Erik Jonsson School of Eng. and Computer Science

IEEE Circuits & Systems Society Distinguished Lecture

Present

Prof. Krishnendu Chakrabarty
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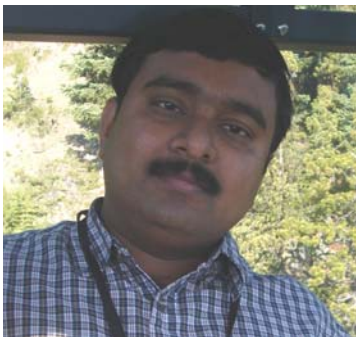

Automated Design of Microfluidics-Based Biochips: Connecting Biochemistry to Electronics CAD

Microfluidics-based biochips are soon expected to revolutionize laboratory procedures involving molecular biology. Advances in microfluidics technology offer exciting possibilities in the realm of enzymatic analysis, DNA analysis, proteomic analysis involving proteins and peptides, immuno-assays, and environmental toxicity monitoring. Another emerging application area for microfluidics-based biochips is clinical diagnostics, especially the immediate point-of-care diagnosis of diseases. As the use of microfluidics-based biochips increases, their complexity is expected to become significant due to the need for multiple and concurrent assays on the chip. There is a need to deliver the same level of computer-aided design (CAD) support to the biochip designer that the semiconductor industry now takes for granted.

This talk will present early work on CAD tools that allow biochip users to describe bioassays at a sufficiently high level of abstraction. The talk will describe synthesis tools that can map behavioral descriptions to a droplet-based microfluidic biochip 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. Cost-effective testing techniques will be presented to detect faults after manufacture and during field operation. It will be shown how on-line and off-line reconfiguration techniques can be used to easily bypass faults once they are detected. Thus the biochip user can concentrate on the development of the nano- and micro-scale bioassays, leaving implementation details to design automation tools.

Friday,
September 15, 2006
12:00 PM
(Refreshments at 11:30 AM)
Engineering and Computer Science Complex on the UTD Campus
TI Auditorium 2.102

Dr. Krishnendu Chakrabarty is an Associate Professor of Electrical and Computer Engineering at Duke University. He is a recipient of the National Science Foundation Early Faculty (CAREER) award and the Office of Naval Research Young Investigator award. He has published over 200 papers in journals and conferences and holds a US patent in built-in self-test.

Research Areas: microfluidics-based biochips,SOC design & test

Awards: Distinguished Visitor of the IEEE Computer society for 2005-2007, Distinguished Lecturer of the IEEE Circuits and Systems Society for 2006-2007, Best paper awards at the IEEE DATE-2001 and the IEEE ICCD-2005 Conferences; and the Humboldt Research Fellowship award.

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