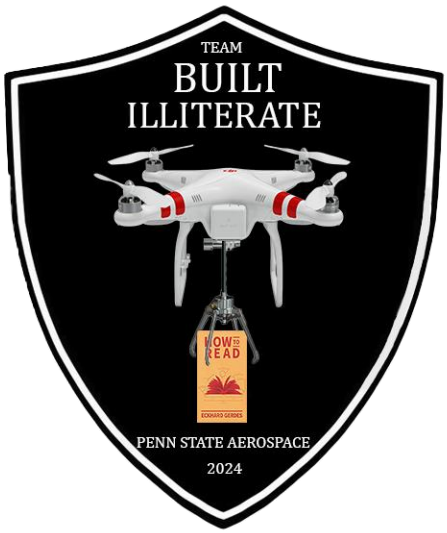
Simulation Autonomous Flight Milestone



April 2, 2024

Principles of Success

The metric of success for this milestone was not able to be demonstrated, but it was conceived if the team were able to meet the deadlines. To consider the simulated autonomous flight a success, the simulated drone would need to autonomously plan a path to a designated target coordinate. It would then take off , rise to a cruise height of 2 meters, and fly along the planned path towards the destination. Upon nearing the destination, the simulated drone would descend to a height of 1 meter, maintain a 1-meter, 5-second hover over the destination, and return to and land at the starting location in the simulation. Since there was no simulated autonomous flight to occur, this milestone cannot be considered a success.

Achievement

The team was not able to complete this milestone by the end of the spring semester. This goal was not far off and might have even been achievable depending on where time was spent after the manual flight demonstration. This milestone was not necessarily coupled with the physical drone because the code required to fly the simulator is different than the code that was used for the team's drone. Since they were not coupled, a task could have been set to someone to attempt to reach this milestone while efforts were made elsewhere. Unfortunately, that was not the case due to a lack of planning.

Roadblocks

The primary roadblock to achieving simulated autonomous flight was the altitude controller. This controller was meant to use the data gathered by the ultrasonic sensor and Pozyx system to create an altitude controller for the drone to autonomously hover and stay at a fixed height while moving. Being able to read and use the data from both systems took longer than

expected, and the logic to make it all work autonomously has yet to be figured out. In addition to this, it was discovered that the simulation's gain values did not match those of the physical model, so taking a different route to achieving autonomous flight appeared to be a better option. Within the final week leading up to the competition, it was considered to put time into reaching a simulated autonomous flight. However, the team agreed that the goal for the rest of the semester just be shifted to achieving autonomous takeoff to use in the final flight demonstration to boost the score.

Lessons Learned

Since this milestone was not attempted, there were not any lessons learned from it directly. If there had been more parallelization throughout the team after the manual flight demonstration, a simulated autonomous flight could have been possible. The main problem with parallelizing work is that not everyone knows how to do everything. Those specialized in areas like structures are not as knowledgeable about the coding side of the project, making it hard to utilize everyone in the group for one task. In addition to this, other classes and limited time in the hangar have gotten in the way of being able to further the progress on the drone. These were problems that the group expected to happen but did not manage them well.

New Timeline Review

With the setbacks encountered leading up to the manual flight demonstration, it seemed unlikely that this milestone would be completed. In the new schedule, all assigned tasks after than manual flight demonstration and the remaining milestones were inactivated since they could not be completed. Not only this, but the direction of the tasks did not directly align with the work that the group had been doing. Therefore, a new goal (represented by a milestone) and the

associated task was added to show that an autonomous takeoff is the final push for the group to make before the competition takes place. It will be the sole focus of work throughout the following week, besides the preparation needed for the Design Showcase.