

JOURNAL #5

GOALS

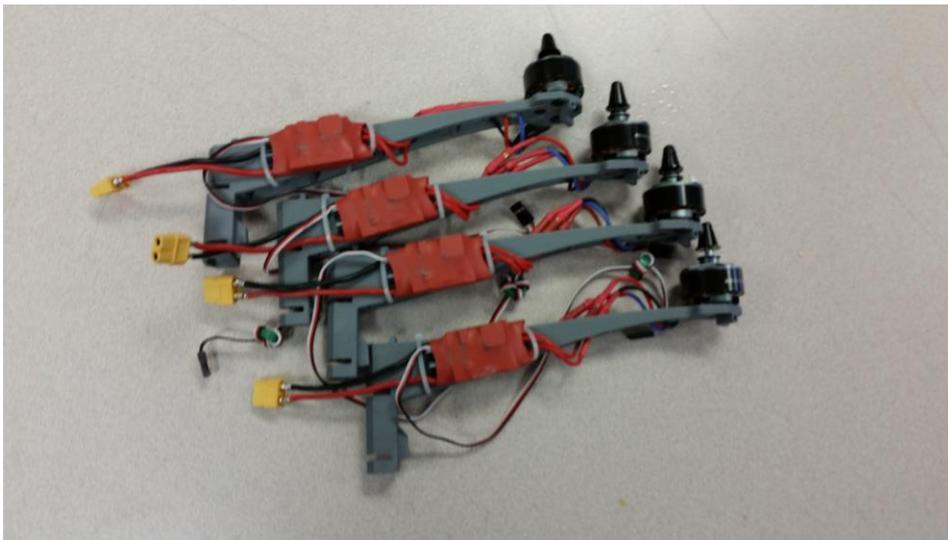
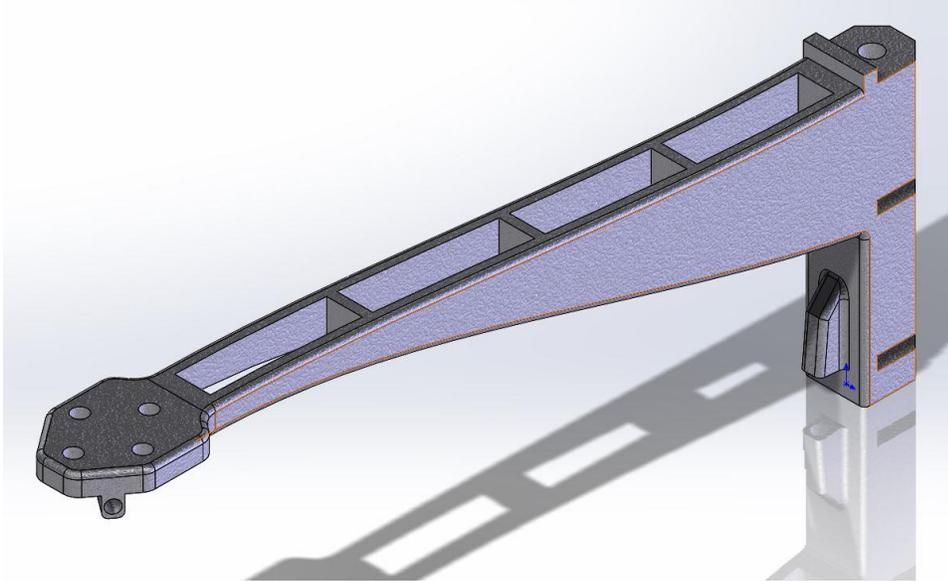
- Construct final quadcopter
- Create drawings for major parts and assemblies
- Create collapse animation for presentation
- Prepare for final presentation

RESEARCH

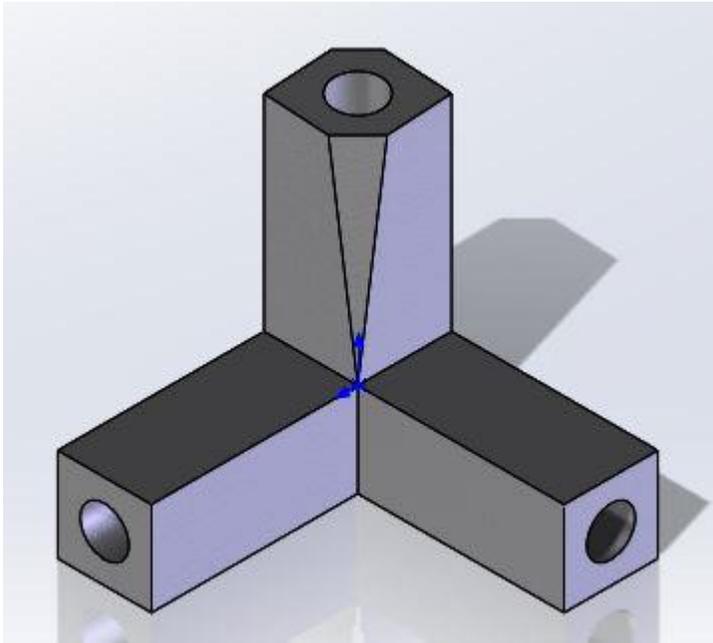
I had very little research during this stage of development. I gained some experience with 3D printers due to some complications with printing, which will be discussed in the accomplishments section. I also learned more about the animation wizard which can be used to create animations of collapses and explodes. As I was creating the exploded view, I learned that by holding the alt key, it is possible to move the triad and align it normal to other faces. This allowed the exploded view to be more symmetric and made the animation smoother.

ACCOMPLISHMENTS

- Finished final quadcopter chassis
- Printed arms and laser cut new acrylic plates.
- Constructed landing gear
- Made drawings and animation for presentation and binder

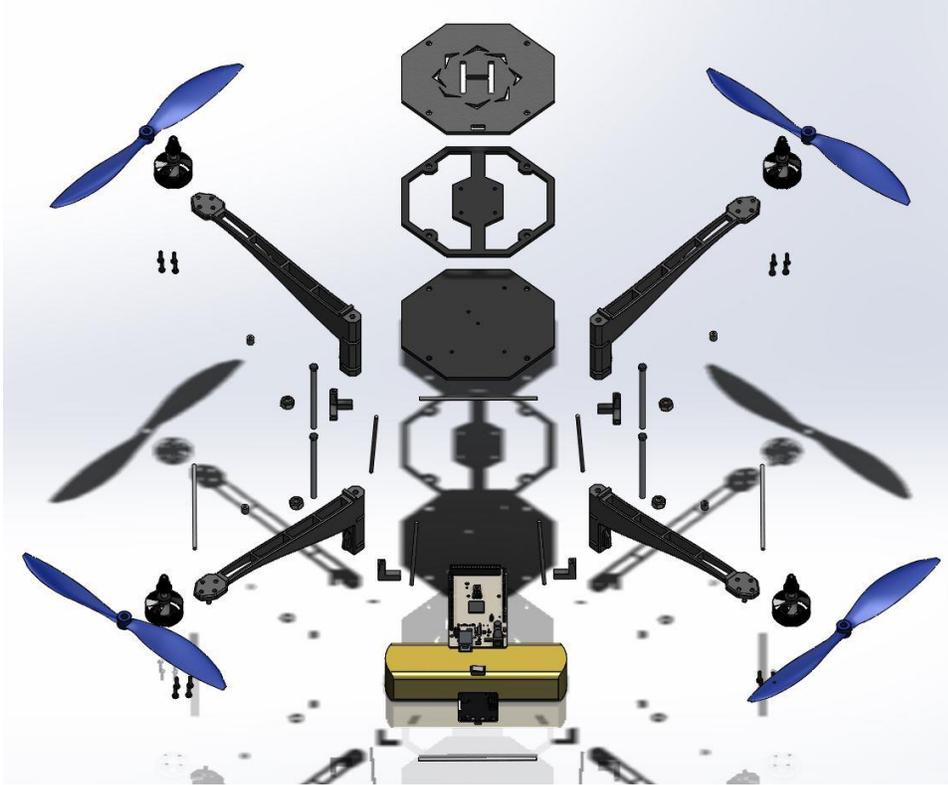


One major issue with 3D printing the arms was the delamination that occurs because of the different heating and cooling the part experiences as it is being printed. We had to stop several prints short because they were delaminating, which bent the pillar part of the arm. Although we would have preferred to have printed on the carbon fiber printer, we ended up utilizing the larger print which prints in ABS and requires a chemical bath. The parts were very accurate, but a little weaker than the partial prints from the markforg3d printer.

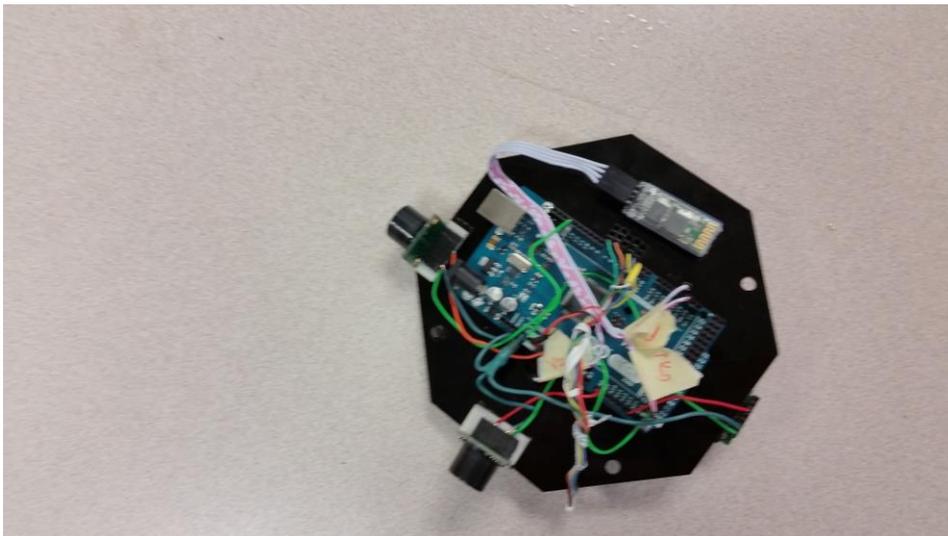


3D printed. Design w/ rods and arms

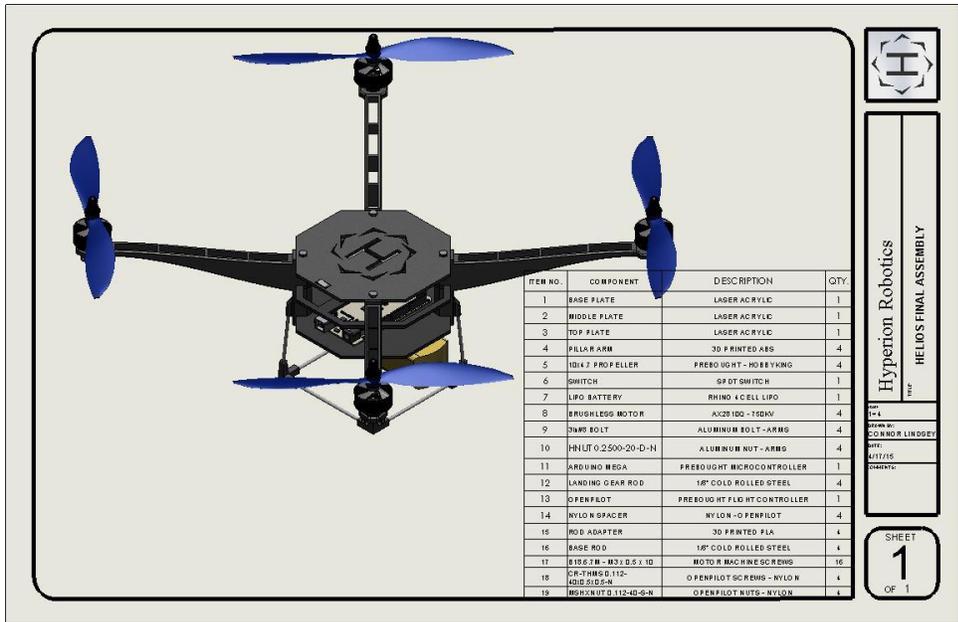




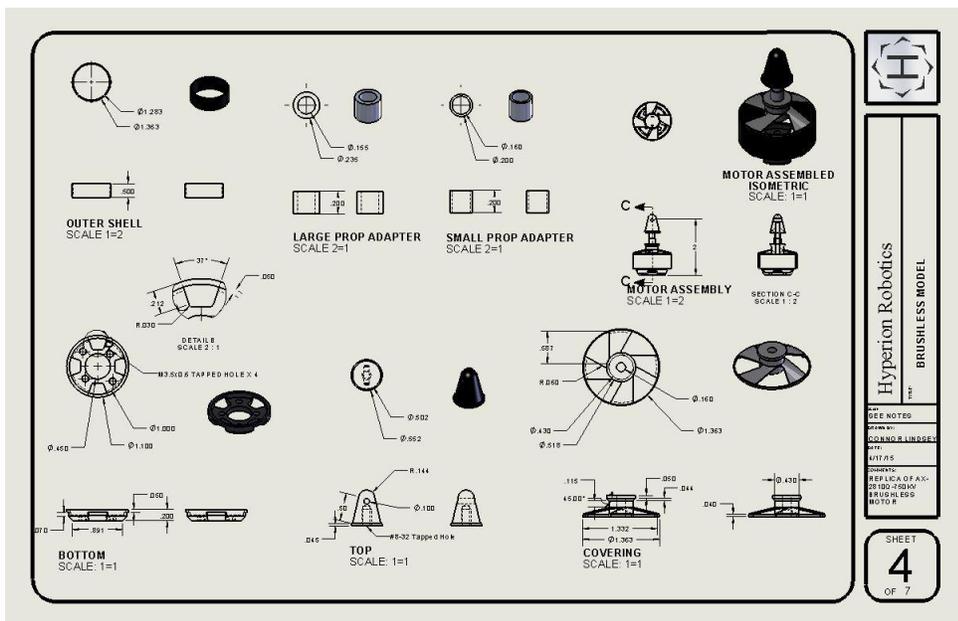
The above snapshot shows the exploded view. Because of the orientation of the part, it was difficult to move parts. I learned that by holding the alt key, it is possible to realign the triad normal to any face of any part. This allowed me to be more precise with the exploded steps. It also made the collapse animation smoother.



The final design is much more compact, especially for wiring. Openings between the different layers allow key electrical connections to be shorter. Also, it was relatively easy to mount the three ultrasonic rangefinders, as shown by the above photograph.



The last drawing includes a bill of materials, which includes all of the hardware for mounting the electronics.



Using skills I learned the last two years in SolidWorks focused classes, I was able to create technical drawings for a majority of the parts. Some key aspects of the drawings are the bill of materials for the final assembly and several detail views for small and intricate parts.

Part	Quantity	Price Per(\$)	Total Cost(\$)
Acrylic	1	15	15
3D Printed Arms	4	12.5	50
Propellers	4	1	4

ESC	4	22	88
Motor	4	21	84
Battery	1	40	40
Hardware	N/A	N/A	20
Landing Gear Adapters	4	0.25	1
Rod	1	3	3
Arduino Mega	1	45	45
Switch	1	0.25	0.25
Openpilot	1	24	24
Lipo Charger	1	40	40
Ultrasonic Rangefinders	3	25	75
Misc. (tax, shipping, etc.)	N/A	N/A	25
		Total Cost	514.25

This chart breaks down the cost of the parts on the quadcopter. It does not include other parts like the battery monitor or tools we used like a soldering iron. Aside from the battery charger, these are all the parts required for the final design of the quadcopter. Total cost is harder to calculate because many tools we used we already owned or were borrowed, as well as some materials. It also doesn't include development costs.

REFLECTION ON GOALS AND TIMELINE

It is very rewarding to see the final results of the project. Although it isn't what I envisioned at the beginning of the year, I am very proud of what we have accomplished. I deviated very much from the initial timeline, but in the end, ended up relatively close to where I thought I would. I feel that in the end, the project turned out very well considering I was balancing sports, work, and other difficult classes. I learned incredible amounts about a wide variety of subjects. I also learned skills unrelated to the engineering aspect of the project. Completing things like journals and creating a website helped with professionalism and documentation. Also, much of the front end work like the job shadow was instrumental in fortifying my desire to become an engineer.