

CPDM Guest Lecture

Embodied, Reflective, Generative: Three Stories on Computer-supported Design

Speaker:

Vinayak R. Krishnamurthy, PhD

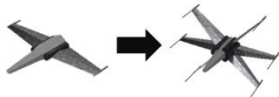
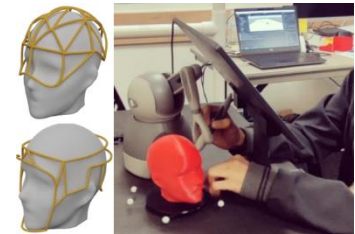
Associate Professor and Morris E. Foster Faculty Fellow II,
J. Mike Walker '66 Department of Mechanical Engineering,
Department of Computer Science and Engineering (Affiliated Faculty)
Texas A&M University, College Station, Texas, USA
(<https://engineering.tamu.edu/mechanical/profiles/vinayak.html>)



Abstract:

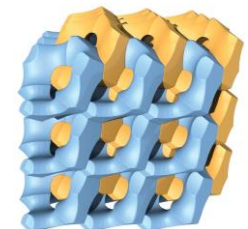
Design conceptualization can be viewed as a complex process of exploration where perception, action, and cognition come together to help the designer understand and disambiguate the design problem itself. A fundamental challenge of computer-supported design is to facilitate an uninhibited flow between what a designer is thinking and what the designer is doing to communicate thought. In this talk, I will share three stories each of which attempts to address different aspects of this challenge in different ways.

Taking inspiration from embodied cognition and ecological psychology, the first story gives an account of the evolution and evaluation of spatial user interfaces and interaction techniques to explore how the innate human ability to make and use tools can be embedded within digital design interfaces. At the end of this story, we will reflect on the role of tangibility in spatial interfaces for design support.



Taking inspiration from the notion of reflection-in-action, the second short story gives an account of some recent experiments to study verbalization as an interaction modality to support iterative design ideation. We end with a discussion on the implications of verbal interactions in the era of vast online knowledge graphs and large language models in enabling cognitive support for design ideation.

The third story describes how a simple discovery about the shapes of animal skin cells led to the development of a new paradigm for generative design, namely, partite geometry. I will detail the principles of this new approach and demonstrate its applications to meta-material design and multi-robot manufacturing. At the end of this story, I will discuss the impact of such geometric design methodologies on generative design ideation.



Finally, we will reflect on the relationship between the three stories within the broader purview of research in computational and computer-supported design.

Biography:

Vinayak Krishnamurthy is an Associate Professor and Morris E. Foster Faculty Fellow in the J. Mike Walker'66 Department of Mechanical Engineering and an affiliated faculty in the Department of Computer Science at Texas A&M University. He earned his M.Sc. in Engineering in 2010 from the Centre for Product Design and Manufacturing at the Indian Institute of Science and his Ph.D. in 2015 from the School of Mechanical Engineering at Purdue University. Dr. Krishnamurthy's dissertation research led to the commercial deployment of zPots, a virtual pottery app using Leap Motion controller in collaboration with zeroUI, a California-based startup. He is the recipient of multiple awards including the NSF CAREER award, ASME CIE Young Engineer Award, two ASME CIE best paper awards, and the Peggy L. and Charles L. Brittan Teaching Award for Outstanding Undergraduate Teaching.

Dr. Krishnamurthy currently directs the Mixed-Initiative Design Lab (MIDL) at Texas A&M University. His research is at the interface of geometric & topological computing, human-computer interaction, and artificial intelligence. He applies the knowledge gained in these areas to various domains such as metamaterial design, extended reality for design, computational fabrication, data-driven design, collaborative design, autonomous systems, surgical training, and engineering education.