

# Final project selection guidelines

The purpose of the final project is to allow you to explore in more depth some topic related to emerging memory technologies. The project will require you to research a topic of interest to you, based on some of the work that we discussed throughout the semester and implement the project (including developing the experiments required for evaluating the main ideas addressed in the project).

## Project selection

The project selection process is arranged in two phases:

**Phase 1 - Project pitch presentations:** For this phase you will have to prepare a short presentation (3-5 minutes) in which you have to highlight the main goal of your project, background and motivation, proposed resources and deliverables, expected outcomes. Following each presentation we will have a Q&A session. This phase is supposed to help you better define your project goals, expected outcomes, and evaluation approaches. Phase 1 will take place on Wednesday 11/10 during our regular class meeting time.

**Phase 2 - Project proposal:** Based on the feedback you received during your pitch presentation you will have to write a project proposal (1-2 pages) including relevant literature related to your project. The project proposals are due on Monday 11/15 at 11:59pm.

## Suggested Projects

Projects may verify results from work presented in papers you've reviewed from your literature search. Alternatively, they can be used to test out new ideas that address issues raised from reading these papers. You can use some of the following as suggestions:

- Extend NVSim to evaluate technology scaling beyond 22nm. Characterize different NVM technologies and compare their performance to SRAM in advanced technology nodes. This project will require a combination of SPICE and NVSim simulations.
- Research and evaluate an application (other than Deep Neural Networks) that may be particularly well suited for use of emerging memory technology. Set up an experiment/simulation to evaluate potential benefits.
- Select a memory technology and create a model for some of the device non-idealities (variability, resistance drift, intrinsic device noise, multi-level cell faults). Use this model to evaluate the impact of these non-idealities on a target application.

- Characterize SOT-RAM using SPICE simulations. Based on the circuit-level simulation results, build a cell model for SOT-RAM in NVSim.
- Evaluate the use of non-volatile memories for in-memory computing applications using [NeuroSim](https://github.com/neurosim/MLP_NeuroSim_V3.0) ([https://github.com/neurosim/MLP\\_NeuroSim\\_V3.0](https://github.com/neurosim/MLP_NeuroSim_V3.0)). Compare your results with a traditional accelerator architecture (e.g. NVDLA+NVSim)
- Explore a topic that may become an issue or byproduct as a result of deployment of a particular emerging memory technology. Topics may include security, environmental, privacy, etc.
- Explore how inexact/approximate computation/storage may be exploited in order to make better use of an emerging technology.

Do not feel constrained to pick one of the projects on this list. In fact, you are encouraged to propose your own project ideas and use these topics to guide your project selection.