

EE/CPRE/SE 491 - sddec24-13

ReRAM Compute ASIC Fabrication

Weekly Report 7

3/19/24 - 3/26/24

Client: Prof. Henry Duwe

Advisor: Prof. Cheng Wang

Team Members:

- Gage Moorman - Team Organizer, main analog designer
- Konnor Kivimagi - Main documentation editor, mixed analog digital designer
- Nathan Cook – Main client liaison, mixed analog digital designer
- Jason Xie – Assistant documentation editor, main digital designer

Weekly summary:

This week, we ran into more issues with the ReRAM models not simulating properly. We also finalized our ReRAM architecture after researching the different operations and benefits of different layouts.

Past Week Accomplishments:

- Continued Sizing Comparator transistors
- Finalized ReRAM architecture
- Improved and expanded design document

Individual Contributions:

Team Member	Contributions	Weekly hours	Total Hours
Konnor Kivimagi	Looked into fixing ReRAM model issues, and more about how basic ReRAM operations work in different setups	6	46
Gage Moorman	Tested sizes for StrongARM comparator	6	48
Nathan Cook	Started working on ReRAM schematic and controller design	6	46
Jason Xie	Finished a proposed schematic for transimpedance amplifier. Documentation.	6	46

Pending Issues:

- ReRAM instances within xschem are not simulating properly
- Figuring out controller design
- No straightforward way to analyze xschem/ngspice data on outside applications
- Need to update website

Plans for the coming week:

- Gage Moorman
 - Finalize Sizing of Comparator Transistors
 - Create resistor ladder for ADC and Encoder Verilog
 - Formulate a process using gm/id sizing method for transistors
 - Build upon analog documentation
- Konnor Kivimagi
 - Work on improving our documentation
 - ReRAM model issue
 - Look into interfacing with ReRAM crossbar
- Nathan Cook
 - Work on controller further
 - Figuring out what needs to happen within the controller to get our desired results
 - How much area the controller might take
- Jason Xie
 - Assist on improving documentation formatting and quality
 - Continue designing transimpedance amplifier

Summary of Advisor Meeting:

Our meeting this week was brief due to Dr. Duwe being unable to attend. We discussed parameters of the comparator and what might be some of the considerations for them. We also discussed our progress and came to a final decision on Crossbar architecture. For the Architecture we decided on 1T1R because of the way that Dr. Duwe and Dr. Wang would use them fitting that architecture better, being able to select a specific cell but also having the ability to turn on all cells and make the array act as a true crossbar architecture.