



# ACM Fellow Distinguished Lecture

Neurosymbolic Programming

**Rajeev Alur**

University of Pennsylvania

**Hosts: Shantanu Sharma and Vincent Oria**

**Date:** Monday, February 24, 2025

**Coffee:** 2:15 PM – 2:30 PM

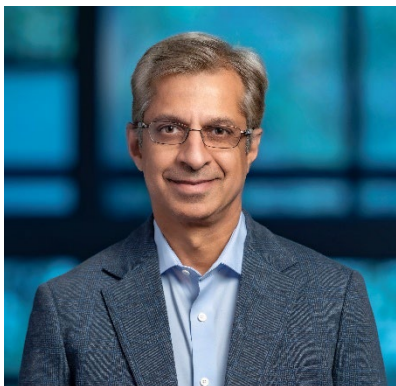
**Time:** 2:30 PM – 3:30 PM

**Location:** GITC 4402 (4th floor Seminar Lecture Hall)

**Zoom Link:** <https://njit-edu.zoom.us/j/95468440358?pwd=sGMHVSILa9SDZHiYwea6tlC6LWqUR.1>

## **Abstract:**

Neurosymbolic programming combines the complementary worlds of deep learning and symbolic reasoning. It thereby enables more accurate, interpretable, and domain-aware solutions to AI tasks. In this talk, I will give an overview of the state of the art in neurosymbolic programming. I will give examples of how computational problems can be naturally expressed in neurosymbolic frameworks as a composition of a deep neural network followed by a program written in a traditional programming language. The key technical challenge then is to train the neural network based only on end-to-end input-output labels for the composite. I will review some recent learning algorithms addressing this challenge both when the symbolic component is written in a differentiable logic programming language and when the symbolic part is a black-box component. This latter class of algorithms can also support calls to modern LLMs such as GPT-4. I will conclude with an analysis of relative merits of the neurosymbolic approach on benchmarks, potential applications, and remaining challenges.



## **Bio:**

Rajeev Alur is Zisman Family Professor of Computer and Information Science and the Founding Director of ASSET (Center for AI-Enabled Systems: Safe, Explainable, and Trustworthy) at University of Pennsylvania. He obtained his bachelor's degree in computer science from IIT Kanpur in 1987 and PhD in computer science from Stanford University in 1991. Before joining Penn in 1997, he was with Computing Science Research Center at Bell Labs. His research is focused on principles and tools for design and analysis of safe and trustworthy systems. He is a Fellow of AAAS, ACM, EATCS, and IEEE, an Alfred P. Sloan Faculty Fellow, and a Simons Investigator. Notable awards include the inaugural CAV (Computer-Aided Verification) award (2008), the inaugural Alonzo Church award (2016), IIT Kanpur Distinguished Alumnus Award (2017), and the Knuth Prize (2024). He is the author of the textbook Principles of Cyber-Physical Systems (MIT Press, 2015), has served as the chair of ACM SIGBED (Special Interest Group on Embedded Systems), was the lead PI of the NSF Expeditions in Computing project ExCAPE on program synthesis, and is the General Chair for upcoming Federated Logic Conference (FLoC) in 2026.