EE/CprE/SE 491 WEEKLY REPORT 01
Aug 22- Sep 22

Group number: **22**

Project title: **ReRAM Compute Asic Fabrication**

Client &/Advisor: **Cheng Wang & Henry Duwe**

Team Members/Role:

Ali Mannan
Tyler Kloser
Austin Miller
Vinicius Malaman Soares

- **Weekly Summary**

  - This week our team's objective was to get the tools provided by our advisor on Chip Foundry, skywater130 PDK, to work on our machines to start learning how to tools work to benefit the future development of our project. One goal each team member was given by our advisor was to build an inverter on this tool to get familiarized with how it works. Another objective was to research further into what a ReRAM module is based on the resources provided by our advisor.

- **Past week accomplishments**

  - Vinicius Malaman Soares: Worked on research about ReRAM, its fabrication, different techniques, different applications and common challenges. Worked on setting up the individual environment for the tools needed as well, although not finished.
  - Tyler Kloser: Read through the research documents provided by our advisor to see how the ReRAM module works and how it interacts with the rest of the computer system. I investigated the benefits of this memory module and its applications to where it would be the best use.
  - Ali Mannan: Put in significant effort on successfully getting the tools running and operating, including installing the Ubuntu operating system as a virtual machine on a personal computer and installing all necessary software. Did research on ReRAM, both through advisor-provided information and through other online resources. Did research on analog computing and in-memory computing. Looked into VLSI verification techniques based on the UVM framework.
  - Austin Miller: Worked on getting tools set up, discussed with chip forge how to go about setting up tools and where. Seemingly got tools to work on personal server and created script that automates process (untested)

- **Pending issues**

    - Tyler Kloser: Currently having issues getting the PDK to work on my machine which is limiting me into
    - Ali Mannan: The document provided to set up the tools was incredibly detailed and helpful, however my personal machine (and this was an issue encountered by other group members too) ran into problems installing the PDK files, which culminated in the Virtual Machine or the terminal crashing. After significant research, a workaround was found, where a pre-built set of Skywater PDK files was downloaded using Volare. Additionally, the provided download link for one of the optional software (waveform viewer) was down, but Austin found a version of it on the Wayback Machine.
    - Austin Miller: Tools not fully tested (they all start up, but designing might not work as intended).
    - Vinicius Malaman Soares: actually get the tools to run on local machine, probably look into buying a local linux computer or setting a VM specifically for SD.

- **Individual contributions**

NAME	**Individual Contributions** *(Quick list of contributions. This should be short.)*	**Hours this week**	**HOURS cumulative**
Tyler Kloser	Research, getting pdk to work	6	6
Ali Mannan	Research, installing, and running tools	8	8
Austin Miller	Automated method of installing desired tools	8	8
Vinicius Malaman Soares	Research, meeting with Professor Friday, pdk research	5	5

- **Comments and extended discussion** *(Optional)*

- **Plans for the upcoming week**

  Unless the advisors suggest otherwise, we intend on beginning work on the 1-bit DAC for the project, along with familiarizing ourselves with the open-source tools.

  - Ali Mannan: Contribute to building a working 1-bit DAC in the form of design, and possibly look into the potential application of a hardware description language like Verilog.
  - Tyler Kloser: Practice with the PDK tools to create an inverter, contribute to building a working 1-bit DAC in the form of layout, investigate working on the ADC in the form on the layout
  - Austin Miller: Go through all aspects of tools with simple inverter (make sure they work) (schem,layout,DRC,LVS,waveforms). Research more how CIM works with reram
  - Vinicius Malaman Soares: Testing the 1-bit DAC design, looking into how to and getting started to implement UVM for testing.

- **Summary of weekly advisor meeting**
  - Basic Introductions and overall goal discussion
  - Explanation of ReRAM technology
  - Discussion of challenges faced by previous groups and history of the project
  - Discussion of tools
  - Setting of near-term goals