)
  - Technical contents 4
  - Delivery (presentation, structure, timing) 4
  - Fault Tolerance Relevance 2

Topics

1. Automotive: ABS
2. Automotive: ESP
3. Automotive: Engine management
4. Automotive: Airbag
5. Space: Mars mission Beagle 2
6. Space: Mars mission Nozomi
7. Space: Mars mission NASA rover
8. Space: Mars mission Sojourner ‘97
9. Transport: Nautical Systems
10. Transport: Train systems
11. Transport: Train signaling
12. Transport: Aeronautical systems
13. Medial: X-Ray
14. Medical: Pace maker
15. Medical: Defibrillators
16. Medical: Computer assisted surgery
17. General: Banking systems
18. General: Reservation/booking sys.
19. General: Telephone network
20. Hardware: HP Nonstop
21. Hardware: IBM S/390
22. Hardware: Internet servers
23. Hardware: Commercial FT hardware overview
24. Software: Commercial FT software overview (operating systems)