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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Lift-Off - Secondary Space Education (2)

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UNDERGRADUATE STUDENT DESIGN TEAM STEM OUTREACH EFFORTS VIA THE DESIGN AND DEVELOPMENT OF A WIND TUNNEL

Abstract

In the course of pursuing an undergraduate degree in Mechanical and Aerospace Engineering (MAE), students at the University of Alabama in Huntsville (UAH) are required to complete a capstone design course, the purpose of which is to challenge students to design, fabricate, test, refine, and deliver a product to a customer. Throughout the design effort, students develop critical thinking, communication, research, analysis, and team skills that will prove to be invaluable in the professional world. At UAH, a number of these projects take the form of educational tools focusing on Science, Technology, Engineering, and Mathematics (STEM). Designed to stimulate interest in primary and secondary school students, STEM tools provide an interactive and hands-on method of teaching and learning. A recent capstone design team yielded a mobile, small-scale, low velocity wind tunnel with the intent of teaching students in the North Alabama region the basic fundamentals of aerodynamics and the principles regarding flight and aerodynamic forces. The goal is to inspire the students to pursue a STEM education and career. The project requirements were defined with input from the secondary school teacher and students that will utilize the tool. Market surveys and outreach efforts by the UAH team ensured that the end product met the specifications required for the classroom and that student interests and desires were considered in the design process. Once the design process reached the end phase of the fabrication process, the product was delivered to the recipient school and evaluated to verify that all requirements and criteria had been met to the satisfaction of the teacher and students. Key factors considered during product verification included design considerations such as performance, safety, overall functionality, durability and life cycle, ease of maintenance, and overall reliability of the system. Metrics cataloguing the responses of the students with respect to overall interest in pursuing a STEM education were also collected. A survey administered both before and after a presentation given by the design team quantified student interest as well as gauged the overall effectiveness of the demonstration in teaching the desired topics. The results of these metrics provided the UAH design team a better understanding of how the middle school students responded to the STEM tool, as well as provided verification that the students retained the information presented. Future design teams can utilize the data collected from this and other projects to better suit future STEM tools to the classroom.