Dear Friends and Colleagues,

This year, the College of Engineering at NC State welcomes 38 new faculty members. We feel very fortunate to have recruited this distinguished and talented group. We are confident that their talents and accomplishments will take our College to even higher levels of achievement and provide our undergraduate and graduate students with exciting, new opportunities to strengthen the breadth and depth of their education. We are grateful to the departmental faculty recruiting committees and department heads for their exceptional work in attracting such outstanding candidates. Their insight and judgment were critical to the task, and the College has richly benefited from their efforts. We also want to acknowledge the significant commitments that have been made to the College by the university and the state that have facilitated this recruitment process. We are delighted with this important show of support and are excited about the prospects that our growing faculty will provide in the future, especially as we expand our College with funding from the state legislature’s Engineering North Carolina’s Future initiative.

We also extend a very warm and cordial welcome to our new faculty members and are delighted that you are now part of NC State’s College of Engineering family. Please be assured that we are committed to providing you with an environment that will facilitate your success, allow you to achieve your full potential and ultimately turn your ideas and dreams into reality.

Sincerely,

Louis A. Martin-Vega, Ph.D.
Professor and Dean
Assistant Professor  
Ph.D. (2022), Iowa State University  

Research Interests: Agricultural robotics, 2D and 3D computer vision and machine learning.

Xiang received her B.S. in biosystems engineering from Zhejiang University in Hangzhou, China. She received her Ph.D. in agricultural engineering from Iowa State University (ISU). She was a postdoctoral researcher in the Automation and Robotics Laboratory at ISU, led by Lie Tang, professor of agricultural and biosystems engineering.

Xiang’s research is about high-fidelity biological sensing. During her Ph.D. program, she has been dedicating her efforts and time to developing robotic-assisted and automated facilities for plant phenotyping; stereo-vision-based image sensors for high-throughput, field-based plant phenotyping; and automated artificial intelligence (AI)-driven pipelines to analyze 2D and 3D images.

---

ARTEM RUMYANTSEV

Assistant Professor  
Ph.D. (2017), Lomonosov Moscow State University  

Research Interests: Polymer physics, statistical physics of polyelectrolytes and polyampholytes, microphase separation in ionic polymer systems, role of monomer sequences, charge correlation effects, micellization of ionic polymers, polyelectrolyte gels and complex coacervates, polymer microgels.

Rumyantsev received his B.S. and M.S. in physics with honors from Lomonosov Moscow State University in 2013. He earned his Ph.D. in polymer physics from the same school in 2017. During his doctoral studies, he was simultaneously working in DFI–Leibniz Institute for Interactive Materials at RWTH Aachen University, Germany. He was a CNRS postdoctoral researcher in Pau, France. Prior to joining NC State University, he was a postdoctoral fellow at the Pritzker School of Molecular Engineering at the University of Chicago.

Rumyantsev’s group combines scaling theory, field-theoretic methods and coarse-grained simulations to explore the relationship between the polymer structure and the physical properties of the resulting materials. Their research also deals with fundamental problems of polymer physics, including the biological context. Particular attention is paid to ionic polymers, such as polyelectrolytes and polyampholytes, in which the combination of long-range Coulomb interactions and connectivity of charges results in unique conformational and phase behaviors.

---


WENTAO TANG

Tang was born in Hunan Province, China. He received his B.S. in chemical engineering and a secondary degree in mathematics and applied mathematics from Tsinghua University in 2015, and his Ph.D. in chemical engineering at University of Minnesota in 2020. He was a process control engineer at Shell Global Solutions (U.S.) Inc., where he undertook multiple research projects for the development of Shell’s advanced process control software, prior to joining NC State University.

His current research focuses on developing data-driven control algorithms that integrate nonlinear control theory with machine learning techniques, which avoid detailed dynamic modeling procedures and can be more flexible for systems with complex dynamics. He is also interested in derivative-free algorithms for optimization problems without explicit algebraic models, especially in how the solution of large-scale problems can benefit from the identification of underlying network topology, decomposition of networks into constituent subsystems and adoption of acceleration schemes.


IDIL DENIZ AKIN

Akin earned her Ph.D. in 2017 and M.S. in 2014 from University of Wisconsin-Madison Civil and Environmental Engineering Department, and her B.S. in 2012 from Middle East Technical University, Turkey. Prior to joining NC State University, she was an assistant professor at Washington State University, where she developed an active teaching and research program in unsaturated soil mechanics and biogeotechnics.

Akin’s current major research interest is in post-wildfire slope stability. She studies post-wildfire, wetting-induced landslides, runoff-dominated erosion, associated debris flows and hillslope stabilization. Her group uses a variety of techniques, from the atomic scale to the field scale, to understand the fundamental mechanisms that lead to unstable conditions. She also leads projects in bio-inspired and bio-mediated geotechnics. Her most recent project aims to understand how kangaroo rat burrows stay stable for extended periods under extreme environmental conditions.

Her research has been sponsored by multiple sources including the National Science Foundation (NSF), Department of Transportation and industry. She is a recipient of the 2021 NSF CAREER Award.

Haikal holds a bachelor’s degree in civil engineering from Tishreen University, Syria, and M.S. and Ph.D degrees from the University of Illinois at Urbana-Champaign, also in civil engineering. She was an assistant professor in the Lyles School of Civil Engineering at Purdue University. Prior to joining the NC State University faculty, Haikal led the Computational Materials Integrity group in the Materials Engineering Department at Southwest Research Institute in San Antonio, Texas.

Haikal’s research focuses on developing advanced computational models for assessing structural integrity and resilience in complex structures and materials governed by interactions on interfaces at different scales. Her work has introduced efficient and accurate numerical formulations of contact, bond, friction and damage on critical load transfer interfaces in civil, mechanical and aerospace applications, including bond and anchorage of reinforcement in structural concrete. Haikal’s research targets the development of interface-driven multiscale models for novel composites and physics-informed machine learning methodologies for modeling structures and materials with limited data.


MacDonald Gibson received her B.S. in mathematics from Bryn Mawr College, her M.S. in environmental science in civil engineering from the University of Illinois at Urbana-Champaign and a dual Ph.D. degree in civil and environmental engineering and engineering and public policy from Carnegie Mellon University.

Prior to her current position, MacDonald Gibson served for 12 years on the faculty of the Department of Environmental Sciences and Engineering in the Gillings School of Public Health at the University of North Carolina at Chapel Hill. She has also worked in senior engineer and research positions in the private and public sector. MacDonald Gibson is a topic editor of *Environmental Science & Technology* and serves on the Emerging Issues Committee for the Health Effects Science Institute and as chair of the Justice, Equity and Risk Specialty Group for the Society for Risk Analysis. She was an RTI University Scholar and received the IBM Junior Faculty Development Award and the Newton Underwood Award for Excellence in Teaching, Department of Environmental Sciences and Engineering, from UNC-Chapel Hill.


ANDREW ZICCARELLI

Ziccarelli received his B.S. in civil engineering with a concentration in structures from the University of Notre Dame in 2011. He received his M.S. in civil and environmental engineering from Stanford University in 2014. After his M.S., he worked in industry as a practicing structural engineer at Tylk, Gustafson, Reckers, Wilson, Andrews (TGRWA), LLC in Chicago. In 2017, he returned to Stanford to pursue a Ph.D. He graduated with a Ph.D. in civil and environmental engineering in 2021, and joined the faculty at NC State University in January 2022.

Ziccarelli studies the behavior of civil structures under extreme limit states, with a particular emphasis on steel structures, and on the failure mode of fracture. As a doctoral student, he developed a novel technique for simulating ductile crack propagation in structural steel, and implemented this approach into an open-source finite element analysis program. His current work focuses on brittle cleavage fracture in steel and seismic engineering. His work involves both computational and experimental components.

**Research Interests:** Advanced models for prediction of fracture in metals, finite element analysis, seismic engineering, uncertainty quantification, application of machine learning to civil engineering problems.

ALEXANDER CARD

Card received B.S. degrees in both mathematics and computer science and a M.S. in mathematics from the University of Central Missouri. After receiving his M.S., he taught mathematics courses at his alma mater before receiving his Ph.D. in computer science from NC State University.

Presently, Card studies the struggles novice game designers face in their coursework and investigates methods which can be used to facilitate learning and communication in the classroom.

**Research Interests:** Computer science and game design education, especially in project-based courses featuring design work, as well as procedural content generation.


MARCELO D’AMORIM

d’Amorim received his Ph.D. from the University of Illinois at Urbana-Champaign in October 2007. Before joining NC State University, he was an associate professor at the Federal University of Pernambuco, Brazil.

His research interests are in software engineering, with a focus on improving software reliability through program analysis and systematic testing. Software bugs are expensive and inevitable as software is mostly written by humans or automatically synthesized via machine learning. His research focuses on improving various software quality assurance tasks, including bug prevention, bug finding, bug diagnosis and code repair. As part of his research, d’Amorim developed tools to automate software testing and debugging activities. The tools he developed revealed many bugs in code and were integrated into other software.

ADAM GAWEDA

Gaweda received two bachelor degrees from the University of North Carolina at Wilmington. He holds a B.S. in computer science and a B.A. in theatre with a focus on performance. He also holds an M.S in computer science and information systems from UNC Wilmington. Gaweda earned his Ph.D. in computer science from NC State University. Prior to joining NC State, he was the lead software development instructor for Cape Fear Community College and a systems analyst and research developer for Efficient Energy Technology, a smart-thermostat company out of Leland, NC.

During his M.S. at UNCW, Gaweda’s research focused primarily on biometric identifiers for individuals including individual identification based on facial dynamics and artificial face aging. However, after finding a passion for teaching, his Ph.D. research focused on applying artificial intelligence toward computer science (CS) education. Currently, he studies lower-level practice exercise types commonly found in CS courses and determining how to provide students with deliberate practice to improve their skills.


Jung-Eun Kim
Assistant Professor
Ph.D. (2017), University of Illinois at Urbana-Champaign

Research Interests: Resource- / time-dependent machine learning, AI / machine learning for cyber-physical and embedded systems, safety- / time-critical systems and real-time multicore systems.

Guo received his B.Eng. (with honor) in computer science and technology from Tsinghua University, Beijing, China; his M.Phil. degree in mechanical and automation engineering from The Chinese University of Hong Kong, Hong Kong; and his Ph.D. degree in computer science from the University of North Carolina at Chapel Hill. Prior to joining the NC State University faculty, he was a tenure-track assistant professor and then a tenured associate professor in the Department of Electrical and Computer Engineering at the University of Central Florida (UCF).

His current research efforts are related to safety-critical autonomous systems, wearable medical sensor systems, intelligent medical education and diagnose systems, as well as smart city and smart transportation / tourism. During his years at UCF, his group published more than 25 papers on top-tier (CSRanking) conference venues and more than 20 Institute of Electrical and Electronics Engineers (IEEE) / Association for Computing Machinery (ACM) transaction papers in real-time cyber-physical systems, design automation and machine learning domains. His group has received several awards, including the Best Paper award of EMSOFT, and the Best Student Paper, Best Industry Solution and Outstanding Paper awards of Real-Time Systems Symposium (RTSS). His research is sponsored by the National Science Foundation (over $2 million) and several industry partners. He has also received departmental teaching and IEEE service awards.

Zhishan Guo
Associate Professor
Ph.D. (2016), University of North Carolina at Chapel Hill

Research Interests: Real-time scheduling, machine learning (time series prediction and sparse discriminant learning), cyber-physical systems (autonomous driving and medical).

Cuong Tran, Ferdinando Fioretto, Jung-Eun Kim, and Rakshit Naidu, “Pruning has a disparate impact on model accuracy,” CoRR abs/2205.13574 [cs.LG], 2022.

Kuttal received her Ph.D. in computer science from the University of Nebraska-Lincoln. She received her B.Tech and M.Tech (with distinction) in computer science and engineering from the Punjab Technical University, India. She was a postdoctoral researcher in the School of Electrical Engineering and Computer Science at Oregon State University. Prior to joining the NC State University faculty, she was an assistant professor at the University of Tulsa, Oklahoma, directing the Human-Centric Software Engineering Lab.

She is interested in inventing technologies by studying and modeling both human factors and software engineering factors, in the context of programming tasks. The primary goal of her research is to empower programmers by integrating software engineering activities into their existing workflow without changing the nature of their work or priorities by using or inventing human-computer interaction methods. Kuttal has developed new strategies, theories, visualizations and prototypes for programmers. She is a recipient of the National Science Foundation CAREER Award and U.S. Air Force Young Investigator Program (YIP) Award.

Sandeep Kaur Kuttal

Li’s research emphasizes high performance computing with a focus on the interaction among applications, numerical methods, data structures, algorithms, automatic performance tuning and computer architectures. She is eager to pursue high performance sparse (multi-) linear algebra, solvers and tensor decompositions for large-scale data analytics and domain applications on diverse computer architectures.

Jiajia Li


JIANQING LIU

Liu received his B.S. degree in electrical engineering from the University of Electronic Science and Technology of China (UESTC) in 2013 and Ph.D. in computer engineering from the University of Florida in 2018. Prior to joining NC State University, he was an assistant professor in the Department of Electrical and Computer Engineering at the University of Alabama in Huntsville from 2018 to 2022.

In broad terms, Liu’s research interests lie in computer communications, systems and networking and security. He applies both theoretical (e.g., optimization, control and statistics) and experimental (e.g., system implementation and hardware-software co-design) approaches to solve complex research problems in the future communication technologies such as Internet-of-Things, 5G-and-Beyond systems and quantum networks.

Research Interests: Computer communications and networking with emphasis on MAC- and network-layer design and evaluation; network security, data privacy; low-power Internet-of-Things; and quantum networks.


XIAORUI LIU

Liu received his Ph.D. in computer science from Michigan State University in 2022 under Jiliang Tang, University Foundation Professor in the Department of Computer Science and Engineering. Before that, he received his master’s degree in electrical engineering and bachelor’s degree in automation from South China University of Technology. He was awarded the Best Paper Honorable Mention Award at the International Conference on Healthcare Informatics (ICHI) 2019, the MSU Engineering Distinguished Fellowship in 2017 and the Cloud Computing Fellowship in 2021.

He has published innovative works in top-tier conferences such as the Conference and Workshop on Neural Information Processing Systems (NeurIPS), International Conference on Machine Learning (ICML), International Conference on Learning Representations (ICLR), Special Interest Group on Knowledge Discovery and Data Mining (KDD) and International Conference on Artificial Intelligence and Statistics (AISTATS). He also organized and co-presented five tutorials related to these research topics in KDD 2021, International Joint Conference on Artificial Intelligence (IJCAI) 2021, International Conference on Automated Planning and Scheduling (ICAPS) 2021 and World Wide Web Conference (WWW) 2022. He regularly serves as organizer, (senior) PC member and reviewer for multiple international conferences and journals in machine learning and data science such as the ICML, NeurIPS, ICLR, KDD, Association for the Advancement of Artificial Intelligence, IJCAI, WWW, Web Search and Data Mining, Learning on Graphics, Conference on Machine Learning and Systems, Transactions on Machine Learning Research, Transactions on Neural Networks and Learning Systems and Transactions on Pattern Analysis and Machine Intelligence.

Research Interests: Large-scale machine learning, distributed optimization; trustworthy artificial intelligence, security and fairness in AI; deep learning on graphs, graph neural networks.

Linear Convergent Decentralized Optimization with Compression, ICLR 2021
Graph Neural Networks with Adaptive Residual, NeurIPS 2021
Elastic Graph Neural Networks, ICML 2021
To be Robust or to be Fair: Towards Fairness in Adversarial Training, ICML 2021
YUCHEN LIU

Liu received his Ph.D. in electrical and computer engineering from the Georgia Institute of Technology. Before that, he received his B.S. in electrical engineering from Shanghai University, China, and an M.S. in electrical and computer engineering from Shanghai Jiao Tong University, China.

His research covers broad areas of networking, computing and communication, which aims to increase the intelligence, capacity and robustness of next-generation (nextG) network systems that support emerging applications on mobile edges, and enable the freedom of experience via untethered and smart connectivity for work, entertainment, social connections, health, etc. Liu also seeks to develop novel software and testbeds for the evaluations of computer networks with enhanced efficiency and run-time scalability. All research topics are investigated using theory, algorithms, simulation and experimental techniques.


STERLING MCLEOD

McLeod received his B.S. and M.S. in computer science from the University of North Carolina at Charlotte. His Ph.D. was also from UNCC studying real-time robot motion planning for mobile robots in unknown environments. Prior to joining NC State University, he was a lecturer at UNCC in the Department of Computer Science. His research in robotics focuses on enabling robots to navigate real-world environments, which are often unknown and/or unpredictable. This requires robust and adaptable motion planning systems whose performance can be measured and verified. At UNCC, he introduced two new robotics courses that became regularly scheduled and led several curriculum development initiatives. McLeod is also interested in indie video game development. He worked on the 2017 and 2018 Axis Football game releases and an upcoming VR language learning game NounTown set to release in late 2022 or early 2023.

McLeod received his B.S. and M.S. in computer science from the University of North Carolina at Charlotte. His Ph.D. was also from UNCC studying real-time robot motion planning for mobile robots in unknown environments. Prior to joining NC State University, he was a lecturer at UNCC in the Department of Computer Science. His research in robotics focuses on enabling robots to navigate real-world environments, which are often unknown and/or unpredictable. This requires robust and adaptable motion planning systems whose performance can be measured and verified. At UNCC, he introduced two new robotics courses that became regularly scheduled and led several curriculum development initiatives. McLeod is also interested in indie video game development. He worked on the 2017 and 2018 Axis Football game releases and an upcoming VR language learning game NounTown set to release in late 2022 or early 2023.


SHARMA THANKACHAN

Thankachan received his bachelor’s degree in electrical and electronics engineering from the National Institute of Technology in Calicut, India, in 2006. He received his Ph.D. in computer science from Louisiana State University in 2014. After that, he worked at the University of Waterloo and the Georgia Institute of Technology as a postdoctoral researcher and research scientist. Before joining NC State University, he was an assistant professor of computer science at the University of Central Florida.

He is interested in theoretical computer science, specifically designing and analyzing algorithms and data structures for processing massive text data (also known as strings or sequences). Such problems are primarily motivated by applications in computational biology. His recent research has focused on advanced techniques for indexing / querying compressed string data, which is highly repetitive (a feature prevalent in many modern data sets) and complex graphs (derived from biological sequences, e.g., pan-genome graphs). His research is supported mainly by the National Science Foundation.

Assistant Professor
Ph.D. (2014), Louisiana State University

Research Interests: String algorithms, compressed data structures, bioinformatics.

DONGKUAN (DK) Xu

Xu earned his Ph.D. at Pennsylvania State University in 2022. His research interest is in resource-efficient deep learning for AI at scale, focusing on how to improve the efficiency of deep learning systems to achieve Pareto optimality between resources (e.g., parameters, data, computation) and performance (e.g., inference, training). Xu has published more than 26 papers in top conferences and journals, including Conference and Workshop on Neural Information Processing Systems (NeurIPS), Association for the Advancement of Artificial Intelligence (AAAI), Association for Computational Linguistics (ACL), North American Chapter of the Association for Computational Linguistics (NAACL) and the International Joint Conference on Artificial Intelligence (IJCAI), with more than 1,600 citations. He has served as a (senior) PC member or regular reviewer for over 28 major conferences and 15 journals, and has worked as an instructor or teaching assistant for eight courses. Xu also has extensive research experience in industry. He has interned at Microsoft Research Redmond, Moffett AI and NEC Labs America, and holds eight U.S. patents / applications. Xu’s long-term research goal is to democratize AI to serve a broader range of populations and domains.

Assistant Professor
Ph.D. (2022), Pennsylvania State University

Research Interests: Parameter efficiency (network pruning, knowledge distillation); data efficiency (few-shot learning, self-supervised learning); computation efficiency (weight-sharing learning, reduced-cost training); domains (natural language understanding, computer vision, neuroinformatics); applications (model compression for memory-limited devices, privacy-preserving deep learning, energy-efficient AI systems).

Dongkuan (DK) Xu
MAN-KI YOON

Yoon received his B.S. in computer science and engineering from Seoul National University. He received his M.S. and Ph.D. in computer science from the University of Illinois at Urbana-Champaign. Prior to joining the NC State University faculty, he was a research scientist in computer science at Yale University.

He has been tackling security challenges of cyber-physical systems such as autonomous vehicles and unmanned aerial systems. He studies how a complex integration of seemingly trustworthy software components for a cyber-physical system can create unforeseen vulnerabilities such as illegitimate information flow and denial-of-service attacks. The current focus of his research is on developing computer systems technologies that make the non-deterministic decision-making process of autonomous systems transparent and accountable to enable machine intelligence for safety-critical tasks in a dependable and trustworthy manner.

Assistant Professor
Ph.D. (2017), University of Illinois at Urbana-Champaign

Research Interests: Security of safety-critical cyber-physical systems, real-time embedded computing, accountable computing for autonomous systems.

SAMIRA MIRBAGHER AJORPAZ

Ajorpaz received her B.S. in computer engineering from University of Isfahan in 2014 and her Ph.D. in computer science from Texas A&M University in 2019. She is a 2020 University of California postdoctoral fellow in the Department of Computer Science and Engineering at the University of California, San Diego. She is also a 2021 Massachusetts Institute of Technology Department of Electrical and Computer Engineering (MIT ECE) Rising Star.

Her research is centered at the intersection of computer architecture, computer systems security and machine learning with a focus on designing fast, energy efficient and secure microarchitectural units with nano-second scale timing margins. Her recent studies use generative modeling to enable hardware to dynamically adapt itself for security, performance and power efficiency. She has taught graduate machine learning courses at Texas A&M University in 2020, Advanced Microarchitecture at UC San Diego in 2021 and 2022 and will be teaching ECE 792-059: Performance and Security Analysis of Advanced Microarchitecture at NC State University.

Assistant Professor
Ph.D. (2019), Texas A&M University

Research Interests: Pre-silicon security verification of advanced microarchitectural designs, considering the security of application of machine learning in hardware, identifying microarchitectural side channel and adversarial machine learning attacks, and developing defenses for them.
Assistant Professor
Ph.D. (2020), Purdue University

Research Interests: Reinforcement learning and bandits; optimization and statistical inference; federated learning; control and estimation over networks; resilience and security.

ARITRA MITRA

Mitra received his Ph.D. from the School of Electrical and Computer Engineering, Purdue University, in 2020. He received his M. Tech degree from the Indian Institute of Technology, Kanpur, in 2015, and his B.E. degree from Jadavpur University, Kolkata, in 2013, both in electrical engineering. Before joining NC State University, he was a postdoctoral researcher in the Department of Electrical and Systems Engineering at the University of Pennsylvania, from 2020 to 2022.

The broad goal of Mitra’s research is to enable reliable and efficient learning and decision-making in large-scale distributed systems, while contending with modern challenges related to computation, communication and adversarial robustness. To meet this goal, his research draws on ideas and tools from control and optimization theory, statistical signal processing, machine learning and network science. The theory he develops is motivated by a variety of applications spanning multi-robot systems, wireless sensor networks, federated learning and edge computing.


Assistant Professor
Ph.D. (2018), University of Central Florida

Research Interests: Nanophotonics, plasmonics, nanotechnology, micro/nano fabrication and packaging of photonic devices, biosensing, wearable devices, implantable devices, wireless multimodal biosensors, closed-loop control in biological systems, bio-integrated optoelectronics and nanophotonics.

ABRAHAM VÁZQUEZ-GUARDADO

Vázquez-Guardado received his B.Eng. in electrical engineering from the Autonomous University of Nayarit in 2008, his M.S. in optics from the National Institute for Astrophysics, Optics and Electronics in 2012 and his Ph.D. in optics and photonics from the College of Optics and Photonics (CREOL) at the University of Central Florida in 2018. Vázquez-Guardado was a postdoctoral researcher in the Querrey Simpson Institute for Bioelectronics at Northwestern University. Vázquez-Guardado will join the Department of Electrical and Computer Engineering at NC State as an assistant professor in January 2023. In his postdoctoral training at Northwestern University, he worked in the design and development of bioengineered implantable NFC and Bluetooth wireless devices, some of them in battery-free configuration. Examples include implantable oximeters, optogenetic stimulators and optical sensors for behavioral neuroscience research, and implantable multimodal medical devices for closed-loop control in biological systems. In his future research at NC State, Vázquez-Guardado will develop the next generation of optics and photonics enabled wearable and implantable devices for applications in clinical diagnostics, medicine and neuroscience. The main focus is the fundamental research, fabrication and packaging of novel nanoscale optical and photonics sensors devices for continuous multimodal biosensing of physiological parameters.


Suresh Venkatesh
Assistant Professor
Ph.D. (2017), University of Utah

Research Interests: Topics in electromagnetic-circuit co-design approaches include metamaterials / metasurfaces / active reflector arrays (GHz - THz), phased arrays, computational imaging, integrated circuits, 5G communication, physical layer security, antenna / waveguide theory and design, transformation optics design, remote sensing, RF characterization / instrumentation, advanced EM simulations.

Venkatesh received his B.Eng. in electronics and communications from Ramaiah Institute of Technology, Bangalore, India. He received his M.S. in electrical and computer engineering from NC State University, and his Ph.D. from University of Utah, under the guidance of David Schurig, associate professor of electrical and computer engineering. Prior to joining the NC State University faculty, he was a research associate scholar at Princeton University in the Department of Electrical Engineering. He was the recipient of the best dissertation award in 2016 and Mistletoe Research Fellowship from Momental Foundation in 2021-22. He serves as an affiliate member on two technical committees in the Institute of Electrical and Electronics Engineers (IEEE) Microwave Theory and Technology Society. He is also a lead antenna technology consultant at E-Space, a startup company based in Massachusetts, pursuing massively deployable and sustainable satellite technology solutions.

Presently, his research area is in developing electromagnetic-circuit co-design approaches for applications such as high-speed secure communications, imaging and sensing across the electromagnetic spectrum from Microwave to Terahertz regime.

Benjamin (Ben) Rachunok
Assistant Professor
Ph.D. (2020), Purdue University

Research Interests: Engineering and climate justice, data science, risk analysis, simulation, operations research.

Rachunok received his B.S. in industrial and systems engineering from NC State University, and holds a Ph.D. in industrial engineering from Purdue University. Prior to joining the NC State faculty, he was a postdoctoral scholar in the Department of Civil and Environmental Engineering at Stanford University, and a fellow of the 2021 cohort of the Rising Environmental Leaders Program at the Stanford Woods Institute for the Environment.

Rachunok uses data science and risk analysis to study sustainability. Specifically, he studies how low-income communities can be made more sustainable and resilient to natural hazards and climate change. He blends operations research, data science and simulation methods to develop tools which quantify the disproportionate impact of natural hazards on historically marginalized communities. His work investigates how the policies, designs and decision-making related to how we build our communities contribute to inequity in disaster impacts.
Michael R. Spano

Spano holds a Ph.D. in industrial engineering, with a minor in artificial intelligence, and an M.S. in integrated manufacturing systems from NC State University. He has been teaching at NC State and Duke University for over 25 years in the areas of manufacturing, database and applications, application development, mechatronics, robotics, instinctual intelligence and electronics in interactive art.

Spano was formerly the chief technology officer (CTO) for the NC Department of Public Instruction and several other top companies. He is a forward-thinking technology executive with over 40 years of broad expertise collaborating with global, cross-functional internal and external stakeholders to drive innovative solutions for seamless operations in diverse and rapidly changing business environments. Spano is a situational-style team leader and dedicated team player with proven success managing complex billion-dollar projects, programs and portfolios, and an analytical problem-solver with exceptional interpersonal and C-level communication skills.

Bharat Gwalani

Gwalani received his Bachelor of Technology (B.Tech) degree from the National Institute of Technology, Jaipur, India, in 2010, and his Ph.D. from the University of North Texas in 2017, both in materials science and engineering. After receiving his B. Tech. degree, he worked in the steel industry for three years. In 2019, Gwalani joined the Department of Energy Office of Science’s Pacific Northwest National Laboratory and served as a senior materials scientist. His research focuses on mechanistic understanding of materials vulnerabilities under extreme environments, deformation-assisted modification of phase transformation pathways, development and characterization of advanced materials.


Assistant Professor
Ph.D. (2019), University of California, Berkeley

Research Interests: Low-dimensional optoelectronic materials and electron microscopy.

YIN LIU

Liu received his B.S. and M.S. both in materials science and engineering from Zhejiang University in China. He received a Ph.D. in materials science and engineering from University of California, Berkeley. He was a postdoctoral researcher in the Department of Materials Science and Engineering at Stanford University.

Presently, Liu’s research group focuses on synthesis, optical and electric measurements of two-dimensional materials and heterostructures. The group uses analytical scanning transmission electron microscopy, electron energy-loss spectroscopy and cathodoluminescence spectroscopy in combination with optical spectroscopies to investigate the fundamental structure-property relationships on the nanoscale for novel electronic, photonic and polaritonic properties.

Thuo obtained his bachelor’s and M.S. degrees from Kenyatta University, Nairobi, Kenya. After a brief stay at Simon Fraser University, he transferred to the University of Iowa where he obtained his Ph.D. Thuo pursued postdoctoral work at Harvard University, first as a Mary-Fieser Fellow. A second fellowship from the Nanoscale Science and Engineering Center capped his stay at Harvard. He joined Iowa State University as an assistant professor in 2014 and was promoted to associate professor in 2020. He held a Black & Veatch Junior Faculty Fellowship followed by the Schafer 2050 Challenge Professor upon promotion to associate professor.

Thuo is interested in surface and thermodynamics driven frugal innovation. His research cuts across applied and fundamental areas of all material classes. His specific interests are in soft matter (molecular electronics, polymers, and low-melting alloys), metastable materials and applied interface engineering.
Assistant Professor
Ph.D. (2018), University of California, Berkeley

Research Interests: Synthesis of oxide thin film heterostructures and freestanding membranes, understanding structure-property relationship in oxide materials, and in situ control of material properties via strain, temperature and electric field.

Xu received her M.S. in materials science and engineering from the University of Illinois at Urbana-Champaign and a Ph.D. in materials science and engineering from the University of California, Berkeley. She was a Geballe Laboratory for Advanced Materials (GLAM) postdoctoral fellow at Stanford University.

Presently, she is focused on developing novel oxide thin-film materials for next-generation nanomechanical, electromechanical and magnetoelectric applications. She studies complex oxide materials exhibiting dielectric, ferroelectric, piezoelectric, pyroelectric and multiferroic properties using thin-film synthesis, multi-scale characterization and nanofabrication techniques. She is particularly interested in understanding the mesoscopic physics of complex oxides as well as manipulating the structure and property of these materials using various external stimuli such as strain, temperature and electric field, etc.


Associate Professor
Ph.D. (2009), Chinese Academy of Sciences

Research Interests: Additive manufacturing, advanced microstructural characterization, radiation effects, mechanical / thermal properties, oxidation / corrosion behavior of advanced ceramics and nuclear materials.

He received his B.E. in metallurgical engineering from the Central South University and a Ph.D. in materials science from the Chinese Academy of Sciences. He was a postdoctoral researcher and assistant scientist at Nagaoka University of Technology, Japan, and at the University of Wisconsin-Madison before joining Idaho National Laboratory as a staff scientist in 2014. He was a distinguished staff scientist and High-Resolution Materials Characterization group lead prior to joining NC State University.

He studies materials behavior in extreme environments, with a focus on environmental degradation of materials in nuclear power systems. He aims to understand how the processing and radiation/corrosion environments affect the microstructure, mechanical / thermal properties and structural integrity / durability of materials and components.

He has published 123 peer-reviewed journal articles, with an H-index of 30 (according to Web of Science). He is the recipient of the Laboratory Director’s 2020 Exceptional Scientific Achievement Award at Idaho National Laboratory.

ELIZABETH J. KAUTZ

Kautz received her B.S. in materials engineering in 2010 from Rensselaer Polytechnic Institute (RPI) in Troy, NY. From 2010-14 she worked at Knolls Atomic Power Laboratory (KAPL, Schenectady, NY) as a materials engineer. She received her M.S. and Ph.D. in materials engineering from RPI in 2014 and 2018, respectively. She was a postdoctoral researcher at Pacific Northwest National Laboratory (PNNL) in Richland, Washington, from 2018-20, and a staff scientist at PNNL from 2020-22 prior to joining the NC State University faculty.

Her research is focused on materials detection, monitoring and degradation phenomena relevant to nuclear energy, defense, forensics and non-proliferation applications. Specific topics of interest include understanding the hydrodynamics, chemistry evolution and nanoparticle formation in laser produced plasmas generated from reactive materials, such as actinides. She also studies oxidation phenomena in the gas and solid phases. She uses a variety of tools and techniques in her research including optical diagnostics for studying laser produced plasmas, and materials characterization techniques, such as electron microscopy and atom probe tomography. Another topic of interest is the application of machine learning methods for improving analytical capabilities of materials detection and characterization techniques.

Laggner is an experimental plasma physicist, who received his B.Sc. from TU Wien, Austria. He also received his M.Sc. and Ph.D. from TU Wien, performing research in a collaboration with the Max Planck Institute for Plasma Physics in Garching, Germany. In 2017, Laggner joined the plasma control group at the Department of Mechanical and Aerospace Engineering at Princeton University as a postdoctoral researcher. Prior to joining NC State University, he worked as a research scientist for Princeton Plasma Physics Laboratory, a U.S. Department of Energy national laboratory, with permanent research assignment at the DIII-D National Fusion Facility in San Diego.

Laggner studies the ionization source form neutral deuterium in high temperature plasmas. In collaboration with the MIT Plasma Science and Fusion Center, he installed a prototype Lyman-α diagnostic called LLAMA at DIII-D, which enables the measurement of edge-neutral density profiles. Furthermore, he performs research toward establishing low Z impurity powder injections as a real time actuator for plasma control in international collaborations with the fusion facilities KSTAR (Korea) and ASDEX Upgrade (Germany).


Diallo A. and Laggner, F. M. 2021 “Turbulence dynamics during the pedestal evolution between edge localized modes in magnetic fusion devices” Plasma Phys. Control. Fusion 63 013001
Laggner, F. M. et al. 2020 “Real-time pedestal optimization and ELM control with 3D fields and gas flows on DIII-D” Nucl. Fusion 60 076004
AMANDA M. LIETZ

Lietz received her Ph.D. in nuclear engineering and radiological sciences at the University of Michigan in 2019 and a B.S. in nuclear, plasma and radiological engineering from the University of Illinois at Urbana-Champaign. She was the recipient of the National Science Foundation Graduate Research Fellowship and the Towner Prize for Outstanding Ph.D. Research. Before joining NC State University, she was a postdoctoral researcher at Sandia National Laboratories in the Applied Optical and Plasma Sciences Department.

Her research is focused on computational modeling of low temperature plasmas for a variety of practical industrial applications. These applications include the manufacturing of computer chips, treatment of cancer and chronic wounds, and electrification of the chemical industry. Through computational modeling, it is possible to investigate the role of radiation transport, gas flow and different chemical pathways in low temperature plasma sources.

THOMAS SCHROEDER

Schroeder received a B.A. in chemistry from Northwestern University and an M.S.E. and Ph.D. in chemical engineering from the University of Michigan. During his Ph.D., his research group moved to the Adolphe Merkle Institute in Switzerland, where he worked for three years. Most recently, he has worked as a postdoc in materials science at Harvard University. Lately, Schroeder has focused on studying and engineering diverse transport processes in gels, including electrical power generation from salt gradients, light-responsive behaviors mediated by photoswitches and crystal growth (and concomitant latent heat release and mechanical transitions).

The Schroeder Research Group will engineer polymeric additives to control crystallization processes relevant to material fabrication and energy storage. A related focus will be the development of new mineralization-based processing techniques to sustainably produce plastic-like materials from biopolymers. Another area will be the development of ionic circuitry in textiles and gels towards autonomous functionality. Schroeder is excited to leverage the resources of the College of Textiles to scale up materials developed at the bench, as well as to collaborate with colleagues across NC State University.
**TOVA N. WILLIAMS**

Williams is a double alumna of NC State University, earning her Ph.D. in fiber and polymer science (chemistry minor) in 2018 and her B.S. in polymer and color chemistry in 2014. Her dissertation work focused on experimental and computational approaches to the design of sustainable permanent hair dyes. In 2019, she held a postdoctoral research scholar appointment in the Textile Protection and Comfort Center at NC State and investigated, for example, quantitative and qualitative analytical techniques to detect contaminants found on firefighter gear. Complementary to her academic experience, she has held various positions in research, manufacturing and sales. Currently, she leads The Sustainable Dye Chemistry Laboratory. Her research focuses on the design and development of environmentally benign dyes and dyeing processes for textiles, human hair and other materials using a variety of approaches (e.g., application of green design tools such as cheminformatics / computer modeling and exploitation of microorganisms for their potential to produce colorants). In addition, she investigates dye and substrate structure-property relationships (e.g., toxicity, porosity) and dye-substrate interactions (e.g., uptake of dye) key in designing and developing the dyes.


