Student design earns national honors at NIH Challenge

A Smart Walker Device, designed by a student team from the Michigan State University College of Engineering, has earned national recognition at the National Institutes of Health (NIH) Design by Biomedical Undergraduate Teams (DEBUT) Challenge. Their project will be honored at ceremonies in Florida in October.

The students received an honorable mention for their “smart” walker, which can respond to a space void, like drop-offs or stair steps – obstacles that are often difficult for people using walkers to see.

Team manager Jeffrey Hancock of Grand Blanc, Trevor Dirheimer of Grand Haven, Dominic Hill of East Lansing, Yakov Kochubievsky of Ann Arbor, and Sean Moore of St. Joseph all graduated from the MSU Department of Electrical and Computer Engineering (ECE) in May.

“We designed and built an intelligent sensor and feedback device to equip or retrofit a walker with an intelligent feedback capability,” Hancock said. “It alerts the user to dangerous drop-offs with ample time to stop,” he explained.

Their efforts began as an ECE 480 Capstone project and were presented at the college’s Design Day on May 1. The team later submitted their project to the NIH Health DEBUT Challenge, a competition that encourages undergraduate students to design solutions for unmet clinical needs. Fifty-nine eligible entries were received from 30 universities in 18 states.

Three top prizes and six honorable mentions will be recognized during the annual meeting of the Biomedical Engineering Society in Tampa, Fla., Oct. 9.

“This is an amazing accomplishment that represents MSU extremely well,” said ECE Department Chair John Papapolymerou. “We are very proud of their national success.”

Hancock said the team’s inspiration came from fellow MSU student David Shachar-Hill, a junior from Okemos studying interdisciplinary social science. Shachar-Hill, who is associated with the MSU Resource Center for Persons with Disabilities (RCPD), uses a walker on campus as a mobility aid.

“I have significant visual and mobility disabilities, plus a moderate hearing loss in the high frequencies,” Shachar-Hill explained. “Last year, I was walking in Brody Hall in a part of the building that I was unfamiliar with. I didn’t see a flight of four stairs in front of me.

“As I approached the first stair, the wheels of my walker lurched forward, pulling me down the stairs with it. I was glad this wasn’t a full set of stairs, but it was quite a warning sign.”

Shachar-Hill said unexpected drop-offs and/or changes in the terrain pose a hindrance to accessibility throughout campus and the community.
“My rehab doctor wondered if a simple 'Roomba' knows not to go over an edge, why can’t my walker? If there was a device that I could attach to my walker to warn me of changes in the terrain, I would have avoided the accident. Mobility and/or visual disabilities could benefit from such an innovation tremendously, increasing confidence, safety, and independence.”

Shachar-Hill teamed up with assistive technology expert Stephen Blosser and together worked with the team on the Smart Walker Device, which was sponsored at Design Day by the RCPD. The team’s faculty facilitator was ECE professor Virginia Ayres.

Ayres said the unusual advantage for this project was that the customer, Shachar-Hill, worked directly with the team.

“He contributed invaluable experience of his own visual and motor impairment to the design, testing, and implementation(s) of the Smart Walker Device,” Ayres said. “This contributed greatly to the professional level of the device-patient integration.”

Ayres added that developing the project could have potential in the marketplace. “The design and methods to produce the Smart Walker Device can be a breakthrough for the assistive technology industry, as well as for users with disabilities.”

Shachar-Hill recently began his fall semester at MSU, using his Smart Walker Device.

Related Website: Read more on the smart walker device
National Institutes of Health
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Source URL: https://www.egr.msu.edu/news/2015/09/14/smart-walker