SYSTEM ARCHITECTURE
ADVANCED SYSTEM ARCHITECTURE
Graduate School of Engineering and Science, Univ. of the Ryukyus

2007/Fall-Winter Term
Monday 12:50

Room# 1-322

Instructor: Fire Tom Wada, Professor

English based class

- Univ. of the Ryukyus is promoting English based education as the University Mission.
- To open wide to not only Japan Main land but also to Asian and other countries.
- To send graduated students to NEW THE 3RD Technical Graduate University (OIST, Okinawa Institute of Science and Technology), which will launch in several years later at Onna, Okinawa.

Japanese and Special course Joint Class

- Now, our Faculty is considering the better course organization including Japanese Master course and English based special course.
- As you know, Majority people is Japanese. Then, it is not easy to provide good education environment to special course students.
- We would like to provide better education environment for both students.

One more Mission

- Univ. of the Ryukyus is requesting
  - an education, which is closely relating to industrial real-use Engineering, and
  - an education, which is relating to the Faculty member Research and Development Activity.
- Fortunately, I and my company in Okinawa have the Top level activity such wireless communication device development.
- Then, I try to include this good topic in the lecture.

Course Description

- This course provide a detailed introduction of digital system design with stress of wireless communication system.
- The course begins with a wireless communication related signal processing basics and how to design such system with digital technology.
- Then, one of the state-of-the-art communication system such as OFDM will be deeply explained.
- Digital system components such as FPGA, LSI, DSP devices will be deeply explained and shows how to use them in real life.
- As a second important topics: Error Correction basics will be covered and the state-of-the-art Error Correction system will be examined.
- Finally, the course try to cover the real large scale digital wireless communication system designed in WADA LAB and Magna Design Net as a one big example.
- Digital signal processing simulation tool will be used in the course.

For ADVANCED SYSTEM ARCHITECTURE

- Following task will be added.
- After several lectures, personal meeting will be arranged with negotiation.
- Then each doctor candidates have to propose each short research topics relating to digital system design.
- According to the proposal, they have to make short research paper as a Final course report.
- The personal meeting will be arranged roughly every two weeks with negotiation.

Notes

- No Text book, Lecture note will be distributed
- Reference materials will be indicated in the lecture.
- Grading:
  - Home Works (20%) + Midterm exam or report (40%) + Final exam or report (40%)
- Digital signal processing simulation tool will be used in the course or home works.
  - Can be “SCILAB”, http://www.scilab.org/ ???

Information

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- Office: 1-605
- URL: http://www.ie.u-ryukyu.ac.jp/~wada/lecture.html
  - **MATERIALS WILL BE AVAILABLE ON THE WEB**
- Office hour: Tuesday 13-14pm, Thurs 10-11am,
  Please make reservation by email.

Schedule of Topics

1. Basics of wireless communication related signal processing
   - - Fourier, complex signal, digital signal representation
2. OFDM wireless communication system
   - - Digital Modulation
3. Digital System Devices
   - - FPGA and LSI (Large Scale Integration) and how to design
   - - Digital Signal Processor and how to use it
4. Digital Error Correction and application
   - - Galois field , Reed Solomon, Viterbi
5. Recent achievements and examples of Large scale digital wireless communication system
   - - Digital TV, Adaptive array antenna system, Wireless LAN, WiMAX

Self introduction -School-

- 1983/March
  - **BS degree from Osaka Univ. Electronic Engineering, JAPAN**
- 1992/January
  - **MS degree from Stanford Univ. Electrical Engineering, USA**
  - **Major: COMPUTER HARDWARE**
- 1994/December
  - **PhD from Osaka University, JAPAN**
  - **High Speed SRAM design methodologies and It's application to Cache memory**

Self introduction -Jobs (1)-

- 1983/4-1990/7
  - **Designer at Mitsubishi Electric LSI research Laboratories**
- 1990/7-1992/1
  - **Stanford University Electrical Engineering Master course**
  - Major: computer H/W, RISC
  - Computer Cache memory design
- 1992/1-1995/12
  - **Cache design project leader in Mitsubishi Electric for INTEL corporation**
- 1995/1-1996/5
  - **Design member for 3D Graphics rendering ASIC jointly developed by Mitsubishi Electric & Evans&Sutherland, UTAH**

Self introduction -Jobs (2)-

- 1996/6-1997/7
  - **Design member for Flash memory**
  - **Design member for low voltage SRAM (mobile application)**
- 1997/7-1999/4
  - **300MHz pipelined burst cache SRAM design team leader for INTEL pentium III**
- 1999/5
  - **Associate Professor at the Univ. of the Ryukyus, SOC design**
- 2001/4
  - **Professor at the University of the Ryukyus**
- 2001/3
  - **Founder of Magna Design Net, Inc at Naha**
  - **Fabless Broadband communication LSI venture company**

Student Self-introduction in Speech

1. Name,
2. Where are you from?
3. Master or Doctor, Grade, or Bachelor
4. Who is your supervisor?
5. What is your major , research topic?
6. What do you want to expect to this course?

Registration of the course

- Web registration
- Physical registration

Code	Course	webcode
R0040900	**システムアーキテクチャ論**	zema
R0046400	System Architecture	wau2
R0078800	**システムアーキテクチャ特論**	7u2r
R0085400	Advanced System Architecture	3vza