

NDnano Undergraduate Research Fellowship (NURF) 2012 Project Summary

- 1) Student name: Matthew Donahue
- 2) Faculty mentor name: Greg Snider
- 3) Project title: Characterization and Fabrication of CMOS Circuits
- 4) Briefly describe any new skills you acquired during your summer research: I learned how to design, fabricate and assemble circuits. I also learned how to test sound chips on wafers, and dice the wafers in order to use the sound chips in the circuits that I made. I also learned how to etch photo resist off of wafers using a PVA Tepla machine located in the clean room.
- 5) Please briefly share a practical application/end use of your research: The goal of our research was to find if there is a limit on power dissipation can be reached in reversible computation. If the research suggests that there is no such limit then it would be wise to develop new systems in which this goal can be reached.

Project summary:

The issue that we were supposed to research this summer was whether or not there is an absolute limit to power dissipation in reversible computation. Reversible computation is so attractive because of the fact that irreversible computation must dissipate energy and this energy dissipation will eventually reach a limit where it will no longer be able to dissipate from the circuit efficiently. With finding the absolute limit to power dissipation in reversible computation, we would be able make a tradeoff between computing speed for increased circuit density.

Unfortunately, our team was unable to research ultra low energy computations like we were supposed to. Technical difficulties in the clean room prevented us from accomplishing our research goal. Instead we built certain pieces of equipment that will assist in future research. I helped construct a breakout box that can be used for testing wafers in the clean room. I also learned how to dice wafers, etch photo resist from wafers, as well as how to design, fabricate, create, and troubleshoot circuit boards.

Publications (papers/posters/presentations):