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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
LIFT OFF - PRIMARY AND SECONDARY SPACE EDUCATION (1)

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DESIGN AND FABRICATION OF HARDWARE TO PROMOTE STEM EDUCATION AND CAREERS AMONG SECONDARY EDUCATION STUDENTS

Abstract

Collaborative efforts between the University of Alabama in Huntsville (UAH) and Women in Defense (WID) - a non-profit organization - have resulted in various student designed hardware being implemented and utilized in secondary education classrooms across north Alabama in order to promote interest in Science, Technology, Engineering and Math (STEM). WID is a national organization in the United States (US) that has developed a STEM initiative (STEMi) in order to encourage middle school and high school students to seek a STEM related education and career. Via collaboration with the UAH Mechanical and Aerospace Engineering (MAE) department, WID has sponsored several MAE senior undergraduate student design teams. The teams design, model, analyze, fabricate and test the STEM oriented hardware. Resulting designs include a fluid flow circuit, catapult, ballistic pendulum, mechanically driven solar system and a Carbon Dioxide (CO2) launching mechanism. The design teams focused upon the requirements and constraints specified by the sponsor, recipient classroom instructor and the middle school and high school students. In addition to the creation of the STEM hardware, outreach efforts that involved the secondary education students in the design process – via market surveys and definition of requirements – was emphasized. The UAH MAE design team members have actively engaged the secondary education students by visiting their classrooms and integrating the students' ideas into the final product. Upon delivery of the product to the school the MAE teams discuss the engineering design process and the various aspects of the final product including the functionality, performance, ergonomics, features, maintainability, safety, durability and reliability. The promotion of STEM education and careers is critical to a nation's economy and security. The present approach encourages students to seek a STEM career by reinforcing the understanding of various complex and technical concepts by providing a hands-on and intuitive understanding of the concepts. A survey of the secondary education teachers and students has resulted in overwhelming excitement and support of this new initiative. The present paper describes the collaboration between UAH, WID and the middle schools and high schools, the interaction and mentoring of the students by MAE design teams and the impact of the hardware upon the students desire to seek a STEM education.