

## Neuromorphic Computing Final Project

### Overview:

The final project for this course will be performed in groups of 2-3 students. Each group will identify a recent research paper (published within the last 5 years) related to neuromorphic computing. The group should reproduce the main result(s) of the paper by demonstrating 1.) the baseline functionality of the hardware/algorithm/etc., 2.) at least 2 significant experiments conducted in the paper (i.e. the effect of X on Y) and 3.) at least one experiment not shown in the paper (i.e. chosen by you). Examples of experiments could be the effect of hyperparameters (learning rate, network size), neuron model, learning algorithm, hardware design, etc. *Note: If you have an interesting idea that you can't find in a paper, then come talk to me.*

Each group will write a 4-6-page IEEE-style paper to document their work with the following sections:

	Description
<b>Abstract</b>	<ul style="list-style-type: none"><li>• What was done and what are the significant results. ~5 sentences.</li></ul>
<b>Introduction</b>	<ul style="list-style-type: none"><li>• What is the problem that is being solved and why is it important?</li><li>• What is the current state-of-the-art (as of publication date) and how does it fall short? Provide references.</li><li>• Summary of the rest of the paper.</li></ul>
<b>Background</b>	<ul style="list-style-type: none"><li>• Discuss any technical background required. Assume that the reader does not know anything about spiking neural networks or other brain-inspired algorithms.</li></ul>
<b>Methodology</b>	<ul style="list-style-type: none"><li>• Describe the technical approach, including any important mathematical concepts, simulation and analysis techniques, materials and fabrication, etc.</li></ul>
<b>Results and Analysis</b>	<ul style="list-style-type: none"><li>• Summarize your results, showing important graphs, tables, numerical values, etc.</li><li>• Analyze the results. Why are they significant?</li></ul>
<b>Conclusions and Future Work</b>	<ul style="list-style-type: none"><li>• Re-state what was done and summarize the significant results as well as what they mean for the future of the research field. What are the next steps that other researchers should take to continue the work?</li></ul>
<b>References</b>	<ul style="list-style-type: none"><li>• Cite all references using standard IEEE format.</li></ul>

Each group will give a 20-minute presentation of their work during the final exam period. The flow of the presentation should follow the same as the paper.

**Timeline:**

11/15 – Proposal due (1-page): What is the chosen paper and what are the experiments? How will they be carried out (e.g. what simulation tool, dataset, etc.)

11/26 – Status update 1 (informal): Should have functionality and 1 experiment complete

12/13 – Final project due (with paper). Students will present their projects during final exam period (10:45 am – 1:15 pm).

**Grading:**

Functionality: 45%

Experiments: 30%

Paper: 15%

Presentation: 10%