CMS Students Win Awards

Computer science students Sean Smith and Wenxi Zeng, were selected to present their research on a 3-D wheelchair simulation system at the annual Council on Undergraduate Research Posters on the Hill in Washington D.C. in April. Smith and Zeng’s poster was one of 60 selected out of 600 applications. UCO was the only Oklahoma university selected. The students were accompanied by their faculty advisor, Dr. Jicheng Fu, assistant professor of computer science.

Joseph Acquaviva won 1st place poster at the 2014 Beta Beta Beta Southcentral Convention in Austin, TX. His poster was titled “Nanotechnology and Phototherapy: A Novel Treatment Modality for Metastatic Cancers,” and qualifies him for the Biennial Tri-Beta National Convention in June. Joseph is a biomedical engineering major and his faculty advisor is Dr. Wei Chen, professor of engineering & physics.

Alanna Reiderer, a freshman mathematics major, was named one of the UCO Alumni Association’s ‘Central Standout’ award for 2014. The awards are given annually to freshmen and seniors who have distinguished themselves in academics and campus/community activities.

Cory Anderson and McKayla Mashburn will participate in the OK-LSAMP summer program, conducting research with Dr. Gang Xu, assistant professor of engineering & physics.

Kara Clark, another of Dr. Xu’s students, has been selected as a participant in the NSF Research Experiences for Undergraduates (REU) summer program at Washington University in St. Louis.

Mathematics major Candace Baker won the Outstanding Presentation award in the MAA Undergraduate Poster Session at the 2014 Joint Mathematics Meeting. Dr. Sean Laverty, assistant professor of mathematics & statistics, is her faculty advisor.

The UCO Center for Interdisciplinary Biomedical Education and Research (CIBER) held its inaugural symposium in March 2014. Students placing in the poster presentation were: 1st-Bryan Dawkins, mathematics; 2nd-Joseph Acquaviva, biomedical engineering; and 3rd-Nhi Nguyen.

Two computer science students, Vlad Antipov and Andres Jaramillo, won 1st and 3rd place respectively for their poster presentations at the Consortium for Computing Sciences in Colleges: South Central Region 2014 conference.

Six UCO CMS students were selected for the 2014 INBRE Summer Research Program: Jennie Allen, Matthew Benton, Jennifer Fessler, Max Lyon, Zhaotong Meng, and Wenxi Zeng.

CMS Research Spotlight: Dr. Jicheng Fu, Computer Science

Dr. Jicheng Fu, Assistant Professor and John T. Beresford Chair of Computer Science, arrived at UCO in 2009 after completing his Ph.D. in computer science at the University of Texas, Dallas. Before pursuing his doctorate, Dr. Fu worked in industry for six years, gaining experience in software design and development.

In his five years at UCO, Dr. Fu has received a 2.5-year INBRE Junior Investigator grant, a 3-year OCAST Health Research Program grant, and a 2.5-year INBRE Research Project Investigator grant. He received the UCO Faculty Merit Research award in 2013 and the Sigma Xi Researcher of the Year award in 2014. Here are details on two of his research projects:

An Intelligent System for Clinical Guidance on Power Seat Function Usage

Pressure ulcers (PUs) impose a significant threat to the quality of life for people with a spinal cord injury (SCI). PUs can lead to pain and infection, and account for 7 ~ 8% of deaths in the SCI population. Despite great efforts made in preventing PUs, they still remain the most common complication in wheelchair users with SCI.

The current clinical practice typically uses wheelchair power seat function to adjust tilt (a change of seat angle orientation while maintaining the seat-to-back angle, and recline (a change of the seat-to-back angle) to reduce seating interface pressure. However, it is unclear at what angle the wheelchair tilt and recline can provide adequate pressure relief for reducing the PU risk.

Dr. Fu and his OUHSC collaborators, Dr. Maria Jones and Dr. Yih-Kuen Jan (Illinois), along with postdoctoral research associate Dr. Tao Liu and student research assistants Paul Wiechmann, Andres Calderon Jaramillo, and Zhibin Zhang, provide intelligent guidance on wheelchair tilt and recline usage for wheelchair users with SCI by using machine-learning techniques. These techniques fit in the research because they can capture patterns passed on training data, even though the underlying probability distribution may not be clear. They developed an intelligent model, which can advise whether a given tilt and recline setting is favorable for an individual with SCI, based on his/her own demographic information, neurological functions, and pressure ulcer history. Experimental results demonstrated that the proposed approach is promising to provide effective guidance on wheelchair tilt and recline usage to reduce pressure ulcer risks.

Robotic Assistance for Young Wheelchair Users

Young children with severe motor impairments are at great risk of secondary impairments in social, perceptual, and cognitive development. Power wheelchairs can be an effective early intervention tool that provides independent mobility. However, research shows that young children often have difficulties in maneuvering power wheelchairs for everyday use. Existing work on robotic wheelchair assistance has focused on elders and adults with disabilities, who have very different mental and physical characteristics from those of young children.

Dr. Fu and his student research assistants Sean Smith, Wenxi Zeng, and Melicent King provide robotic assistance for young wheelchair users aged 24 to 60 months. Specifically, they are developing an intelligent framework using state-of-the-art machine-learning technology to achieve effective and safe wheelchair maneuverability. The control of the wheelchair is shared by the human user and the intelligent framework. This is a dynamic process: the intelligent framework will play a less important role and the young children mature over time and their driving will likely become more skillful. Dr. Fu and his team have developed a wheelchair simulation system to train young children with severe motor impairments to practice wheelchair maneuvering skills. This platform also serves as a testing bed for evaluating artificial intelligent algorithms.
**CONFERENCE PROCEEDINGS**
