DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

BING CHEN – leading the development of a sustainable small house (SSH) prototype. The SSH project will design and build a 400 sq. ft. home combining sustainability, renewable energy, and conservation in a single package. The design is replicable, affordable, and adaptable to meet the needs for low income/senior/disabled/homeless/ migrant housing in rural and urban settings, families wishing to downsize, temporary FEMA disaster housing, and as alternative dwelling units for seniors.

LEIMIN DENG – building an advanced 5+3 axis ultrafast laser micro-nano manufacturing system to meet the challenges from advanced manufacturing technology, especially with respect to the growth requirements of metamaterials, ceramic Multi-Chip Modules (MCM), new electronic devices, functional surface microstructures, and new medical devices. His research in the Laser Assisted Nano Engineering Lab is focused on extreme laser-assisted manufacturing technology and equipment, laser micro- and nanomachining, optical system design, and 3D metal printing.

YONGFENG LU – conducting state-of-the-art research in the field of nanotechnology using lasers. With support from the U.S. Navy's Office of Naval Research, he has developed a laser system (a shipyard on a ship) that prevents and repairs corrosion on aluminum-sided ships, which will be demonstrated on-board a ship in service this spring. Lu's research group is a leader in the Honeywell-KCP Advanced Radar Consortium and the only university in the USA involved in target manufacturing for fusion research. Lu is also co-editor-in-chief of the new International Journal of Extreme Manufacturing (first issued in April 2019), Editor in Chief of the Journal of Laser Applications (American Institute of Physics), and President of the International Academy of Photonics and Laser Engineering.

HASSAN OTU – focusing on problems in Bioinformatics, Systems and Computational Biology, and Network Science. His research is rooted in data compression, signal processing, information theory, statistics, graph theory, machine learning, and artificial intelligence, spanning across the disciplines of engineering, computer science, life sciences, and mathematics. His work has contributed to the understanding of different clinical and biological phenotypes, such as stem cells, cancer, liver disease, delirium, inflammatory bowel disease, and diabetes.

LIYAN QU – focusing on energy efficiency, renewable energy, numerical analysis and computer-aided design of electric machinery and power electronic devices and systems, dynamics and control of electric machinery, magnetic devices, renewable energy systems, wireless power transmission, and energy harvesting. She has a NSF Career Award on a new and novel magnetoelectric voltage conversion and control device for smart grids. Qu was also a recent College of Engineering Edgerton Innovation Award winner.

PETER SUTTER – interests include 2D materials, interfacial physics and chemistry, nanomaterials and advanced instrument and methods development. By observing synthesis and self-assembly and measuring functional properties in complex environments, the team develops novel material architectures for energy harvesting and storage, information processing, sensing, and other core technology needs.

DEPARTMENT OF MECHANICAL AND MATERIALS ENGINEERING

YURIS DZENIS – advancing the processing and properties of carbon-based nanofibers for engineering and biomedical applications.

RYAN PEDRIGI – advancing the understanding of mechanobiological mechanisms of atherosclerosis and other diseases to create new therapies and prognostic indicators of disease progression.

ELI STUTTER – focuses on the fundamental understanding of growth and formation of novel 0D, 1D and 2D nanostructures, tailoring properties for functional devices.

BENJAMIN TERRY – creating new miniature robotic systems for the non-insvaisve diagnosis and treatment of disease.

JOSEPH TURNER – developing new ultrasonic characterization techniques for microstructure-level monitoring of materials.

JIAN WANG – combining computational and experimental work to understand deformation processes in non-cubic materials, and the development of new radiation-resistant materials. He combines modeling and experiment to examine atomic-level motion of atoms.

RUIGUO YANG – focusing on the fundamental understanding of cell-cell interactions and single-cell biophysics to engineer new disease treatments.

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COLLEGE OF ENGINEERING

▶EXCELLENCE IN RESEARCH CELEBRATION◀

NOVEMBER 11, 2019

UNIVERSITY OF NEBRASKA-LINCOLN

2019 Excellence in Research Honorees

▶ DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING

FOREST KIEVIT – utilizing engineering strategies to tackle neuroscience problems by harnessing expertise in nanoscience, chemistry, biology, and medicine to create nanomaterials that interact with the body in specific ways to reduce the burden of disease. We combine imaging with therapeutic outcome data to identify nanoparticle properties that promote delivery into target tissue and improve therapeutic target engagement.

JOE LUCK – focused on agricultural technology applications for improving production efficiencies in cooperation with growers across eastern NE. Since 2012, he has worked with over 100 growers' sites on applications including variable-rate technologies, sensor-based nitrogen management, multi-hybrid planting systems, and harvest logistics.

TIFFANY MESSER – focused on identifying, tracing, and treating nutrients and emerging contaminants in agroecosystems. Her team has been funded by the USDA, USGS, Daughtery Water for Food Global Institute, and Nebraska Department of Environment and Energy to assess the fate and transport of contaminants in the environment and develop treatment practices to improve water quality in the Midwest

ANGELA PANNIER – focus is on engineering biomaterials (matrices, interfaces, and delivery vectors) and cellular systems for various applications – including gene therapy, tissue engineering, developmental biology models, medical devices, medical diagnostics, and vaccination therapies – to dramatically improve health outcomes. Their lab expertise is in stem cell engineering and controlled release systems for gene delivery, the development of cell priming libraries and the use of priming to dramatically enhance gene delivery to adult mesenchymal stem cells, the role of surface chemistry and features on gene delivery to adhered cells, the application of telecommunications theory to mathematically describe the DNA delivery process, and the use of zein ad other natural biomaterials to form DNA particles for oral delivery.

▶ DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING

VITALY ALEXANDROV – developing a better fundamental understanding of activity-stability relationships across water splitting electrocatalysts using computational physical chemistry methods.

SHUDIPTO DISHARI – designing novel polymeric nanomaterials for energy and biomedical applications.

SRI KADAMBI – work is centered in the area of biomimetic liver models, liver diseases and alcohol research.

YUGUO LEI – developing a new type of micro-bioreactor that enables industrial-scale manufacturing of cellular therapeutics with high quality, high consistency, and affordable cost. The technology has the potential to better facilitate scale-up and significantly advance cell therapies.

WEI NU – work is focused on protein and cellular engineering to achieve microbial synthesis of value-added chemicals from renewable resources and to answer important biomedical questions.

HENDRICK VILJOEN – focus is on mathematical modeling of engineering systems to provide insight into their complexity and stability. The disciplines include sustainable practices in food production, biomedical engineering, drug transport, diagnostics of infectious diseases, and reactor design.

▶ DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

BRUCE DVORAK – focusing on pollution prevention and environmental sustainability and development of the Nebraska Industrial Assessment Center.

YONG RAK KIM – focus is on multiscale analysis of the engineering properties of construction materials and innovative use of recycled products in materials development.

XU LI – working to expand our understanding of environmental microbiology, specifically the proliferation of enivronmental antimicrobial resistance.

JENNIFER RASMUSSEN – research centered on finite element analysis and safety testing of roadway infrastructure.

JOSHUA STEELMAN – research is focused on bridge design and analysis and roadside safety research.

CHRISTINE WITTICH – focusing on methods of predicting the response of various structural systems to natural disasters, including earthquakes and windstorms, within the context of community resilience.

▶ DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BRITTANY DUNCAN – focused on the nexus of behavior-based robotics, human factors, and unmanned aerial vehicles; specifically focused on how humans can more naturally interact with robots, individually or as part of ad hoc teams, in field-based domains such as agricultural, disaster response, and environmental applications.

MEHMET CAN VURAN – work encompasses wireless communications in a wide range of environments: underground, agricultural, cyber-physical systems, autonomous systems.

CARRICK DETWEILER – aiming to improve the capabilities of aerial robots to operate robustly and reliably in challenging outdoor environments. His research focuses on improving the robustness and safety of aerial robots and sensor systems operating in the wild.

MASSIMILIANO PIEROBON – developing a holistic approach toward the design, simulation, characterization, and engineering of information systems that include "living" communicating devices (both natural and engineered), and their components at the molecular level. He has made pioneering contributions in the application of information theory and communication engineering to cutting edge tools from systems and synthetic biology, which resulted in seminal publications, trailblazing federal grants, transformational research mentoring, and several international awards and recognitions from the scientific community.

BONITA SHARIF – working to understand how software developers work in realistic settings by conducting empirical studies using innovative methods and tools such as eye tracking equipment. The long-term goal is to reduce developer effort by discovering and building new methods and tools informed by empirical studies.

HONGFENG YU – focusing on the development of scalable visualization and analysis algorithms by exploiting the power of high-performance computing. These solutions have helped scientists to obtain new discoveries from their large-scale applications, such as plant phenotyping, network analysis, 3D soil mapping, and geophysical analytics.

▶ THE DURHAM SCHOOL OF ARCHITECTURAL ENGINEERING AND CONSTRUCTION

FADI ALSALEEM – recently received more than $800K in competitive awards from NSF, NDOT, and industrial entities. The NSF project addresses using MEMs integrated into a neural sensing and computing unit. This new technology can advance many applications such as smart building.

ERICA RYHERD – acoustical research of neonatal spaces featured in the international general press this year with articles and videos in publications such as the New York Times, USNWR, Daily Mail (UK), local TV news, and Omaha World Herald. She leads a group of interdisciplinary researchers in the development of the University of Nebraska Initiative for Healthcare Facilities Research.

ZHIGANG SHEN – focusing on building information modeling, infrastructure data management, sustainable building envelopes, and innovative engineering education. As PI/Co-PIs, he was awarded more than $3M+(self-portion $800k+) grants from research agencies such as NSF, EPA, DOE, DOL and NDOR. To date, he has published 19 journal articles and 28 conference papers. He had six years industry experience in design and construction of large-scale commercial buildings and high-end residential buildings.

DAVID YUILL – received more than $1M in competitive awards from DoE, Frontier Energy, and LBNL in 2019. His research has the potential for significant impact in energy savings in buildings, which account for approximately 40% of the U.S. overall energy demand.