Ilan Schindler: Individual Self-Assessment related to CEAS Capstone Project 2022-23  
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Under the auspices of the Aerospace Engineering program

*The goal of the project was to add functionality to the Flymaster2 system to detect fires, plan paths through specified waypoints, and avoid both static and dynamic obstacles.*

**Part A**

My individual contribution to the project was to write code to support the pieces of the project that were not focused on aerospace specifically. I joined what was originally the UCAV Team, which was comprised of aerospace students because they needed computer science expertise that was outside of their knowledgebase, specifically planning a path through a given set of waypoints (traveling salesman problem) and updating the web-based UI.

I used PyGAD, a Python library, to build a genetic algorithm to optimize the path as well as a simple brute force methodology to validate it on a small scale. I built a skeleton framework that makes it easy for more complex pieces to be swapped in as needed. One example: the fitness function I provided strictly calculates total distance of the path and minimizes it, but this could be replaced with a more complex fitness function that accounts for vertical distance separately or considers how the windspeed affects flight.

I was not asked to complete an initial assessment last Fall, but I applied skills from my standard programming toolkit: breaking down tasks into smaller pieces, working out problems bit by bit, stepping through code in debug mode, and iterating versions of the code to improve over time. For me, the biggest challenge was my lack of aerospace knowledge. Without an understanding of the terminology and concepts related to aeronautics, it was difficult at first to integrate with and use the rest of the code. But over time, I managed to learn the meaning of the most important parts and how to use what I was being given.

**Part B**

My group made several independent improvements to the Flymaster2 system, including the addition of fire detection using an optical camera, the previously mentioned waypoint path planning, maintenance of and integration with an interop server, both static and dynamic obstacle avoidance, and a revamped ground control station. The teamwork went quite smoothly because all these pieces, while related to and dependent upon each other, were separated in the code so no two people were ever working on the same code at the same time. We all trusted that everyone else’s contributions would work and if it didn’t they would fix it.

The downside to this approach was that sometimes pieces were not ready or were not yet pushed to GitHub when someone else needed it. If one person’s piece was dependent on another, they couldn’t properly test it until something workable was provided. But this was largely mitigated by people ensuring they pushed changes they made promptly and, in cases where that wasn’t an option, temporary solutions were used as placeholders. My efforts matched those of everyone else in the group. We all worked on our assigned parts equally. No team members deserve special recognition; it was truly a group effort.