EE/CprE/SE 491 WEEKLY REPORT 1

Start Date – End Date

Group number: sdmay25-19

Project title: ReRAM AI Accelerator

Client &/Advisor: Dr. Henry Duwe and Dr. Cheng Wang

Team Members/Role: Noah Mack, Olivia Price, Sam Burns, Travis Jakl

o **Weekly Summary:** The overall objective for this week was to learn the new tools given for the fabrication of a ReRAM AI accelerator. The tasks completed were slowly working through the tools as a group and seeing if we can complete them. The tools we are using do not have a user guide. As of this time, there are no changes to the project; we are just researching and figuring out how to use the software.

o **Past week accomplishments**

• Travis: Worked on setting up the analog toolsets, working through the tutorials, and got a basic understanding of how to use the tools, and can visualize how the group will utilize them for our project

    • Olivia: Tried to get the analog software up and running for schematic, layout, and testing. Also, read a paper on how ReRAM works. Also got a more concise answer on what our project should look like at the end from Dr. Duwe.

    • Sam: Worked on the setup of analog toolflow. Made a script to set environment variables for Xschem and Magic. Worked through the inverter tutorial on the ChipISU website. Started reading a paper on the architecture of ReRam.

    • Noah: Worked on the inverter tutorial from the ChipISU website to gain familiarity with the analog toolflow. These are the tools that we will be using when we start the actual design of our project. Also took on the role of being the digital design specialist, and completed the blinky tutorial from the ChipISU website as well.

o **Pending issues**

• Travis: Ran into troubles with Magic, but realized that the environment variables have to be set after every new session

    • Sam Burns: I want a better understanding of the relationship we have to the other team in terms of picking up on their work. When can we get their XSchem files?

o **Individual contributions**

NAME	Individual Contributions *(Quick list of contributions. This should be short.)*	Hours this week	HOURS cumulative
Noah Mack	- ChipISU Meeting - Getting Tools Setup - Meeting with Professor Duwe - Worked on assignments in lecture - Meeting with previous team	6	17
Sam Burns	Got analog flow tools up and running. Created script for setting environment variables. Met with previous team. Met with Professor Duwe and Professor Wang.	6	17
Travis Jakl	ChipISU Meeting setting up tools, Meeting with Professor Duwe, Worked on lecture assignments, Meeting with previous team	6	24
Olivia Price	- ChipISU Meeting: Getting tools set up - Meeting with Duwe - Meeting as a group without advisor - Worked on assignments in lecture	6	18

- **Comments and extended discussion**

After a more formal explanation from Dr. Duwe at last week's meeting, we all have a much better understanding of what we will be doing and how ReRAM computation works. As we continue to ask questions and meet with Dr. Duwe and Dr. Wang, our understanding will grow even further.

- **Plans for the upcoming week**

• Sam Burns: Get post layout inverter working properly in XSchem. Help travis create a script for setting his environment variables. Reach out to the other team to get an update on their VLSI progress and get their files.

• Noah Mack: Complete a more involved digital tutorial from the ChipISU website to gain familiarity with the digital toolflow.

• Olivia Price: Try to create tutorials for the analog software and get a better understanding of how they work. Try to create an inverter from start to finish and see what bugs I run into and what troubleshooting needs to be fixed.

• Travis Jakl: Create a basic circuit using the analog tools and verify that it functions correctly. Work through the digital tutorials so that I can start to think about how we can integrate our analog and digital areas together. Also, look into the ReRAM architecture and get a better understanding of its functionality and how operations take place.

- **Summary of weekly advisor meeting**

The team got a clear understanding of how to divide ourselves as a team, figuring out who is responsible for what (Noah: Digital, Sam & Olivia: Analog, Travis: Digital and Analog for handling integration). We discovered that our next steps after learning the toolset is getting a hold of the prior teams' work and architecture, eventually incorporating it into our own system. With our tape-out deadline, it's crucial we take advantage of the previous work laid out for us. Dr. Duwe took us through the math behind the ReRAM matrix multiplication, working out an example problem and showing how each bit interacted with every other bit. This helped to understand the architecture of the ReRAM accelerator and how it will actually function in practice. To help us figure out the scope of our contributions for this project, we will compare what previous teams have done to what the remaining needs are. We concluded the meeting with the intention of understanding our toolsets and researching basic ReRAM architectures.

Grading criteria

Each weekly report is worth 10 points. Scores will be awarded as follows:

- **8 – 10**: Progress for your project seems to be suitable. Documentation and hours reported by team members are adequate.
- **6 – 8**: There is scope of improvement both in your report and your project progress. Can consult with instructor/TA after class for further inputs.
- **< 6**: Please talk to instructors/TA after class hours about any difficulties that you/your team is facing.

Each weekly report should be unique in that they have a unique set of supporting details for your contributions. So please do not just copy your reports from the previous week. In addition, please avoid any personal pronouns (he, she, I, you). Try to keep your reports as neat as possible.