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**Thesis title:**

*The Metrics of Spacecraft Design Reusability and Cost Analysis as Applied to CubeSats*

**About thesis:**Katharine Brumbaugh came to UT-Austin in the fall of 2010 to begin a Masters/PhD program in Aerospace Engineering, studying under Dr. Glenn Lightsey. Almost immediately, Katharine joined the Satellite Design Lab as the Lead Systems Engineer. In January 2011, she took on the role of Student Program Manager for the ARMADILLO spacecraft where the topic of her Master's thesis was born. The two spacecraft being designed concurrently in the Satellite Design Lab necessitated the calculation of design reusability metrics and total mission cost analysis. Katharine took on this topic as her Master's thesis both to help support the two missions but also to document something never before researched in the nanosatellite community.

The results of this thesis show that it is possible to have a reusable spacecraft design process, including hardware, software and documentation, which will accomplish a broad range of mission objectives. The cost analysis shows that the most accurate industry cost model is the Small Satellite Cost Model (SSCM) developed at the Aerospace Corporation. This analysis, however, uses a grassroots approach at capturing all costs, mainly hardware, facilities and personnel, associated with the 3U CubeSat project while the industry models use Cost Estimating Relationships. It was concluded that a nanosatellite-specific cost model is necessary to more accurately determine the cost of a 3U CubeSat mission. Additionally, the reusability metrics developed throughout the course of the thesis should be applied to other missions to more intensely test the methodology.

**About Me:**Katharine obtained a B.S. in Aeronautical/Astronautical Engineering from Purdue University in May 2010 with a Minor in Mathematics. While at Purdue, she was very active in the Purdue chapter of Society of Women Engineers (SWE), serving as the Community Service Chair, Programs Director and Vice President. Katharine was also the President and Engineering Expo Director of the Purdue Student Engineering Foundation. She co-chaired the Purdue Engineering President’s Council and was instrumental in planning the Engineering Week 2010 celebration on the Purdue campus.
She is currently a graduate student at The University of Texas at Austin (UT-Austin) studying Aerospace Engineering. Katharine serves as the Student Program Manager on the ARMADILLO 3U CubeSat in the Satellite Design Lab where her research focuses on the systems engineering practices of designing, building and testing a 3U CubeSat. She hopes to continue and pursue a PhD in the same area after completing her Masters in May 2012. Katharine also continues her involvement in SWE at the graduate level and co-chairs the Graduate SWE Committee at UT-Austin.
During her collegiate career, Katharine has had many work experiences. She spent three summers with The Boeing Company working on various missions with the Space Shuttle and International Space Station. She has also spent a summer with The Aerospace Corporation as well as within the Intelligence Community.