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Engineering Professors Receive NSF Early Career Awards to Support Promising Research



Katie Byl



Ted Kim



Megan Valentine

With combined grants totaling more than \$1.3 million for their proposals integrating research and education, three assistant professors at UC Santa Barbara have received National Science Foundation (NSF) CAREER Awards.

Katie Byl, in the Department of Electrical and Computer Engineering; Theodore Kim, in the Department of Computer Science's Media Arts and Technology program; and Megan Valentine, of the Department of Mechanical Engineering, are UCSB's CAREER honorees for 2013.

The Faculty Early Career Development (CAREER) Program offers the NSF's most prestigious awards in

support of the early career development of teacher-scholars deemed most likely to become the academic leaders of the 21st century. The awards provide a financial stipend to support research activity for a period of five years.

"The NSF CAREER awards give assistant professors in science and engineering the funding stability they need to make a big impact with their research," said Michael Witherell, UCSB Vice Chancellor of Research. "The three awards this year demonstrate that we are attracting some of the best young engineers in the country to our campus."

For his proposal, "Enabling Efficient Non-Linearities in Biomechanical Simulations," Kim has received a five-year, \$508,658 grant. Hoping to make simulations more realistic via the introduction of non-linear effects, Kim's team is looking to a technique called "model reduction" to drastically speed up simulation times. Potential applications for the work include virtual humans, for use in everything from movies and video games to surgical simulations, and in blood flow simulations advanced enough to run virtual experiments that may aid other research. An integral part of the grant is Kim's pledge to release all of his source code into the public domain.

Valentine's \$400,000 award, for the proposal "An Integrated Approach to Neuron Mechanics: Deciphering the Functional, Mechanical, and Structural Interactions between Microtubules and Actin," will support her work on neuron mechanics. By studying the effects of force on neuron health, Valentine aims to gain new insight into the traumatic brain injuries that affect many combat veterans, athletes, and accident victims. Her project also includes the development of a new educational initiative that would bring student veterans from local community colleges to the UCSB campus for summer research internships in biomechanical engineering.

Byl was also awarded \$400,000, for her project, "Robust Bipedal Locomotion in Real-World Environments," which aspires to develop tools for analyzing and optimizing quasi-periodic biped gaits for high-dimensional models of both humans and humanoid devices. If successful, the work has applications such as evaluating the risk of falling for a stroke survivor who walks with an impaired gait, to the design of smart lower-limb prostheses for injured veterans. Byl's project also has an outreach component, including field trips and a campus Robotics Club, to encourage youth interest in the STEM (science, technology, engineering, and mathematics) disciplines.

According to the NSF, CAREER awardees are selected on the basis of creative proposals that effectively integrate research and education within the context of the mission of their organization. The plans are expected to build a firm foundation for a lifetime of integrated contributions to research and education.

The NSF promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

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Media Contact

George Foulsham

george.foulsham@ia.ucsb.edu
