Week 3

Challenges

ECE 410/510
Spring 2025

Instructions:

- The challenges below are for you to delve deeper into the subject matter and to test your own knowledge.
- I'd suggest you try to solve at least one problem per week. More is obviously better.
- Practice "vibe coding" if necessary.
- Post your solution(s) in the `#weekly-challenges` Slack channel so everybody can appreciate what you did, ask questions, and make comments.
- Document everything for your portfolio and make your code available on Github.

Challenge #10: Identify computational bottlenecks

1. Ask your favorite LLM to identity "computational bottlenecks" in the FrozenLake code from https://github.com/ronanmmurphy/Q-Learning-Algorithm
2. Do the suggestions make sense? How well is it able to identity bottlenecks?
3. Ask it to propose a HW implementation of the biggest bottleneck.
4. Ask it to generate System Verilog code for the HW implementation.

Challenge #11: GPU acceleration

5. Ask your favorite LLM to optimize the FrozenLake code from https://github.com/ronanmmurphy/Q-Learning-Algorithm for a GPU.
6. Benchmark both the pure Python and the GPU-accelerated versions and compare. How much speed-up do you get?