January 18, 2019

CAPSTONE Writing assignment for junior design

CAPSTONE IDEA

I feel that an area that might be good for a CAPSTONE project, that could be done in three semesters would be a deployable array system for cubesats. I feel that something working with something like Figure 1 would be cool to use for attaching an array to the end and having that be able to be extended and retracted to allow for redeployment of an array.



Figure 1 is the process of a rollable deployment system in various stages of deployment. [1]

The appeal of this idea is that the technology already has been proven to work but it still is not perfected and has room to be improved on or adapted to in various ways. Such as, attaching something at the end of the boom would require some creative thinking. Similar ideas have been done but I think Florida Tech could take this idea and make something unique with it.

The biggest challenge of this idea would be creating the composites in our facilities and being able to create a way to mount our desired array to the end of the boom while maintaining the structural integrity of the boom. There are various of types of small booms already in production that come in various materials like, carbon fiber, glass hybrid, and fiberglass, with various finishes allowing for different performance outcomes. [2] This will be the largest challenge to do with it being a fairly delicate process.

Yes I would like to present this to class being that I have already talked to a few other students and Professor ----- about this. Having done some more research and refining of the idea I think more appeal to the project would come.

Well one customer would be NASA. This would be useful technology for them that if we could produce a deployable array system that could be easily mounted to a cubesat and have a mount that allows other experiments to be attached to it they would be able to focus their time and resources into the actual experiment or mission of the cubesat and not the arrays. NASA states that almost every cubesat uses some form of deployable antenna or array and if we produced a reliable easy to implement system that would be a valuable product for them. [3]

The main purpose of this product would be to have an easily integratable deployable system that the customer (NASA) could get in a ready made package that then could simply be plugged into the satellite. This would ease the burden of having to develop a new system for every satelite they use. This will free up time and resources to be allocated to other areas of the mission.

References

[1] Davis, Bruce L, and William H Francis. “Embedding High Performance Electrical Conductors in Space-Based

Deployable Composite Structures.” *Journal of Aircraft*, 2015, arc.aiaa.org/doi/pdf/10.2514/6.2015-0226. Accessed 1/18/19

[2] “Composite Booms and Boom Deployers.” *Composite Technology Development, Inc.*,

www.ctd-materials.com/home/composite-booms-and-boom-deployers/#tab-id-1. Accessed 1/18/19

[3] Jackson, Shanessa. “NASA's CubeSat Launch Initiative.” *NASA*, NASA, 17 Feb. 2017,

www.nasa.gov/directorates/heo/home/CubeSats\_initiative. Accessed 1/18/19