Low-Power VLSI Design

Course Description

Power consumption is one of the critical design factors in modern VLSI design. The rapid increase in both power and performance requirements are especially true in applications such as wireless communication, notebook, and portable multi-medium devices. As technology down scaling, heat dissipation and packaging cost also demand low power IC. This course will cover from fundamental of power consumption to system-level design. The course emphasizes the balance between theory and hand-on practices. Upon completing this course, you will learn 1) basics of low-power digital design; 2) power analysis and estimation; 3) RTL low-power implementation techniques; 4) power management; 5) system-level power optimization. The course can be outlined as below:

- Introduction to low-power system design
- Low-power digital IC basics
- Gate-level & RTL low-power implementation
- Power management
- System-level power optimization
- Power analysis and estimation

Pre-requisite Courses:

- Digital logic or equivalence
- Background in integrated circuits
- Self-motivation in learning CAD tools

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Course Website: http://moodle.ncku.edu.tw

Lecture language: English
Required Reading Materials:

- Lecture Notes

References:

- Selected papers from respective journals and conferences (TBA).

EDA tools:

- NC-Verilog and/or other Verilog simulator
- Synopsys Design Vision, PrimePower, Power Compiler

Exams and Projects:

Midterm exam: Thursday, November 04, 2009
Final project presentation: Thursday, January 21, 2010
Final project report due day: Friday, January 22, 2010

- All examines are closed-book exams. Some complex information will be provided if needed. NO calculator is allowed.
Homework Assignments

4 – 6 homework assignments will be given for the semester. Due day will be specified in the problem sheet.

- NO late submission will be accepted!
- There is no make-up homework.
- To get credit for your homework assignments, your submissions must be done professionally and seriously. Your official name, course number and homework number must be visibly shown in each assignment.
- All submission will be done electronically through the course website before the specified time. If you fail to do so, your homework is considered OVERDUE and gets NO credit. An extra paper copy needs to be delivered in class.

Grading Policy

The tentative weights of the homework assignments and the exams are listed as below and they are subject to minor change.

- Participation 10%
- Homework assignments 30%
- Quizzes and Midterm exam 20%
- Final project report/presentation 40%

Course Policy

- Encouraged to discuss assigned problems with peers
- Must complete his/her homework independently or as specified
- Any person/team who is found to be dishonesty in homework assignments, examines/ quizzes, or the project, the involved person(s) will receive an “0” on the evaluated instrument (paper, exam, project, homework, etc.)