

Low Power Circuits & Systems

CS802D

Contracts: 3L

Credits-3

Basics of MOS circuits: MOS Transistor structure and device modeling; MOS Inverters; MOS Combinational Circuits – Different Logic Families

Sources of Power dissipation: Dynamic Power Dissipation: Short Circuit Power; Switching Power; Glitching Power; Static Power Dissipation

Supply Voltage Scaling Approaches: Device feature size scaling; Multi-V_{dd} Circuits; Architectural level approaches: Parallelism, Pipelining; Voltage scaling using high-level transformations; Dynamic voltage scaling; Power Management.

Switched Capacitance Minimization Approaches: Hardware Software Tradeoff; Bus Encoding; Two's complement Vs Sign Magnitude; Architectural optimization; Clock Gating; Logic styles\

Leakage Power minimization Approaches: Variable-threshold-voltage CMOS (VTCMOS) approach; Multi-threshold-voltage CMOS (MTCMOS) approach ; Dual-V_t assignment approach (DTCMOS); Transistor stacking.

Special Topics: Adiabatic Switching Circuits; Battery-aware Synthesis; Variation tolerant design

References:

1. Sung_Mo Kang, Yusuf Leblebici, CMOS Digital Integrated Circuits, Tata McGraw Hill
2. Neil H. E. Weste and K. Eshraghian, Principles of CMOS VLSI Design, 2nd Edition, Addison Wesley (Indian reprint).
3. A. Bellamour, and M. I. Elmasri, *Low Power VLSI CMOS Circuit Design*, Kluwer Academic Press, 1995
4. Anantha P. Chandrakasan and Robert W. Brodersen, *Low Power Digital CMOS Design*, Kluwer Academic Publishers, 1995
5. Kaushik Roy and Sharat C. Prasad, *Low-Power CMOS VLSI Design*, Wiley-Interscience, 2000