Integrating Computing and Robotics into K-12 Math Education

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Friday, January 29
11 am to 12 noon
UCI University Club
801 E. Peltason, Irvine (Free Parking)

Abstract
The mission of the UC Davis Center for Integrated Computing and STEM Education (C-STEM) is to close the achievement gap in STEM for underrepresented minority and women, at the same time develop 21st century problem-solving skills for all students. The C-STEM program also aims to provide computer science education for *all* K-12 students through integrated learning. The C-STEM Center studies how to use computing and robotics technology to increase student interest and help them learn STEM subjects with an emphasis on Algebra, the gatekeeper for STEM disciplines. The C-STEM Center also studies how to streamline the curriculum on computing education in the context of STEM subjects in elementary, middle, and high schools, as well as the first two years of college. Using the C-STEM integrated curriculum, students will have eight years of computer programming experience in C/C++ by the time they graduate from high school. In this presentation, I will share with the audience how we have developed innovative educational computing and robotics technologies (C-STEM Studio and RoboBlockly), Common Core State Standards Math compliant curriculum, and teaching strategies for integrating computing and robotics into math education in grades 4 to 12 to help close the math achievement gap and prepare students to be career and college ready. I will also present how both access and the success of the curriculum-based RoboPlay Competitions and Girls in Robotics Leadership (GIRL) camps impact students' motivation and learning, especially for students from underrepresented and social economically disadvantaged groups and at-risk students.

Dr. Harry H. Cheng is a Professor in the Department of Mechanical and Aerospace Engineering, Graduate Group in Computer Science, and Graduate Group in Education, and Director of the Integration Engineering Lab at UC Davis. He founded and directs the UC Davis Center for Integrated Computing and STEM Education (C-STEM). C-STEM is a UC Approved Educational Preparation Program for Undergraduate Admission for all UC campuses and has UC A-G Program Status. His work on C-STEM has profoundly changed lives of many young men and women. Dr. Cheng is an internationally recognized leader in robotics and mechatronics fields. He has authored and coauthored more than 180 papers in refereed journals and conference proceedings. He holds two U.S. patents. He received a M.S. degree in mathematics and a Ph.D. degree in mechanical engineering from the University of Illinois at Chicago in 1986 and 1989, respectively. He has taught the introductory computer programming to engineering students, robotics, and engineering software design at UC Davis since 1992. He is a Fellow of the American Society of Mechanical Engineers (ASME) and a Senior Member of IEEE. Throughout his career, Dr. Cheng received many awards, including the 2015 Distinguished Scholarly Public Serve Award from UC Davis Academic Senate and the 2013 ASME's MESA Achievement Award for a cumulative contribution to the field of Mechatronic and Embedded Systems and Applications (MESA).

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