

ECE 225
High Speed Digital IC Design
Lecture 2

Discussion of Projects

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Project Topics....design oriented

1. Circuit Design Issues: (nanometer scale)

- a. Variation/error tolerant design
- b. Low power design under noise margin, performance and area considerations: SRAM, DRAM, Flash, dynamic circuits, keepers etc.
- c. Subthreshold circuit design
- d. Ultra low-voltage design
- e. Chip cooling –design and design optimization

2. Device Circuit Co-design (emerging technologies):

- a. Non-classical CMOS – SOI, FinFET, GAAFET.
- b. Non-Si Devices – CNFET, NWFET, SpinFET, Graphene-FET, NEMFET.
- c. Novel memory technologies like MRAM, FRAM, PCM etc.
- d. Sub-kT/q devices – Tunnel FETs, IMOS etc.

3. Interconnect System Design:

- a. Variation aware design – signal, clocking, P/G (power / ground) Networks.
- c. Interconnect variation aware parasitic (R,L,C) extraction, modeling and optimization
- d. Modeling of VHF (Very High Frequency) signals.
- e. Optimal inductor design

Project Deadlines....

- Mid-quarter report due: Feb 18
 - At least complete literature review and identify problems to be addressed within a given topic.
 - Show some initial analysis....
- Final project presentations: during the last week of class (~ 25 mins per student)
- Final project report due in March (end of last week of class)