Lecture 29
Conclusion

Xuan ‘Silvia’ Zhang
Washington University in St. Louis

ESE 566A: Modern System-on-Chip Design
ese.wustl.edu/~xuan.zhang/ese566
Topics Covered

• Technology
  - Moore’s Law, Dennard Scaling, Memory
  - 3D Packaging and Integration

• Design Flow
  - Software Hardware Partition
  - Synthesis: power, area, timing constraints
  - Static Timing Analysis
  - Physical Design: floorplan, place and route

• Tools
  - Keil MDK-ARM (ARM Core Emulation)
  - Xilinx Vivado HLS (High-Level Synthesis)
  - Synopsys VCS (Verilog Simulation)
  - Synopsys CoreAssembler (IP Integration)
  - Synopsys Design Compiler (Netlist Synthesis)
  - Cadence SOC Encounter (Physical Design)
Example Position

- Communications/DSP algorithms and efficient implementations.
- Demodulation, modulation, digital filters, physical layer in communications
- SOC architectures (interfaces, busses etc)
- Knowledge and hand-on experience with industry ASIC design flow including RTL coding, debugging, verification, synthesis and supporting timing closure.
- Experience with design tools such as NCSIM (and/or VCS), Cadence RC or Synopsys DC compiler,
- Experience with multiple IC tape-out in industry.
- Experience in chip bring up and performance measurement for IC and systems in laboratory to characterize and debug building blocks

This is a full time job in California, base salary > $100,000
The Trend: Follow, Catch, or Create?

- **Intelligent Recognition**
  - computer vision, artificial intelligence

- **Internet of Things**
  - Sensing (Analog)
  - Computing (Digital)
  - Wireless (RF)
  - Energy harvesting (Power)

- **Wearable Sensors**
  - ADC and DAC

- **Software-Hardware Co-design**
  - Analog/Digital/Mixed Signal/Radio...
  - Interface/Communication/Internet/Cloud...
  - Application/Regulation/Resource/Material...
Research Theme (XZ Group)

• Problem
  - designing micro-scale autonomous systems with enhanced security and resilience.

• Approach
  - co-design of algorithm, computer architecture, circuits, and sensing and actuation mechanisms.

• Projects
  - self-healing accelerator-rich SoC with heterogeneity
  - analog-coprocessor to speed up scientific computing
  - sensor-fusion chip for vision-based robotic control
  - synthesizable voltage regulator and converter design
  - intelligent living environment to enable aging in place
Some Final Administrative Stuff
The “Missing” Textbook

- Lecture Slides and Notes
- Tutorials
- Documentations

- Ebook
  - Application-Specific Integrated Circuits (ASICs... the book), by Michael John Sebastian Smith
  - online at EDACafe
Course Evaluation

- Appreciate your feedback
- Email to follow
- Submit by Dec. 9th
Class Essay

• 1 or 2-Page Resume (what I can do)
  - past projects, this class project

• 2 or 3-Page “Wild and Crazy Ideas” (what I would love to do!)
  - similar to project idea submission
  - application
  - current solution and limitation
  - proposed method and system
  - predicted outcome
  - risk analysis
  - market analysis

• Due on 12/13, submitted electronically to email
Questions?

Comments?

Discussion?