Course Information

Instructor: Dr. Osama Khan
Units: 4
Meets: TuTh 3:30-5 pm Cory 293
Pre-reqs: At least one of EE140, 142, 151 ; ( or equivalent)
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Discussion section: TBD
Introductions

- Name
- What projects you have done before?
- Fun fact about yourself
- What you are expecting from this class?
- Major
- Year
EE194 BLE SoC (spring 2017)

- EE194: “28 nm SoC for IoT”
- BLE-specific digital peripherals: GFSK, state machine for MAC
- RISC-V instead of ARM
- 1.1 mm x 1.1 mm
EM9304
Hardware Architecture

RISC-V µP
IRAM
ROM
DRAM
TileLink BUS
Timers
Radio
GPIO
JTAG
Crypto
Power Management
Radio Architecture

Low-IF architecture
Single antenna interface.
Goals

• Translate wireless communication system specifications into architecture and circuit specifications. (Top down approach)

• Matlab system simulation to evaluate communication system performance.

• Project driven: 1 mm x 1 mm SoC tapeout in 28 nm FDSOI process.

• Team effort: Emphasis on communication and collaboration.

• Understand transistor level circuit design all the way up to the C-software execution.
To Do

- EECS Account
- BWRC Server Access
- ST 28nm FDSOI PDK Access
- Slack channel
- Piazza Access
- BLE 5 Specifications
- EM9304 Datasheet
Tentative Timeline

- Jan 31st
  - Cadence Ideal block simulations
  - Matlab simulations
  - Digital FPGA implementation
- Feb. 28
  - Schematic Design
  - Chisel/Verilog Implementation
- March 22
  - Analog Layout
  - Digital APR
- April 12
  - System co-simulations
- April 30
  - Final Integration (PADS, ESD)
  - Chip level checks (DRC & LVS)
Team Formation

- Digital team goal
  - FPGA implementation of the core
  - Execute C-software code
  - Write Verilog/Chisel
- Analog team goal
  - Spice simulation with ideal blocks
  - Verify against the Matlab simulation golden block.
  - Analog/RF circuit design

- Analog Top vs. Digital Top flow?