

66th International Astronautical Congress 2015

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

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DESIGN AND FABRICATION OF MOBILE ARM SUPPORT SYSTEM FOR INDIVIDUALS WITH
CEREBRAL PALSY GUIDED BY THE NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION (NASA) SYSTEMS ENGINEERING HANDBOOK

Abstract

A team of Mechanical and Aerospace Engineering (MAE) students at the University of Alabama in Huntsville (UAH) have designed and built a Mobile Arm Support (MAS) for children and adults with cerebral palsy (CP) using the National Aeronautics and Space Administration (NASA) Systems Engineering (SE) Handbook and design methodologies. The UAH senior product realization design class tasks students with designing, manufacturing and delivering a product to a customer. This is the first professional scale project MAE students are required to complete. NASA's SE processes provided crucial guidelines to develop the MAS and ensure no critical aspects were omitted. The MAS will aid CP patients in arm mobilization while working on everyday movements in therapy; specifically eating and writing. The MAS not only aids young individuals in expanding their mobility and, therefore, quality of life, but also provided engineering students with the experience of designing and building a product that met specified requirements. This design project provided the UAH student team with the skills and knowledge necessary to accelerate their understanding of SE processes as defined by NASA. The North Alabama Section of the American Society of Mechanical Engineers (ASME) organization provided funding for this project to enable the student team to develop a high quality, durable, and reliable product. As a result the therapists at the United Cerebral Palsy (UCP) center in Huntsville, Alabama can immediately integrate the MAS within their daily therapy sessions. This design experience advanced the student team's knowledge and performance of project management, trade studies, concept of operations, team scheduling, Work Breakdown Structures, and numerous other SE tools and processes currently utilized by NASA engineers. The team utilized evaluation matrixes and requirement guidelines from NASA's SE to narrow down design ideas and develop product requirements. Several design reviews provided a breakdown

of each phase of the development of the MAS system. The NASA Systems Engineering Handbook has benefited and prepared college students for professional projects in the work force. A detailed description of how the MAS was created will be provided.