2024 Undergraduate Summer Research and Innovation Symposium
and
National Academy of Inventors (NAI) – NJIT Innovation Day

Agenda

July 24, 2024: Ballroom A&B, and Atrium, Student Campus Center

8.30 AM – 9.00 AM:	Registration and Breakfast
9.00 AM – 9.30 AM:	Welcome Remarks and Introductions Atam Dhawan, Senior Vice Provost for Research John Pelseko, Provost
9.30 AM – 11.00 AM:	Student Session – Ballroom Bioscience and Bioengineering: BB1
11.00 AM – 11.10 AM:	Coffee Break
11.10 AM – 12.30 PM:	Student Session – Ballroom Bioscience and Bioengineering: BB2
12.30 PM – 1.15 PM:	Lunch and Networking
1.15 PM – 2.30 PM:	Student Session – Ballroom Bioscience and Bioengineering: BB3
2.35 PM – 2.45 PM:	Coffee Break
2.45 PM – 4.00 PM:	Student Session – Ballroom Bioscience and Bioengineering: BB4 Environment and Sustainability: ES1

Parallel Student Sessions – Atrium, Campus Center (July 24, 2024 Only)

9.30 AM – 11.00 AM:	Student Session – Atrium Data Science and Management: DM1 Robotics and Machine Intelligence: RM1

11.00 AM – 11.10 AM:	Coffee Break
11.10 AM – 12.15 PM:	Student Session – Atrium Robotics and Machine Intelligence: RM2
12.30 PM – 1.15 PM:	Lunch and Networking - Ballroom

July 25, 2024, Ballroom A&B, Student Campus Center

8.30 AM – 9.00 AM:	Registration and Breakfast
9.00 AM - 9.15 AM:	Introduction to the NAI-NJIT Workshop and Welcome Remarks Atam Dhawan, Senior Vice Provost for Research Teik Lim, President
9.15 AM – 10.45 AM:	Student Session – Ballroom Environment and Sustainability: ES2
10.45AM – 11.00 AM:	Break
11.00 AM – 11.15 AM:	NAI-NJIT Chapter Innovation Day and Induction Ceremony Introduction to Distinguished Keynote Speaker Atam Dhawan, Senior Vice Provost for Research and President, NAI-NJIT Chapter
11.15 AM – 12.00 PM:	Distinguished Keynote Presentation: Hybrid Digital Twin Dr. Amit Chakraborty, Principal Scientist, Hybrid Digital Twin & AI Siemens Corporation
12.00 PM - 12.15 AM:	New NAI-NJIT Chapter Member Induction Ceremony
12.15 PM – 1.00 PM:	Lunch and Networking
1.00 PM – 2.30 PM:	Student Session – Ballroom Material Science and Engineering: MSE1
2.30 PM – 3.00 PM:	Break and Judges Session (Reception Starts)
3.00 PM- 3.30 PM:	Dr. James Stevenson Innovation Awards Ceremony and Reception

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Keynote Talk

Title: Hybrid Digital Twin

Abstract: Digital Twin is an innovative technology that has transformed industries by creating virtual replicas of products, processes, or services. It has the remarkable capability to replicate physical entities in the digital realm, providing engineers with valuable insights and feedback. This technology empowers companies to swiftly identify and resolve physical issues, design superior products, and realize value more efficiently than ever before. Moreover, Digital Twin facilitates the enhancement of business processes and performance. Recently, it has gained significant attention as a crucial component of the Metaverse. With the recent advances in AI and in particular, Physics-Informed AI and Generative AI, the concept of Hybrid Digital Twin where physics is complimented with data has become popular as a major enabler for automating engineering problems.

In this talk, we will introduce the concept and discuss the major technical underpinnings of Hybrid Digital Twins. We will also present some interesting technical problems that are benefitting from this technology.

Biographical Sketches of the Keynote Speaker

Dr. Amit Chakraborty is a **Principal Scientist** with **Siemens Technology.** He has been with Siemens since 1996. Since 2003, he has been leading a Research Group, first as a Program Manager and since 2012 as a Research Group Head. Prior to that he was a Senior Research Scientist. As a Principal Scientist, Dr. Chakraborty focuses on the development of a technology portfolio in the emerging area of **Hybrid Digital Twin** that works at the interface of Simulation, AI/Machine Learning and control, with applications in Dynamical Systems, Condition-based maintenance/ Asset optimization, and Risk Modeling. While leading the Predictive Analytics research group, he and his team primarily focused on a variety of Industrial AI applications across several Siemens business units. He successfully led several large R&D initiatives for predictive maintenance and asset optimization of complex equipment (e.g., Gas Turbines and conveyor belts for automotive manufacturing), energy optimization for High Performance Buildings, Power Flow Optimization for Electric Grids and Semantic Modeling of customer and manufacturing data. In addition, he and his team led or participated in several DARPA and DOE proposals/programs.

Dr. Chakraborty received his M.S and Ph.D. in Electrical Engineering from **Yale University** and his undergraduate from **Indian Institute of Technology, Kharagpur**. His research interests include Hybrid Digital Twin, Physics Informed Neural Networks, Dynamical systems, Reinforcement Learning, Optimization, and risk modeling. He has more than 80 US and International Patents and over 65 publications in respected journals and conferences. Dr. Chakraborty won the **Siemens Lifetime Achievement Inventor of the Year** award in 2021 and the **Edison Award** in 2022 and again in 2024.

Biographical Sketch of Dr. James Stevenson

Jim Stevenson, PhD: Jim Stevenson was a Corporate Fellow at Honeywell International from 1996 until his retirement in March of 2011. His professional work at Honeywell focused on polymer and composite materials and applications for mechanical and electronic structures and enclosures in an aerospace environment. Nine patents and 17 publications followed from this work.

Following a postdoctoral year at Columbia University, Dr. Stevenson joined the Chemical Engineering Department at Cornell University where he earned tenure in 1977. He was a founding member of the Cornell Injection Molding Project, was highly rated for his teaching, and prepared 17 publications. He earned his M.S. and Ph.D. degrees in Chemical Engineering at the University of Wisconsin, Madison and a B.S.Ch.E. from Rensselaer Polytechnic Institute.

Prior to joining Honeywell, Dr. Stevenson was Director of Research at Trexel, a start-up company near Boston commercializing microcellular foam technology. He proposed injection molding as the preferred foaming process, a result that led to nine patents. For the previous 19 years Dr. Stevenson served in technical and management positions with GenCorp, Inc. in Akron, OH. One development of the Extrusion Laboratory, which he supervised, was curved extrusion technology. While at GenCorp, Dr. Stevenson received eight patents and published 23 articles, two book chapters, and a book *Innovation in Polymer Processing: Molding*.

After retirement from Honeywell, Dr. Stevenson founded a consulting company, Stevenson PolyTech LLC, which specializes in polymer material/ process development and industrial short courses with more than 45 presentations worldwide. During his retirement, Dr. Stevenson helped to organize and funded the TechQuest competition which, now in its seventh year, awarded five innovation prizes and fellowships to NJIT undergraduates. He was also instrumental in setting up Innovation Day which celebrates the numerous technical awards won by NJIT undergraduates and hosts electronic presentations of their many innovative projects. Jim served as a member of the URI External Advisory Board and predecessor organizations since 2012. Jim and his wife Steffi also supported endowed undergraduate scholarships for NJIT students primarily from Irvington and Newark high schools. In 2017, Jim received the *Special Friend of the University* award for outstanding contributions by a non-alumnus. He also served on the Board of Directors of the Honeywell retirees association.