C-STEM Curriculum for Integrated Computing and STEM Education (Curriculum Exchange)

Prof. Harry H. Cheng, University of California, Davis

Harry H. Cheng is a Professor in the Department of Mechanical and Aerospace Engineering, Graduate Group in Computer Science, and Graduate Group in Education at the University of California, Davis, where he is also the Director of the UC Davis Center for Integrated Computing and STEM Education (http://c-stem.ucdavis.edu) and Director of the Integration Engineering Laboratory. His current research includes developing computing and robotics technologies and integrate them into STEM education in both formal and informal settings for integrated learning. From 1989 to 1992, he was a Senior Engineer for robotic automation systems with the Research and Development Division, United Parcel Service. He has authored and coauthored more than 170 papers in refereed journals and conference proceedings. He holds two U.S. patents. He is the author of the book "C for Engineers and Scientists: An Interpretive Approach" (McGraw-Hill, 2009). He is the co-founder of SoftIntegration, Inc. and Barobo, Inc. 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 is a Fellow of the American Society of Mechanical Engineers and a Senior Member of IEEE. Dr. Cheng received the ASME's MESA Achievement Award for a cumulative contribution to the field of Mechatronic and Embedded Systems and Applications, a Research Initiation Award from the National Science Foundation, the Best Paper Award and Best Student Paper Award at the IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications, the Procter and Gamble Best Paper Award as well as the Waldron Award at the Applied Mechanisms and Robotics Conference. He received an Outstanding Contribution Award from United Parcel Service, Inc. He was the General Chair of the 2009 ASME/ IEEE International Conference on Mechatronic and Embedded Systems and Applications and the Program Chair of the 2006 IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications.

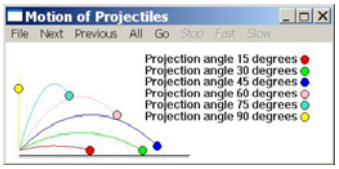
UC Davis Center for Integrated Computing and STEM Education (C-STEM)

http://c-stem.ucdavis.edu

The mission of the UC Davis Center for integrated Computing and STEM Education is to transform computing, science, technology, engineering, and mathematics (C-STEM) education in both *formal* and *informal* programs in K-14. The goal of the C-STEM Center is to broaden participation of students, especially female and under represented minorities, in computing and to develop students' computer-aided problem-solving skills to tackle real-world STEM problems. The C-STEM Center also studies how to streamline the curriculum on computing education in the context of STEM subjects in elementary schools, middle schools, high schools, and the first two years of college to increase student interest in pursuing computing and STEM related careers, and post-secondary study.

What We Do

Researching and Developing Teaching Resources for Computing and STEM Education



- Conduct research on Integrated Computing and STEM Education in K-14
- Develop pedagogy and strategies to integrate computing and robotics into STEM education
- Develop courseware and teaching materials for K-14 computing and STEM education

Training and Professional Development for K-14 STEM Teachers

- Offer workshops, tutorials, and summer institute for professional development for STEM teachers on robotics, computing and programming in C/C++, pedagogy on teaching computing and robotics in K-14, and its integration in STEM curriculum.
- Provide teachers with teaching materials including textbooks, course syllabus, homework assignments, solutions, pre and post assessment, video lessons, group computing and robotics activities.

C-STEM Curricula

- **Elementary School Curriculum:** Exploring Mathematics with Computing and Robotics
- **Middle School Curriculum:** Math 7 with Computing, Math 8 with Computing, Computer Programming with Ch, Exploring Robotics and Film Production.
- **High School Curriculum:** Algebra I with Computing, Integrated Math I with Computing, Computer Programming for Solving Applied Problems, Robotic Technologies.
- **C-STEM Summer Camps:** Exploring Mathematics with Robotics, Exploring Computer Programming with Robotics, Exploring 3D Printing with Robotics, GIRL Camp.

C-STEM Day and C-STEM Conference for Advocating C-STEM Education

- Secondary School Math Programming Competition
- RoboPlay Competitions (Video and Challenge)
- Conference on Integrated Computing and STEM Education
- C-STEM Awards for K-12 teachers and students

Contact: For more information, please contact the C-STEM Director
Dr. Harry H. Cheng at hhcheng@ucdavis.edu or (530) 752-5020

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