

SEMINAR

THURSDAY

MARCH 06, 2008

Scaife Hall Auditorium

Room 125

4:30 p.m.

Refreshments—4:00 p.m.

KRISHNENDU CHAKRABARTY

DUKE UNIVERSITY



Krishnendu Chakrabarty received the B. Tech. degree from the Indian Institute of Technology, Kharagpur, in 1990, and the M.S.E. and Ph.D. degrees from the University of Michigan, Ann Arbor, in 1992 and 1995, respectively. He is now Professor of Electrical and Computer Engineering at Duke University. Prof. Chakrabarty is a recipient of the National Science Foundation Early Faculty (CAREER) award, the Office of Naval Research Young Investigator award, the Humboldt Research Fellowship from the Alexander von Humboldt Foundation, Germany, and several best papers awards at IEEE conferences. His current research projects include: testing and design-for-testability of integrated circuits; digital microfluidics, circuits and systems based on DNA self-assembly, and wireless sensor networks. He has authored seven books on these topics, published over 260 papers in journals and refereed conference proceedings, and given over 100 invited, keynote, and plenary talks.

ECE Seminar Hosts:

Radu Marculescu,
radum@ece.cmu.edu

Yi Luo,
y1827@andrew.cmu.edu

Bruno Sinopoli,
brunos@andrew.cmu.edu

Automated Design of Digital Microfluidic Lab-on-Chip: Connecting Biochemistry to Electronics CAD Computation

Microfluidics-based lab-on-chip (or biochips) are revolutionizing laboratory procedures in molecular biology. Advances in microfluidics technology offer exciting possibilities for high-throughput DNA sequencing, protein crystallization, drug discovery, immunoassays, neo-natal and point-of-care clinical diagnostics, etc. As microfluidic lab-on-chip mature into multifunctional devices with "smart" reconfiguration and adaptation capabilities, automated design and ease of use become extremely important. Computer-aided design (CAD) tools are needed to allow designers and users to harness the new technology that is rapidly emerging for integrated biofluidics.

This talk will present ongoing work on design and test techniques for microfluidic biochips. First, the speaker will provide an overview of electrowetting-based digital microfluidic biochips. Next, the speaker will describe synthesis tools that can map behavioral descriptions to a reconfigurable microfluidic device and generate an optimized schedule of bioassay operations, the binding of assay operations to functional units, and the layout and droplet flow-paths for the biochip. Techniques for pin-constrained chip design, fault detection, and dynamic reconfiguration will also be presented. An automated design flow allows the biochip user to concentrate on the development of nano- and micro-scale bioassays, leaving implementation details to CAD tools.

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