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DISTINGUISHED LECTURE

**Robust Computing Systems:  
From Today to the *N3XT 1,000X***

Tuesday, January 15

10:30 AM

Purdue Graduate Student Center (PGSC) Room 105

(Northwestern Parking Garage)

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Professor Subhasish Mitra  
Stanford University

**Abstract:** Future computing systems require research breakthroughs in:

- **Robustness:** Existing validation and test methods barely cope with today's complexity. Reliability failures, largely benign in the past, are becoming visible at the system level.
- **Performance:** Energy benefits of silicon have plateaued (power wall). Abundant-data applications (e.g., machine learning) are increasingly dominated by off-chip memory accesses (memory wall).
- **New applications:** Neuro- and bio-sciences create tremendous opportunities for new computing systems: from implants to understanding brain functions.

This talk presents an overview of my group's research in the above areas, and particularly emphasizes complexity and performance:

- *QED* and *Symbolic QED* dramatically improve pre-silicon verification and post-silicon validation. Difficult bugs can now be detected and localized automatically, in a few minutes to a few hours (vs. weeks or months of intense manual work today).
- *N3XT* leverages emerging nanotechnologies to create new architectures that overcome the memory wall and the power wall. *N3XT* targets 1,000X energy efficiency improvements for future computing systems. *N3XT* hardware prototypes are examples of transforming scientifically-interesting nanomaterials and nanodevices into actual nanosystems.

**Biography:** Subhasish Mitra is Professor of EE and of CS at Stanford University, where he directs the Stanford Robust Systems Group and co-leads the Computation focus area of the Stanford SystemX Alliance. He is also a faculty member of the Stanford Neurosciences Institute. Prof. Mitra holds the Carnot Chair of Excellence in Nanosystems at CEA-LETI in Grenoble, France. Before joining the Stanford faculty, he was a Principal Engineer at Intel Corporation. Prof. Mitra's research interests range broadly across robust computing, nanosystems, VLSI design, validation, test and electronic design automation, and neurosciences.



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