

Distinguished Lectures

Fall 2022



Dr. Iris Bahar

Department Head and Professor
Department of Computer Science
Colorado School of Mines

The Robots Are Coming, The Robots Are Coming: Teaching an Interdisciplinary Course on Robotics+Art

Monday, November 7, 2022

Reception with refreshments: 10:30 a.m.

Lecture: 11:00 a.m.-12:00 noon

Lory Student Center Ballroom-350D

A Reconfigurable Hardware Library to Enable Real-time Energy-efficient Robot Scene Perception

Monday, November 7, 2022

Lecture: 3:00-4:00 p.m.

Lory Student Center 324

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**Colorado State University's Information Science
and Technology Center (ISTeC)**

**In conjunction with the Department of Computer Science and
Department of Electrical and Computer Engineering Seminar Series**

Abstracts

The Robots Are Coming, The Robots Are Coming: Teaching an Interdisciplinary Course on Robotics+Art

Art, design, computing, and engineering principles are often taught in a siloed fashion. This approach leaves students with a missed opportunity to work together in interdisciplinary teams and learn valuable skills from one another. In my recently taught course, *The Robots Are Coming! The Robots Are Coming!* we illustrate the power of multidisciplinary study and the beauty of collaboration among students. This course aims to both augment existing artistic robots and design new dynamic interactive creations and encourages exploration of issues regarding spirit, self, technology, language, ethics, and sustainability as starting points for design. Students started the semester elaborating, enhancing, and extending robotic structures donated by artist and co-instructor Eva Goetz with new mechanical, electrical, and software features. As the class rebuilt the existing robots, students gained hands-on understanding of fundamental principles in engineering, computing, design, and collaboration. Students also designed final team projects in the spirit of Eva's artistic robots that combined design, hardware, and software concepts covered throughout the semester. My talk concludes with some thoughts on the future of STEM education and how courses may be made more inclusive, collaborative, and engaging.

Neuro-symbolic Architectures for Complex Event Processing in the Internet of Things

Perceiving the position and orientation of objects (i.e., pose estimation) is a crucial prerequisite for robots acting within their natural environments. The goal of sampling-based object pose estimation is to infer the probability distribution of the object pose using observed sensor information. In this talk, I will discuss how an approximate implementation of belief propagation, known as Pull Message Passing for Nonparametric Belief Propagation (PMPNBP) can be used to efficiently model and compute the distribution for articulated objects. I will then present a hardware acceleration approach to enable real-time and energy efficient articulated pose estimation. Our approach is on average, 26X more energy efficient than a high-end GPU and 11X faster than an embedded low-power GPU implementation. Moreover, we present a Monte-Carlo Perception Library generated from high-level synthesis to enable reconfigurable hardware designs on FPGA fabrics that are better tuned to user-specified scene, resource, and performance constraints.

Speaker Biography

Iris Bahar received the B.S. and M.S. degrees in computer engineering from the University of Illinois, Urbana-Champaign, and the Ph.D. degree in electrical and computer engineering from the University of Colorado, Boulder. She recently joined the faculty at the Colorado School of Mines in January 2022 and serves at Department Head of Computer Science. Before joining Mines, she was on the faculty at Brown University from 1996-2021 and held dual appointments as Professor of Engineering and Professor of Computer Science. Her research interests focus on energy-efficient and reliable computing, from the system level to device level. Most recently this includes the design of robotics systems. She is the 2019 recipient of the Marie R. Pistilli Women in Engineering Achievement Award and the Brown University School of Engineering Award for Excellence in Teaching in Engineering. She is an IEEE fellow and an ACM Distinguished Scientist.

To arrange a meeting with the speaker, please contact Prof. Sudeep Pasricha: sudeep.pasricha@colostate.edu.

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