

EE 591L – Neuromorphic Analog VLSI

Project 9 (Optional) – Neuromorphic Systems

Objective

To understand how to put together the basic neuromorphic building blocks to create large-scale neuromorphic systems. Also, this project will be helpful in critiquing relevant neuromorphic literature.

Special Instructions for This Project

This project is NOT required but may be done to replace a previous grade. You may choose to replace EITHER a low quiz grade or a low project grade. You are responsible for telling me which you would rather do, by writing this in the project report.

You have the option to replace the lowest project grade with this grade. Alternatively, you may replace your second lowest quiz grade with this project grade (your lowest quiz grade is already being dropped, so this will replace the “lowest” quiz grade that will actually count toward your grade).

General Procedure

- Choose a paper
- Read the paper
- Get together in a group to discuss the paper
- Individually write a review of the paper
- Group presentation on the final day to summarize the paper content and your collective critique

Literature Review

In this project, you will be responsible for reading, reviewing, and presenting one of the following recent neuromorphic systems papers.

- AER EAR: A Matched Silicon Cochlea Pair With Address Event Representation Interface
- A Neuromorphic VLSI Model of Bat Interaural Level Difference Processing for Azimuthal Echolocation
- Correlation Learning Rule in Floating-Gate pFET Synapses
- Analog VLSI Circuit Implementation of an Adaptive Neuromorphic Olfaction Chip

Copies of these papers will be distributed in class on 4/22 and 4/24. There will only be a few (3-4) copies of each of these papers, and you will have the option to select one of these papers to review. Once all the copies of a particular paper are gone, then you may not select that paper any more – this will be done on a first come, first served basis, so if you are interested in a particular topic, do not be shy!

Additionally, part of this project will involve working together in a group. Since I want to encourage you to work with someone new for this project, you will NOT be permitted to choose the same paper to review as your partner from the previous projects.

Group Meeting

Once you each have read through your selected paper, your group (all who have selected the same paper) must meet together to discuss the paper and prepare your presentation to the class. When you meet together, you are to focus your discussion on a critical review of the paper. Try to draw out the following points.

- What is the motivation for this particular work?
 - Is it good/bad/justifiable?
- Why is this work important (or if you do not think it is, then why)?
- What is good about this work?
- What is bad or may be problematic?
- How can this project be extended? What would be the next step?
- Is there anything that is novel or new?
- Did the authors clearly convince you that this work has merit?
- Did the authors clearly convince you of their method and technique to arrive at the desired goals?

HINT. You may need to look up and read some of the references to truly make sense of these papers.

Individual Reflection

You are EACH responsible for writing a one page (maximum) literature review of this particular paper. This should be guided by your discussion with your group, but it should also be your own work and thoughts. Do NOT use this one page to tell me what the authors did, but instead tell me what you thought of this work (critique the good and the bad of the paper).

Group Presentation

On the last day of class, your group will present this paper to the rest of the class. The duration of the presentation will only be ten minutes (with a hard cap on that duration). You should spend approximately half the time describing the general principles of the paper (i.e. what was done), and then spend the rest of the time analyzing the paper (i.e. presenting your critique).

Grading

- 50% for the group presentation
- 50% for the individual paper

Rules for this Project

Since this project is effectively extra credit, there are several rules, and you must follow them exactly, or else I will not grade this project.

- You must work in a group that does NOT include your partner from all previous projects
- You must choose one of the listed papers during class time – this will be done on a first come, first served basis
- You must be present for all of the group presentations
- Your presentation slides MUST be in my e-mail inbox no later than one hour prior to the start of class – you will not be permitted to use your own laptop or bring in your presentation on a flash drive (purely for speed of changing from one presentation to the next)