

Project Firefly - SAG Grant Reflection

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Final report: [📄 Firefly SP22 report](#)

Brief summary of work:

This semester, we focused on understanding drone physics, networking, and localization. These are three of the core building blocks to the overall project. On the drone physics side, we studied control algorithms, investigated existing drones on the market, and test flew drones of various sizes. This allowed us to build our intuition and understanding of the power required and size required for our system to work in different conditions, specifically different wind conditions.

Alongside the drone research, we also investigated different networking and localization solutions. We stumbled upon the ultra-wideband technology (the same technology that is used in 5G networking) that could function as both our networking and localization solution. We used the Decawave UWB1000 ultra-wideband transceiver to implement this technology, and developed two revisions of PCBs alongside the required firmware to communicate and run the localization algorithms.

Finally, we combined these by mounting the final revision of the PCB to a DJI drone we purchased. In addition, we also added the proposed lights. This allowed us to validate our localization, networking, and lighting solutions all in the air on a similar drone to what we expect to build in future semesters of work.

Learning outcomes:

This experience has been a huge part of my education this semester. This project built on and tied together many of my classes super well. Firstly, the engineering process and teaming felt like a solid extension from Principles of Integrated Engineering. My biggest learnings from that class was the processes we tried for collaborating as a team, and in this project, we continued using those tools to great effect. Specifically, our use of Github and pair programming was a very productive working habit. In addition, this class also extended the technical learnings from QEA, ESA, and Signals. Much of the trilateration algorithm used linear algebra from QEA, and the controls extended a lot of the s-plane lessons taught in ESA. Furthermore, this also tied into Iterate, where we explored the market desirability and customer needs of this project. While this is not something we are intending to transform into a start-up in the future, it was a great platform to learn how to evaluate the needs of this project from a non-technical standpoint.

Having one project tying together all of my classes has helped further the depth of my education as well as provide more intrinsic motivation to learn more. I am not super clear on what my course load next semester is, but if possible, I would love to continue this project next semester, as it was a great experience this semester.