**Monday, August 21, 2023**

Today I learned about how Senior Research is going to work in general (especially in regard to the weekly journals) and what project ideas do and do not turn into good projects. Better projects have a specific metric for success rather than a qualitative assessment.

**Wednesday, August 23, 2023**

Today, I researched the project I plan to do so I could determine possible approaches for solving it. I want to do a project related to multi-agent car racing, with the constraints of having each agent use the policy learned or created, and also the addition of obstacles onto the track which has not been very common in past research. Previous research incorporates [Monte Carlo tree search](https://github.com/travelbureau/f0_icml_code), structuring the problem of path planning to a game tree where each leaf node is a valid trajectory that could be reached from the parent node. Game-theory based approaches also seem to exist, such as [this paper](https://arxiv.org/pdf/2209.07758.pdf) which used regret minimization for planning overtake maneuvers. There are also several implementations of reinforcement learning for the robotic cars I plan on using, including [this](https://github.com/navidmdn/f1tenth_rl) and [this](https://github.com/abhaybd/F1-RL) which provide simple examples of single-agent, no-obstacle driving. Previous approaches which I am already familiar with to solving this simplified self-driving problem include end-to-end machine learning with CNNs, purely algorithmic algorithms involving the iterative closest point algorithm to generate maps and race on a pre-computed racelines, and “reactive” approaches which hand-craft steering angles based on analyzing the LiDAR data. The main concern I have with my project is what to use as input: monocular/stereo cameras or a combination of both could be used. This would change the kind of algorithm I would use as well as the simulation environment and hardware on the real car.

**Friday, August 25, 2023**