



High-Speed 3D Imaging with its Applications

Speaker: Prof. Song Zhang
Purdue University



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Time: 10:00 AM



工程五館
EE 324

Host: Dr. Zu Puayen Tan

Speaker Biography:

Song Zhang is a Professor of Mechanical Engineering at Purdue University. He received his Ph.D. degree in Mechanical Engineering from Stony Brook University in 2005. His work has resulted in over 160 journal articles, 2 books, and 9 patents with over 22,000 citations (h-index 70) and 18 journal cover features. Besides being utilized in academia, technologies developed by his team have been used by Radiohead (a rock band) to create a music video House of Cards. He serves as the Chief Scientist for a 3D intraoral scanning company whose products have been used daily by dozens of dentists. He won a few best paper awards, the NSF CAREER award, the Stony Brook University's "40 under 40 Alumni Award", the CoE Early Career Faculty Research Excellence Award, the CoE Faculty Excellent Award in Research, the Team CoE Staff Award of Excellence (Twice), The Ruth and Joel Spira Award, The Most Impactful Inventors Award 2020-2024, along with others. He is a Purdue University Faculty Scholar, and a Fellow of ASME, OSA and SPIE.

Abstract:

Advances in imaging and machine/computer vision are transforming a wide range of fields, particularly advanced manufacturing. Our research addresses key challenges in high-speed 3D imaging and its real-world deployment. We pursue breakthroughs in acquisition speed through the development of binary defocusing techniques; create innovative geometry and video compression strategies to efficiently manage large-scale 3D data; automate structured-light 3D imaging systems using state-of-the-art electrically tunable lenses (ETLs); and solve complex application problems through tightly integrated hardware–software innovations. A major focus of our current work is enhancing in-situ quality control for Additive Manufacturing (AM). In this presentation, I will highlight our core capabilities in high-speed 3D imaging and introduce a novel approach that significantly accelerates error detection and correction, enabling more effective closed-loop control in AM processes. I will also showcase broader applications of our technologies in areas such as biomedical engineering and forensic science, demonstrating the versatility and impact of our research.