



**Embedded Electrical and Computer Engineering**

# **MASTER ORAL DEFENSE**

**TITLE:** *Analysis of a Carbon Nanotube Based H-Tree Clock Distribution Network.*

**PRESENTER:** **Vish Ganti**

**TIME & DATE:** 2.30 to 3.30pm, April 14<sup>th</sup>, 2011

**LOCATION:** SCI 256

**COMMITTEE CHAIR:** **Dr. Hamid Mahmoodi**

**COMMITTEE MEMBERS:** **Dr. Hao Jiang**

## **ABSTRACT**

Clock distribution network (CDN) is an important part of digital integrated circuits. The clock signal carried by CDN has to reach every node at the same time to ensure synchronized switching. The transistor switching speed determines the functional speed of the chip. Several studies have shown the impact of temperature on chip performance. The spacing between interconnects and driver transistors decreases in technologies below 45nm. A slight variation due to external factors could lead to localized hot spot generation thereby resulting in possible performance degradation and premature chip failure.

This project compares the impact on H-tree CDN by replacing the traditional copper interconnects with carbon nanotube (CNT). By applying temperature mismatch, threshold voltage mismatch, process mismatch and a realistic temperature profile, Our findings show that using CNT interconnects reduces the clock skew significantly compared to traditional copper interconnects. The underlined benefits of this technology will clearly reduce failure rate, increases performance and is a tangible approach towards future scaling.