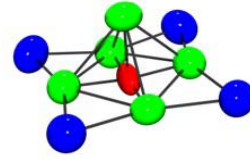


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## **Nano-scale VLSI Design: A Significant Paradigm Shift?**

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### *Abstract*

The recent progression of events in nano-technology, from nanotubes to nano-transistors, begs a basic reassessment of the underlying premises on which VLSI systems design theory and practice is based. Specifically, there are a number of fundamental questions in which the research team in the CSE VLSI Lab are interested.

- (1) How will the changes in underlying device materials theory of nano-scale electronics affect ways in which we currently think about and model basic VLSI circuits?
- (2) How will the underlying behaviors of nano-scale devices affect the practices we currently follow to specify systems and transition to fabrication from a layout specification for a VLSI circuit?
- (3) How will the associated quantum computing theories of nano-scale electronics affect the theoretical basis for switching circuits on which all computing systems today are built (using Boolean and Multi-valued Logics), and how will we abstract and specify such VLSI systems on a nano-electronics scale?
- (4) Given that nano-scale behaviors approach those of biological systems (in terms of complexity and capacity for emergence), what does this mean in terms of the types of systems that we will be able to imagine and construct using VLSI-based electronics on the nano-scale? How will we specify and design such systems?

Our poster session will discuss our current thinking on these topics, and we hope to identify researchers within the Nano-technology Center who might wish to collaborate on research in these and other areas pertaining to the coming paradigm shift in VLSI systems engineering at nano-scale levels of circuit integration.