JOHNS HOPKINS UNIVERSITY

Department of Electrical and Computer Engineering

Seminar

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Date: September 11, 2025
Time: 3:00 - 4:15 p.m.
Location: Remsen 1

The Three P's of Modern Computer Vision: Beyond Recognition, Reconstruction, and Reorganization

Abstract: For decades, computer vision has been defined by three grand challenges, elegantly summarized by Jitendra Malik et al. as the "Three R's": Recognition (what is it?), Reconstruction (what is its 3D shape?), and Reorganization (what belongs together?). While this framework has guided the creation of powerful computer vision systems, the next frontier lies in moving from static description to dynamic, interactive understanding. This talk presents our research on a new paradigm, "Pixels -> Perception -> Physics," that leverages generative visual models to learn how to see and act in the world.

First, the process of generating interactive 3D worlds from a single image will be shown. Then, the process of learning their appearance as latent variables without supervision will be explained. Next, I will show how we push into intuitive physics by exploiting counterfactual reasoning with generative models to play Visual Jenga—a new scene understanding task that we propose. I will conclude by examining the key failures of these generative models on physical laws like projective geometry and gravity.

Bio: Anand Bhattad is an Assistant Professor of Computer Science at Johns Hopkins University, where he leads the 3P Vision Group. He is also a member of the DSAI Institute at Hopkins. His research aims to enable machines to perceive, understand, and physically interact with the 3D world from raw visual data, with a focus on learning without human supervision. His work lies at the intersection of 3D computer vision, generative AI, and robotics. Previously, he was a Research Assistant Professor at the Toyota Technological Institute at Chicago. He received his PhD from the University of Illinois Urbana-Champaign, advised by David Forsyth.