Department of Mechanical Engineering

UC RIVERSIDE

2024-2025 Colloquium Series

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Safe Autonomy through Neuro-symbolic AI and Statistical Reasoning

Autonomous systems are increasingly relying on learning-based techniques for perception, decision-making, and low-level control. An important aspect of such systems is that they are safety-critical: any undesirable system behavior can cause serious harm to human lives or property. Formal methods research has long advocated the use of logic and automata as specifications, and the past few decades have seen significant strides in algorithms for verification, testing, and automated synthesis with formal specifications. The challenge is to adapt such specification logics and verification algorithms to learning-enabled components (LECs). In this talk, we will review some recent work on using logic and learning-based techniques to provide guarantees in applications using LECs. Specifically, we will discuss how we can use temporal logic specifications to specify system-level properties, learn safe controllers for such systems, and how we can leverage statistical and formal verification algorithms to provide probabilistic guarantees.

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Dr. Jyotirmoy V. Deshmukh (Jyo) is an Associate Professor in the Thomas Lord Department of Computer Science in the School of Advanced Computing at the University of Southern California. He is the co-Director of the USC Center for Autonomy and AI. Before joining USC, Jyo worked as a Principal Research Engineer at Toyota R&D. He got his Ph.D. from the University of Texas at Austin in 2010 and was a postdoctoral research fellow at the University of Pennsylvania. He is the recipient of the 2021 NSF Career Award and the 2021 Amazon Research Award.