2026 NIST-University Research Summit

June 30, 2026

Speaker Schedule & Presentation Details

Schedule of speakers and presentation information for each session.

Day: June 30, 2026 (NIST Staff Presentations During Sessions)	
10:30 AM - 12:00 PM	**Session 1** Artificial Intelligence and Machine Learning *Building 101, Portrait Room*
Wai Cheong Tam, Ph.D. Mechanical Engineer Fire Fighting Technology Group Engineering Laboratory NIST	**Title: Machine Learning Based Forecasting for Building Fire** Flashover remains one of the most dangerous phenomena encountered by firefighters, often leading to rapid fire growth and life-threatening conditions with little warning. This talk presents the development of a flashover prediction model designed to provide early warning of impending flashover events and enhance firefighter situational awareness. The presentation will highlight how a machine learning (ML) framework can address two key challenges in flashover prediction: 1) overcoming the computational limitations of traditional physics-based models to enable real-time prediction, and 2) learning the complex relationships between temperature measurements and flashover conditions across diverse multi-compartment building configurations under realistic fire scenarios and temperature sensing environments. In addition, the speaker will highly ongoing research efforts aimed at improving the interpretability, transparency, and trustworthiness of the ML model. The outcomes of this work represent an important step toward trustworthy AI-enabled fire safety systems that can improve firefighter safety, enhance operational decision-making, and help reduce firefighter injuries and fatalities.
Anna Sberegaeva, PhD Acting Deputy AI Program Manager (on Detail) Information Technology Laboratory NIST	**Title: ITL AI Program Overview** This presentation provides an overview of the NIST Information Technology Laboratory (ITL) AI Program's portfolio, highlighting research that advances the measurement science, testing, evaluation, verification, and validation (TEVV) needed to support trustworthy artificial intelligence.

William Ratcliff, Ph.D. Physicist, Neutron-Condensed Matter Science Group NIST Center for Neutron Research NIST	**Title:**
Scott Jones, Ph.D. Mechanical Engineer, Materials and Structural Systems Division Infrastructure Materials Group Engineering Laboratory NIST	**Title: Evaluating Machine Learning Models to Predict Compression Strengths of Cementitious Materials** A long-standing goal of the cement and concrete research community has been to estimate engineering properties of cementitious materials from the chemical and physical information of the constituent materials. A dataset of ASTM C150 cements obtained from the Cement and Concrete Reference Laboratory was used to evaluate a variety of machine learning models for predicting the compression strength of ASTM C109 mortars. Results indicate that ensemble models such as decision trees, predict compression strength with an error comparable to physic tests conducted according to ASTM procedures.
10:30 AM - 12:00 PM	Semiconductors and Microelectronics *Building 101, Heritage Room*
Matthew Daniels, Ph.D. Physicist, Alternative Computing Group Nanoscale Device Characterization Division Physical Measurement Laboratory NIST	**Title: Computing is physical: coordinating intelligence with hardware** Artificial intelligence (AI) technologies are rapidly expanding in all sectors. Yet even as algorithms and AI models improve, the conceptual foundations of the physical hardware executing these AI calculations remains largely unchanged from the pre-AI era. In this talk, we explore how the Alternative Computing Group at NIST invents, builds, and characterizes new computational fabrics for tomorrow's artificial intelligence needs. First, we discuss how a brain-inspired approach to computing uses time itself, rather than voltage state, as a computational primitive, achieving compute latency an order of magnitude lower than state-of-the-art. Then we show how we partner with industry to turn a NIST-designed silicon chip into an array of magnetic nanodevices that can be used for high-density, low-power neural network operations, and preview our future plans to tape-out more silicon wafers specifically designed to accelerate university research into CMOS+X technologies.
William Alexander Osborn, Ph.D. Materials Research Engineer, Materials Measurement Science Division NIST	**Title: Strain Measurement for CMOS and Quantum Devices** Mechanical strain strongly affects the performance of both CMOS transistors and quantum Q-bits. Measuring strain of 3D structures at the nanoscale is essential to controlling high-volume manufacturing processes and enabling the development of new device architectures. This presentation will discuss in-line Raman measurements and the advancements that are being made using Electron Backscatter Diffraction (EBSD) and 4D-Scanning Transmission Electron Microscopy (4D-STEM) to provide the full deformation tensor of a material with nanometer spatial resolution.

Sanjay Rekhi, Ph.D. Group Leader, Computer Security Division Hardware Security Group Information Technology Laboratory NIST	**Title: Hardware Security** Advance the security, assurance, traceability, and provenance of computing systems across their lifecycle through foundational research, measurements, guidance, standards, and best practices for microelectronics, firmware, AI, and quantum technologies, enabling trustworthy, resilient, and verifiable systems and supply chains.
12:00 PM-1:00 PM	Lunch- Boxed lunch, Dining Room A
1:00 PM-2:30 PM	Session 2 Robotics *Building 101, Portrait Room*
Mr. Prem Rachakonda Group Leader, Mechanical Engineer Intelligent Systems Division Engineering Laboratory NIST	**Title: Overview of the NIST Robotics Program** The growing importance of robotics in U.S. manufacturing has been driven by labor shortages and the need for greater responsiveness and innovation. Despite advancements in core technologies, adoption challenges persist. To overcome these challenges, emerging technologies such as artificial intelligence, advanced sensors, and dexterous manipulators must be rigorously validated and characterized. The Measurement Science for Robotics and Automation Systems Program (MSRAS) aims to provide the necessary underpinnings to enable manufacturers of all sizes to understand and characterize robotic system performance. By establishing a common language for expressing performance requirements and verifying system performance, measurement science will guide innovations that address capability gaps. This talk will give you an overview of the MSRAS program and discuss fundamental paradigms in robotics and measurement science.
Kenny Kimble, Ph.D. (Virtual) Mechanical Engineer, Intelligent Systems Division, Manipulation and Mobility Systems Group Engineering Laboratory, NIST	**Title: Benchmarking end-effector Performance** Many manufactures, research institutes, and academia claim the capabilities of their robot end-effector system based on the tests they ran under controlled conditions within the confines of their test protocol. Each claim is backed by data that was collected differently under tests that were performed differently and with no standard metric. To accommodate the validation and authenticity of such claims, there needs to be unified test metrics which can be performed by anyone, anywhere, at any time. Unified and standardized benchmarks for robot end-effector performance are essential to push technology forward while maintaining authentic and comparable results. I will work on my presentation today and get that to you as soon as possible.

Joshua Gordon, Ph.D. **(Virtual)** Leader, Antenna Metrology Project *Robotically Enhanced Antenna Laboratory for Metrology (REALM)* Communications Technology Laboratory (CTL) NIST	**Title: The NIST *Robotically Enhanced Antenna Laboratory for Metrology (REALM):* Supporting Communications R&D, and Calibrations Through Advanced Robotic Automation for Antenna Metrology** Antenna parameter measurements are necessary to accurately characterize radiating systems for a wide range of important applications and sectors including communications, spectral utilization, wireless networks, aerospace and defense systems. The Antenna Metrology Project at NIST has fulfilled the National Metrology Institute (NMI) role of developing, maintaining, and defining antenna parameter standards, traceable calibrations and methodologies since the 1950's having pioneered many of the most widely used antenna metrology techniques throughout the world today including those used at other NMIs and throughout industry. The NIST Robotically Enhance Antenna Laboratory for Metrology (a.k.a *REALM*) is based on NIST's pioneering work in robotic antenna measurement systems and is the primary antenna metrology facility at NIST that supports antenna metrology for communications and wireless networks. This presentation will provide an overview of REALM and discuss its advanced automation capabilities that support a wide range of applications and programs both internally and externally to NIST.
1:00 PM-2:30 PM	Quantum Technologies *Building 101, Heritage Room*
Justyna Zwolak, Ph.D. Mathematician, Technology Test and Evaluation Division Information Technology Laboratory NIST	**Title: From Art to Algorithm: Automating the Craft of Quantum Dot Tuning** Semiconductor spin qubits have advanced from few-qubit demonstrations toward larger quantum-dot arrays fabricated in increasingly reproducible academic and industrial processes. This progress marks an inflection point: the central challenge is no longer only to demonstrate high-fidelity operation in carefully tuned devices, but also to discover, verify, and reliably maintain stable operating conditions across many interdependent controls, device geometries, and material platforms. I will describe our efforts to transform quantum-dot tuning from an expert-driven craft into a modular, AI-enhanced automated workflow. I will focus on methods for interpreting measurements, tracking electrostatic drift, and applying real-time feedback in semiconductor quantum-dot devices. These tools combine convolutional neural networks, image-processing methods, physics-informed heuristics, and simulation-based benchmarks to automate key steps in device operation. I will highlight recent results from a 10-dot planar germanium device, including more than 48 hours of autonomous monitoring, detection of electrostatic shifts as small as 0.1 mV, and spatially resolved noise-correlation measurements. I will also showcase a recent live demonstration of this approach. More broadly, I will discuss how scalable quantum-dot operation will require explicit interfaces between tuning modules, standardized intermediate data products, and workflow-level metrics that enable deployment on larger arrays. This work is part of a broader NIST research program in AI-enabled measurement, control, simulation, and benchmarking for quantum devices.

Zane Comden, Ph.D. Physicist, Quantum Measurement Division Foundational Electrical Measurement Group Physical Measurement Laboratory NIST	**Title: Beyond Sticks and Stones:** NIST's Next-Gen Devices for Mass and Torque Metrology
Nicholas Butch, Ph.D. Physicist, Neutron-Condensed Matter Sciences Group NIST Center for Neutron Research NIST	**Title: Quantum Technology at the NIST Center for Neutron Research**
2:30 PM- 2:45 PM	Afternoon Break
2:45 PM- 4:15 PM	Session 3 Communication and Networking Technologies *Building 101, Portrait Room*
David Griffth, Ph.D. Group Leader Wireless Networks Division Radio Access and Propagation Metrology Group Communications Technology Laboratory NIST	**Title: NIST 28 GHz Multimodal ISAC Datasets: Environment and Target Channels** Wireless communications signals (e.g., Wi-Fi and cellular) use different waveforms than radar signals, but both are forms of electromagnetic waves. Thus, the signals that carry data from one antenna to another can be used to detect nearby objects and even estimate their locations and velocities by measuring their delays, angles of arrival, Doppler shifts, and other properties after they have reflected off those objects. Integrated Sensing and Communications (ISAC) is the harnessing of communications signals to perform radar-like functions. ISAC is a topic of intense research interest across academia, industry, government, and international standards bodies, which are incorporating ISAC into the next generation of wireless networking standards, such as 6G. The Communications Technology Laboratory (CTL) at NIST is actively contributing to the development of metrology and standards for ISAC through extensive radio channel measurement campaigns in frequency bands used by 6G systems, including the (7-24) GHz band. In addition, CTL is using context-aware sensing to combine radio channel data synchronized with video frames and LiDAR point clouds to generate multimodal datasets that produce highly detailed pictures of both the wireless channel and sensing targets. This data will help to create accurate channel models, calibrate wireless systems, and aid training and validating Artificial Intelligence (AI) network controllers for the next generation of wireless networks.

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Tasshi Dennis, Ph.D. **(Virtual)** Group Leader Quantum Communications Division Quantum Networking & Transduction Group, Communications Technology Laboratory, NIST	**Title: Quantum Networks for the Scaling of Superconducting Quantum Computers** Superconducting quantum computers continue to show great promise in solving difficult computational problems far beyond the realm of their classical counterparts. However, the brute force scaling of a quantum processor necessary to reach 1000 fault tolerant qubits for practical applications faces numerous physical challenges. One promising solution is to quantum entangle individual processors in an optical network to continue the exponential scaling of computational power. Doing so requires establishing a high-efficiency, low-noise interconnect between the room temperature, terahertz optical domain and the cryogenic, gigahertz microwave domain with a transducer device. This talk will describe the design and micro-fabrication of transducers at NIST, the generation of squeezed light entanglement, and bi-directional transducer operation.
2:45 PM- 4:15 PM	Biotechnologies *Building 101, Heritage Room*
Samantha D. Maragh, Ph.D. Leader, NIST Genome Editing Program	**Title: Genome Editing Technology is Now** Genome editing technologies (e.g., CRISPR-Cas systems), have revolutionized biotechnology and medicine, enabling previously impossible precision to make targeted changes in the DNA of biological cells. This presentation will explore this new frontier and the role of the NIST Genome Editing Program in realizing the promise of this exciting sector.

Ashley Beasley-Green, Ph.D. National Institute of Standards and Technology (NIST) 100 Bureau Drive, Gaithersburg, MD 20899-8390	**Title: Precision at the Bedside: Elevating Patient Diagnostics Through Global Measurement Standards** Urine albumin is a crucial biomarker for the early detection and management of kidney disease, strongly influencing the medical decisions and actions of healthcare practitioners. To ensure these clinical decisions are based on accurate measurements, it is essential to establish standardized, comparable patient results across diverse testing methods and laboratories. This consistency is achieved through a reference measurement system (RMS)—a robust traceability framework of reference materials and measurement procedures that links routine clinical results directly to the International System of Units (SI). This presentation highlights a collaborative biotechnology initiative in which NIST has partnered with assay manufacturers, clinical laboratories, professional societies, and government agencies to develop and implement a global RMS to standardize clinical urine albumin results. By improving the quality and accuracy of routine testing, this initiative significantly enhances clinical confidence in kidney disease diagnostics. Ultimately, bridging the gap between laboratory metrology and bedside care paves the way for better patient outcomes and healthier futures.
Edward Kwee, Ph.D. Biologist, Cell Systems Science Group Biosystems & Biomaterials Division Materials Measurement Laboratory NIST	**Title: Advanced Metrology as the Foundation for Gene Therapy Quality** Gene delivery systems, consisting of viral and non-viral vectors, are heterogeneous preparations with a variety of assays to describe identity, quantity, and potency. Lack of standardized assays with poor precision and reproducibility in measurements makes product comparability and regulatory filing challenging. To address these challenges, NIST has research programs dedicated to advancing genomic and biophysical particle measurements. NIST has developed novel control materials to minimize genome titer variability, as well as live-cell imaging and flow cytometry platforms to accurately quantify viral vector infectivity. Additionally, utilizing light scattering and flow virometry to assess vector content offers unique insights into particle function. NIST is applying these advanced measurements to characterize commercial reference materials, allowing the broader community to benchmark and calibrate their own gene delivery assays. Through the NIST Flow Cytometry Standards Consortium, we collaborate with industry, academic, and government stakeholders to conduct interlaboratory studies, ensuring high-confidence measurements and maximizing the utility of these reference materials. These advanced measurement science initiatives and cross-sector consortia are driving confidence in gene delivery metrology and the broader gene therapy field.