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Faculty Candidate Seminar – Physical AI

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Brett Lopez
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Tuesday, March 31, 2026
Presentation 10:30 A.M. – 11:30 A.M.
Q & A: 11:30 A.M. – 12:00 P.M.
MSEE 112 / Zoom

Agile Autonomy Anywhere and Anytime: Achieving Safe and Deployable Physical AI

Abstract: The trait that has long set humans apart from intelligent machines is the ability to make fast and intelligent decisions when new information becomes available, even in unfamiliar situations. Recent advances in sensing, computing, and AI have reduced this gap, but modern Physical AI systems still cannot be reliably deployed in most real-world environments, especially those that have not been previously seen. Explicit or implicit assumptions about the environment and the ad hoc design of safety-critical components in modern Physical AI systems are the main reasons why reliable deployment remains difficult. This talk will present recent progress toward achieving agile autonomy for safe deployment anytime, anywhere in extreme environments. Specifically, it will cover how reliable motion estimation and robot perception are the foundation of every Physical AI system, and how recent advances in real-time optimization, machine learning, and estimation theory are enabling breakthroughs in field-deployable multi-agent coordination, human-robot teaming, trajectory planning, and high-level reasoning. Results from extensive field testing across DARPA and ARL projects in various environments, including underground and forest areas, on agile aerial, wheeled, and legged platforms, will be presented. Lessons learned from DARPA and ARL programs, as well as the future directions of Physical AI, will also be discussed.


Bio: Brett Lopez is an Assistant Professor in the Mechanical and Aerospace Engineering Department at the University of California, Los Angeles (UCLA). He is the director of VECTR Laboratory, which focuses on developing and deploying Physical AI systems for safety-critical applications. He earned his Ph.D. and S.M. degrees from MIT, specializing in autonomous systems and control theory, his B.S. in Aerospace Engineering from UCLA, and his A.S. in Mathematics from El Camino College. Before joining UCLA, he was a postdoctoral fellow at NASA-JPL, where he served as the Aerial Autonomy Lead for the DARPA Subterranean Challenge. He has worked on the DARPA Fast Lightweight Autonomy (FLA) program and is currently a PI for ARL's Scalable, Adaptive, and Resilient Autonomy (SARA) program. He has received the UCLA Faculty Career Development Award, the UCLA MAE Outstanding Teaching Award, and the NSF Graduate Research Fellowship. His work has been successfully transferred to multiple DoD field robotic programs, including ARL's SARA and DARPA's RACER, and is also utilized by several robotic companies. His specific research interests include localization and mapping, real-time trajectory planning, nonlinear control and estimation, multi-agent systems, and field robotics.