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Vision for efficient infrastructure recovery: from AI-based assessments to robotic repair



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ABSTRACT:

This presentation explores innovative approaches to enhance infrastructure recovery through AI-based assessments and robotic repair systems. The presentation discusses how AI can help address the limitations of manual visual inspections by leveraging deep learning and consumer robots for autonomous inspections and repair. Strategies to improve AI model generalizability without extensive manual annotations, including synthetic data generation and the use of unlabeled data are presented. We examine the potential of satellite and aerial imagery for damage assessments and explore unsupervised domain adaptation techniques to enhance building assessment models' performance across diverse conditions. The efficacy of generative AI for data augmentation is also examined. Finally, we introduce recent advancements in vision-based robotic repair systems for autonomous crack detection and filling in concrete structures, showcasing a comprehensive approach to revolutionize infrastructure recovery.

BIOGRAPHY:

Dr. Vedhus Hoskere is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Houston (UH) and holds a joint appointment in Electrical and Computer Engineering. Dr. Hoskere received his Ph.D. in Civil Engineering in 2020, after an MS in Computer Science in 2020, and an MS in Structural Engineering in 2016, all from the University of Illinois at Urbana-Champaign. At UH, Dr. Hoskere is the Director of the Structures and Artificial Intelligence Lab. (<https://sail.cive.uh.edu/>) Dr. Hoskere's research interests are interdisciplinary, at the intersection of structural engineering, machine learning, computer vision, and robotics. He currently leads \$1.5M in projects with several agencies in the US including NSF, NASA, Department of Defense, and Texas Department of Transportation. Dr. Hoskere's research has been published in over 25 journal papers and 33 conference papers and has received awards for his research at prestigious venues including best paper awards at SHMII-9 and at the ASCE EMI Conference.