NORTHERN ARIZONA UNIVERSITY

Summer 2020 Research Experiences
Research Faculty & Projects Directory

The NAU faculty listed in this document have expressed interest in hosting a student or students (multiple) from Sonora for an 8-week summer research experience. Some faculty have listed possible project work. Students may be hosted/advised by more than one faculty member, and may also be overseen by NAU Graduate Assistants during their stay. Students may also work on more than one project as assigned by the advising faculty member. For questions, please contact Kristin Allen (Program Manager, NAU Latin American Initiatives) at kristin.allen@nau.edu.

College of Arts & Letters

Dr. Erik Vaughn Meeks
Associate Professor, Department of History

Eric V. Meeks is associate professor of history at Northern Arizona University. His research and teaching focus primarily on the history of the US-Mexico borderlands and race and ethnicity in North America. His first book is *Border Citizens: The Making of Indians, Mexicans, and Anglos in Arizona* (University of Texas Press, 2007), which has been published in a new edition with a new chapter and a new forward in 2020. He has published essays on the history of Indigenous peoples, ethnic Mexicans, borderlands, and race, and has garnered several awards, including the Western History Association's Bolton-Kinnaird Award for the best article on borderlands history and a Southwest Book Award. He is currently working on a new book on the history of the US-Mexico borderlands from the late eighteenth century to the present, to be published by Yale University Press in cooperation with the Clements Center for Southwest Studies at Southern Methodist University, where he was senior fellow in 2016–2017.

Project Description:
The U.S.-Mexico Borderlands, currently under contract with Yale University Press after a double-blind peer-review of a detailed proposal, will trace the history of a vast region that today encompasses the U.S. Southwest and the Mexican North from the late eighteenth century to the early twenty-first century. It is intended to answer historians' recent calls for histories that challenge teleological, nation-

bound narratives with studies that cut across national, ethnic, temporal, and academic boundaries. Most fundamentally, I will argue that globalization, nation-building and boundary-making have been deeply interrelated components of the same process. In the late eighteenth century, after the British defeat of the French, the remaining Atlantic imperial powers, Spain and England, sought to secure and expand their footholds in Indigenous homelands. Yet most inhabitants of the borderlands identified as members of clans, villages, extended families, local groups, tribes, religious groups, towns, or provinces rather than as "Spanish," "English," "French," or "Indian." *The U.S.-Mexico Borderlands* will trace how these identities changed over time in relation—and often in opposition—to the emergence of two competing nation-states, global capitalism, large scale global migration, and the shifting presence of an international border. I will examine how tensions and conflicts over land and resources as well as anxieties about political and cultural cohesion fueled the construction of territorial, ethno-racial, and national borders.

A guest student from Sonora would help me to gather research materials, work on translations, and conduct some targeted research of primary and secondary sources. A student from Sonora, the border state that is the subject of the newest chapter in the second edition of my first book, would be an ideal research assistant for a project on the history of the very borderlands he/she will be working across.

College of Education

Dr. Angelina E. Castagno
Professor, Department of Educational Leadership

Angelina E. Castagno is professor of Educational Leadership and Foundations, and Director of the Diné Institute for Navajo Nation Educators at Northern Arizona University. She is editor of *The Price of Nice: How Good Intentions Maintain Educational Inequity* (Minnesota, 2019), author of *Educated in Whiteness: Good Intentions and Diversity in Schools* (Minnesota, 2014), and coeditor of *The Anthropology of Education Policy: Ethnographic Inquiries into Policy as Sociocultural Process* (Routledge, 2017).

Project Description:
Culturally responsive teacher professional development and curriculum writing: An analysis of the Diné Institute for Navajo Nation Educators
The student intern will support a research component for the Diné Institute for Navajo Nation Educators (DINÉ). The DINÉ is a partnership between Northern Arizona University and Navajo schools aimed at strengthening teaching in schools serving Diné and other Indigenous students. The program offers 8-month

Fellowships to K12 teachers, during which time the teachers participate in a seminar aimed at increasing their content knowledge around a particular subject area. Each teacher creates a culturally responsive curriculum unit to use in their classroom. Dr. Castagno is the Director for the DINÉ, and she will work with the student intern to analyze the curriculum units written by teachers in the program. The intern will also identify relevant publications for a literature review on the topic of culturally responsive curriculum. The literature review and analysis will result in a manuscript we will submit for publication. The student intern will benefit from direct research experience, learning about an innovative university-community partnership, and being involved in an important initiative to help NAU become the nation's leading university serving Native Americans.

College of the Environment, Forestry, & Natural Sciences

Dr. Anita Antoninka
Assistant Research Professor, School of Forestry

Dr. Antoninka is an Assistant Research Professor in the School of Forestry at NAU. I am fascinated by the interface of the above- and below ground systems. The soil environment is shaped from above and from within. Understanding the interactions of soil biota with each other and with changing resources or environment are themes that come up repeatedly in my research. My current research focuses on understanding how we can use soil organisms in ecosystem, from desert to forest ecosystems. I love working with students and helping them find their path in science.

Dr. Matthew Bowker
Associate Professor, School of Forestry

Matthew Bowker is an Associate Professor in the School of Forestry at Northern Arizona University in Flagstaff. His research touches on many aspects of soil ecology, with a current focus on community ecology and ecological restoration techniques. His most frequent study systems are biological soil crusts (biocrusts), cryptic photosynthetic soil surface communities that may be composed of cyanobacteria, lichens, and bryophytes among other organisms that form a "living skin" over the soil, especially in the dry places of the world.

The below research project(s) will be jointly overseen by Dr. Antoninka and Dr. Bowker.

Project(s) description:

The student could work on any number of ongoing dryland restoration projects, learning a variety of techniques for cultivation in the greenhouse and field, and learning a variety of measurements in the lab and field. The student would learn to identify biocrust organisms (a community of cyanobacteria, lichens and bryophytes that live in and bind the top millimeters of soil together, performing important ecosystem functions like stabilizing soils, adding fertility and affecting the hydrology) and get familiar with the ecology and functions of these organisms. The student would work hands on with mentors to implement an independent research project and help on a variety of other projects with mentors, graduate students and technicians.

Dr. Devon Burr
Professor, Astronomy & Planetary Sciences

Dr Burr's primary interest are the landforms that result from fluid flow. Fluid flow includes flow by water that formed ancient rivers deposits on Mars, as well as flow in current rivers of liquid nitrogen on Titan, the largest moon of Saturn. Dr Burr also studies the deposits formed by the flow of air, or wind, on Mars and Titan. In addition, Dr. Burr studies lava flows on Mars and the tectonic landforms on icy satellites of the outer Solar System.

Project Description:

Correlating rock characteristics with radar return on Death Valley alluvial fans

Light emitted by a radar system on an airborne or space asset scatters from a planetary surface as a function of the light wavelength and the surface properties. The resulting radar images can be informative as to how such properties vary spatially. By correlating radar to specific properties of rocky sediment (such as size and shape), CA, we can better inform inferences made from radar images of the surfaces of other planets and moons. Our research team has collected sediment properties on alluvial fans in Death Valley, both by hand and extracted from ground-based visible-light images, and using them to derive correlations to existing radar datasets. This project would involve data analysis tasks such as running semi-automated programs to compare image-based properties with our hand measurements. In addition, groups of images might be used to create 3-D models for better understanding how surface roughness contributes to radar return. Lastly, work on this project might entail additional field work in Death Valley. Sediment properties determined for different types of alluvial fans and across different parts of their surface will enable comparisons between depositional environments and sedimentological processes on other worlds.

Dr. Amanda de la Torre
Assistant Professor, School of Forestry

Amanda De La Torre is an Assistant Professor in Forest Genomics and the Director of the Forest Genomics lab at the NAU School of Forestry.

Project Description:
Drought and Cold Adaptation in Southwestern Conifers Using Genetics and Physiological Studies
Conifers such as Douglas fir (Pseudotsuga menziessii) and Ponderosa pine (Pinus taeda) are adapted to dry and cold environmental conditions. To fully understand what physiological and genetic mechanisms are required for these adaptations, we have conducted several physiological measurements including water use efficiency, photosynthetic rate, and others, and have done expression and genetic analyses. A research assistant will likely work in the greenhouse growing plants, help with doing physiological tests and may even learn some molecular analyses in our Forest Genomics lab. This is part of a PhD student thesis in Dr. De La Torre's lab. For any questions, please email Dr. De La Torre in English or Spanish to Amanda.de-la-torre@nau.edu.

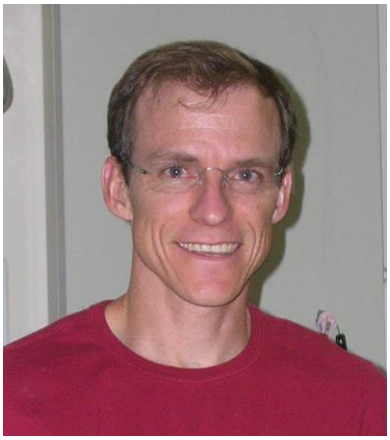
Dr. Karen Haubensak
Assistant Research Professor, Center for Ecosystem Science & Society
Department of Biological Sciences

Dr. Haubensak is a field ecologist who works at the interface of communities and ecosystems, examining plant-soil interactions in the context of restoration, biological invasions, and climate change.

Project Description:
Designing Habitat Restoration to Facilitate Plans and Pollinators in the Face of Climate Change in the Southwest
My collaborators and I have begun an ambitious project that attempts to understand the factors that affect native pollinators in the southwest, particularly those pollinators that depend on native wildflowers (or forbs) with high restoration potential. We are interested in identifying those forb species that will be both robust in a restoration project as well as support a high diversity of pollinators. We will test those plant-pollinator relationships in the field under a climate change scenario. Last summer and fall we planted nearly 20,000 wildflowers across five common gardens in Arizona. In summer 2020 we will visit these gardens and measure plant performance in addition to doing pollinator observations.

The student(s) will assist the PIs (Haubensak, Biology; Grady, Forestry; Aslan, SESES) as well as graduate students in the field; the field site is approximately 3.5 hours drive from Flagstaff. The fieldwork will involve taking measurements of plants, doing pollinator observations, and taking soil samples. There will be lab and greenhouse work at NAU in addition to the fieldwork.

Dr. Richard Hofstetter
Professor, School of Forestry



Dr. Rich Hofstetter is Professor of Forest Entomology at Northern Arizona University. He received his Ph.D. in Ecology and Evolution at Dartmouth College in 2004 and a Master's in Entomology from University of Wisconsin-Madison in 1996. Dr. Hofstetter's research focuses on bark beetle biology, bioacoustics, microbial ecology, and forest health protection. He has contributed over 200 presentations within the U.S. and abroad, and published >70 peer-reviewed scientific articles, 1 book (620 page book: 'Bark Beetles: Biology and Ecology of Native and Invasive Species') and 10 book chapters. In 2016, he produced a US and International Patent on the 'Use of Acoustics to Disrupt and Deter Wood-Infesting Insects and Other Invertebrates from and within Trees and Wood Products'. Some of his other accomplishments include Teacher of the Year and Researcher of the Year in School of Forestry at Northern Arizona University, is currently a Fulbright Specialist, and has a mite species named in his honor: Petalomium hofstetteri. Dr. Hofstetter also teaches international courses in Ecology and Conservation abroad in such places as Costa Rica, Nicaragua, and Siberia, and is the co-Director of a new Forest Biosecurity Research Initiative lab in Siberia Russia.

Project(s) Description:
We have a variety of research opportunities in study forest health and forest entomology in the forests and rangelands of Arizona. Projects include but are not limited to the following: 1) acoustic ecology of bark beetles - we will record and playback bark beetle sounds and determine if we can protect trees from beetle attack by using sound. 2) effects of fire on ground insects - we will sample and catalog insects from pile burns created during forest thinning practices in the Coconino National Forest, 3) natural history of the Pandora Moth - we will travel to the Jacob Lake area (north of the Grand Canyon) to study a native moth that feeds on Ponderosa needles (as a caterpillar) and determine whether fire or forest management practices affect their distribution and abundance, 4) seed foraging behavior of harvester ants - we will observe and quantify seed preferences of harvester ants to determine how ant foraging affects restoration efforts.

Dr. Yeon-Su Kim
Professor, School of Forestry

Yeon-Su Kim, is a professor of Ecological Economics, School of Forestry, Northern Arizona University. She has expertise in economic valuation of forest ecosystem services and regional economic impact analysis. Her research focuses on social and economic dimensions of ecological restoration and wildfires in the American southwest, as well as factors promoting collective actions for sustainable forest management in developing countries.

Dr. Alark Saxena
Assistant Professor, School of Forestry

Alark's primary interests are in poverty alleviation, sustainability of natural resources and developing resilient communities. Alark uses an interdisciplinary approach to environmental problem solving. He has used a systems approach for developing novel techniques to evaluate resilience of local communities and model relationships between forests landscapes and rural communities. Currently, Alark is working on measuring resilience of flood affected communities between India and Nepal, evaluating the impact of tourism on the natural and social systems in Sagarmatha National Park in Mt. Everest region in the Himalayas and developing an integrated landscape and livelihood management decision support system for forests in Turkey and India. Recently, Alark's team has been awarded a 3 year long NASA project for identifying vulnerable communities living across Himalayas in India, Nepal and Bhutan.

The below research project will be jointly overseen by Dr. Kim and Dr. Saxena.

Project description:

Advancing actional science for sustaining forest in a burning world

Anthropogenic fire regimes are changing around the world and the trend is likely to accelerate with increasing influence of climate change and economic pressures driving environmental degradation. In this project, we will compile all available secondary data in the fire-prone regions of Latin America for social, economic and demographic attributes, livelihood options, governance responses to fires and link them to globally observed frequency, intensity, size, pattern, season, and severity of fires. Students will be collecting/translating/building an integrated database of social and ecological information about fires.

Dr. Andrew Sanchez Meador
Associate Professor, School of Forestry

Dr. Sánchez Meador is an Associate Professor of Forest Biometrics and Quantitative Ecology in the School of Forestry at Northern Arizona University. His research program focuses primarily on quantitative forest ecology, spatial pattern-process interactions, applications of airborne and mobile lidar, forest biometrics and vegetation dynamics and modeling. His current research and teaching interests range from multi-scale forest restoration and ecology issues, to practical interpretations of large complex data sets, to neighborhood effects on individual tree growth and stand patterning, to new ways of visualizing data for science communication.

Brief summary of three possible projects/research that student(s) will work on this summer:

1. Lidar and forest management - The coming year (and likely many more years in the future) we'll be doing field research in support of applications of airborne and mobile lidar, or light detection and ranging to enable land managers to make inferences on forest conditions. Lidar is a remote sensing method that uses light in the form of a pulsed laser to measure the distance from a known location to an object with high accuracy. A fact sheet on how lidar can be used in forest application is available here: https://t.co/4Ha47Be1ik?amp=1
2. Forest neighborhood effects on tree and understory dynamics – Forest restoration in the western United States relies on tree thinning and prescribed fire to reestablish structure and process that make forests more resilient. Fundamental to the design of restoration treatments are considerations of neighborhood- or fine-scale spatial patterning and that pattern's influence on organism and community interactions as well as ecological processes. This summer, we'll be conducing more field work to investigate how specific neighborhood effects, such as spatial patterning, demographics, and type of interaction (ranging from competition to facilitation) influence individual tree growth, mortality and herbaceous understory richness and abundance.
3. Technological advances for evaluating restoration effectiveness at multiple scales – While forest and rangeland restoration treatments have been widely implemented over the past two decades in frequent-fire ecosystems of the western United States, few projects have analyzed treatment effectiveness at multiple scales on operational landscapes using advanced monitoring tools. This summer, my lab will be working with NAU's Ecological Restoration Institute to conduct field research at a long-term, research landscape and utilizing high-resolution satellite imagery to evaluate outcomes of restoration treatments at multiple scales on the Grand Canyon-Parashant National Monument.

Dr. Kristen Waring
Associate Professor, School of Forestry
Director, Silviculture & Applied Forest Health Lab

Dr. Kristen Waring is Professor of Silviculture and Applied Forest Health in the School of Forestry, Northern Arizona University, where she has worked since 2006. She has forestry degrees from the University of Montana and the University of California-Berkeley and specializes in finding solutions to a wide assortment of challenging forest health problems using silviculture and other management strategies.

Project Description:
The Silviculture and Applied Forest Health Lab at Northern Arizona University is seeking an undergraduate assistant to help conduct research on the sustainability of aspen regeneration in Arizona. Aspen is in a tenuous situation because of the lack of successful regeneration and recruitment beneath declining overstories. Drought is hypothesized to be the main driver of aspen decline, which is alarming because the Southwest is projected to become even more arid because of climate change. Other factors contributing to aspen decline include browsing by ungulates, conifer encroachment, and fire suppression. Insects and disease also contribute to aspen decline, and the emergence of an invasive insect, oystershell scale (Lepidosaphes ulmi), threatens to escalate decline in the Southwest. The emergence of oystershell scale and the certainty of a warmer and drier future warrant a broad assessment of aspen regeneration in the Southwest and an analysis of all potential factors that influence such regeneration. This information is critically important for informing future management of aspen.

Day-to-day responsibilities for the research assistant will consist primarily of quantitative sampling of aspen stands and data entry. Data to be collected include height, diameter, crown ratio and dieback, and presence and severity of insects and diseases. Other tasks, such as use of GIS to obtain abiotic data for sites, can be developed based upon the student's interest. Research sites are located on the Coconino and Kaibab National Forests, which are within daily driving distance of Northern Arizona University. The assistant will work closely alongside a PhD student and will be under the supervision of Dr. Kristen Waring.

College of Engineering, Informatics and Applied Sciences

Dr. Amir Arzani
Assistant Professor, Mechanical Engineering
Director, Cardiovascular Biomechanics Lab

Dr. Amir Arzani is the director of the Cardiovascular Biomechanics Lab. His research interests are computational fluid dynamics (CFD), computational mechanics, multiscale modeling, cardiovascular fluid and solid mechanics. His lab develops advanced computational modeling tools to study and model cardiovascular disease progression.

Project Description:
Patient-Specific Computer Modeling of Blood Flow and Cardiovascular Disease
Cardiovascular disease is the leading cause of death in the US. In this research, the student will create patient-specific computer models of diseased vasculature using state-of-the-art open-source patient-specific computer modeling tools. Using MRI or CT scan data, 3D patient-specific computer models will be created using image segmentation techniques. Subsequently, blood flow simulations will be done using high-performance computing (HPC) simulations and computational fluid dynamics (CFD). The results from these patient-specific simulations will be used to identify novel predictive biomarkers of cardiovascular disease progression. The ultimate goal of this project is to blend computer modeling, medical imaging, fluid mechanics, and data processing to better understand cardiovascular disease.

The student will use state-of-the-art open-source (free) software to create patient-specific computer models. The student will learn how to navigate medical images and interpret medical image data. The student will learn how to create 3D personalized computer models of the diseased and healthy vasculature. The students will run computer simulations using computational mechanics tools and learn how the data is analyzed. The students are expected to attend our regular weekly lab meetings and present their results, and therefore improve their presentation skills.

Dr. Toby Hocking
Assistant Professor, School of Informatics, Computing & Cyber Systems

Toby Dylan Hocking obtained a bachelor at UC Berkeley (2006), Master at Paris 6 (2009), and PhD at Ecole Normale Superièure de Cachan (2012). His main research interests

are developing new statistical models, optimization algorithms, interactive systems, and software for machine learning.

Project Description:
Unsupervised Penalty Learning Using Cross-Validation for Optimal Changepoint Models
Changepoint detection is an important class of models for analyzing sequences of data which are gathered over space or time. For example, in genomics, aligned read count data are measures of biological activity along a reference sequence. Abrupt changes along the sequence indicate changes in activity, i.e. genes turning on or off. Detecting such changes is important in order to accurately diagnose genetic diseases such as cancer. Most changepoint detection algorithms are unsupervised, which means that no information about the positions of true changepoints is known in advance. In the framework of optimal changepoint detection, there is a single model complexity parameter called the “penalty” that controls the number of changepoints detected. Choosing the right value of the penalty is important in order to avoid false positives (changepoints detected by the model in regions where there is only noise) and false negatives (no changepoints detected by the model in regions where there are real changes). In this project we will investigate a new unsupervised algorithm for selecting the penalty parameter, using cross-validation, which means dividing the data into “train” and “validation” sets. The train set is used to compute a sequence of models of increasing complexity, whereas the validation set is used to select the right value of the model complexity (penalty) parameter. In this internship the student will learn about machine learning algorithms, R programming, and data visualization.

Dr. Gabriel Montaño
Professor and Department Chair, Applied Physics & Materials Science

Dr. Gabriel Montaño is a native New Mexican born and raised in Gallup, NM and has spent his academic and professional careers in the southwest. Gabriel attended New Mexico State University where he received his Bachelors of Science in Biology in 1997 and was introduced to research working in the lab of Dr. Peter Houde. He then attended Arizona State University where he completed his PhD in the lab of Dr. Robert Blankenship in 2002 in the Department of Chemistry and Biochemistry. Upon completion of his PhD., Gabriel accepted a postdoctoral appointment in biomaterials design with Dr. Andy Shreve at Los Alamos National Laboratory where he was an Intelligence Community Postdoctoral Fellow. In 2005, Gabriel accepted a position as a Technical Staff Member with the newly developed Department of Energy-Center for Integrated Nanotechnologies (CINT) where he remained until the fall of 2017.

In the fall of 2017, Gabriel and his wife Inès began faculty positions in the Departments of Chemistry & Biochemistry and Physics & Astronomy, respectively at Northern Arizona University (NAU) moving to Flagstaff, AZ with their 2-year old son Eusevio. Gabriel led the creation of the Center for Materials Interfaces in Research and Applications (¡MIRA!) and continues to serve as ¡MIRA! Chief Scientist. In addition, he led the establishment of the Department of Applied Physics and Materials Science at NAU and serves as Department Chari. In the spring of 2019, Dr. Montaño was also selected to serve as the NAU Diversity Fellow and oversees all diversity initiatives at NAU.

Dr. Montaño's lab group investigates membrane biophysics and non-equilibrium bio-inspired materials. In particular, they are interested in bio- and bio-synthetic interfaces and supramolecular structure/function relationships. Many biological processes rely on complex interfacial interactions to drive function ranging from infectious diseases to organ function and complex processes such as photosynthesis. Understanding and mimicking such interactions are the focus of the Montaño team. Gabriel is as devoted to outreach initiatives as he is to his research, in particular to enhancing diversity in the Science Technology, Engineering and Mathematics (STEM) workforce. Among his outreach efforts, Gabriel has served as a Board Member and as President of the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), as a member of numerous committees and Task Forces including the Hispanic Association of Colleges and Universities (HACU) STEM task force the Minority Affairs Committee of the Biophysical Society and currently leads the Hubs of Innovation Task Force for the National Institutes of Health. He has dedicated his career to demonstrating to aspiring scientists the possibility of being an effective, high-impact research scientist while making a difference through outreach initiatives that can help current and future generations of scientists.

Current projects that summer research students can work on are:

- Supramolecular polymer nanocomposites for phototherapeutic applications
- Force Spectroscopy of Bio-synthetic Interfaces
- Polymer-based artificial Organelles

Dr. Jennifer S. Martinez
Professor, Applied Physics & Materials Science
Director, Center for Materials Interfaces in Research (¡MIRA!)

Jen Martinez's current research interests center on the development of fluorescent nano clusters, their physical characterization and their applications. Further, the Martinez group has been active in creating polymers through genetic engineering. Through combinatorial processes, they are

creating systems to select for polymers that have defined function within days and not decades (for applications in both regenerative medicine and optoelectronics).

Jen is privileged to have been honored as a AAAS and Kavli Fellow and has received the Presidential Early Career Award in Science and Engineering (PECASE), Los Alamos Fellows Research Prize and an R&D 100 Award (the "Emmy" of patent development), and other fellowships and student mentorship awards.

Jen is accepting summer research students interested in areas of nanotechnology, biophysics and medically related physics and materials.

Dr. Truong X. Nghiem
Assistant Professor, School of Informatics, Computing & Cyber Systems
Director, Intelligent Control Systems (ICONS)

Dr. Truong X. Nghiem is an Assistant Professor at the School of Informatics, Computing, and Cyber Systems (SICCS) at Northern Arizona University (NAU). He is the founder and director of the Intelligent Control Systems (ICONS) Laboratory. Dr. Nghiem received his Ph.D. in Electrical and Systems Engineering from the University of Pennsylvania. Before joining NAU, he was a postdoctoral scientist in the Automatic Control Laboratory at EPFL (Switzerland), and a postdoctoral researcher at Penn. During his time at Penn, he was a member of the General Robotics, Automation, Sensing and Perception (GRASP) Laboratory, the Real-time and Embedded Systems Lab (mLab), and the Penn Research In Embedded Computing and Integrated Systems (PRECISE) center.

His research bridges machine learning and modern control and computing to develop intelligent control systems in various application domains. Of particular interest are data-driven methods for modeling, controlling, optimizing, and verifying Cyber-Physical System (CPS). Currently, his lab is developing data-driven analytics and control methods for smart buildings and smart grids, and learning-based control algorithms for autonomous cars and autonomous systems in general.

Project Description:
Data-driven Analytics of Building Energy and Water Consumption
This project uses machine learning to develop predictive models of energy and water consumption of buildings on the NAU campus. These models are used to forecast short-term energy and water demand of NAU buildings and to help optimize the operation of NAU campus.
Related poster:
https://drive.google.com/open?id=1Ufjk7UKpoSKtMamUIIwuqfeapEB0UVX6

Project Description:
F1/10 Autonomous Racing (Relevant Project: FF1RR http://ff1rr.nxtlab.org)
In our lab, as part of the FF1RR project, we have built several small-scale autonomous race cars (called F1/10). There are many potential summer research topics on this platform, for example: using Virtual Reality (VR) to drive the car, using Vehicle-to-Vehicle communication to coordinate multiple autonomous cars, applying new AI algorithms to drive the car autonomously, etc.

Dr. Ben Ruddell
Director & Associate Professor, School of Informatics, Computing & Cyber Systems

Dr. Ben Ruddell, PhD, PE, is Associate Professor and Director of the School of Informatics, Computing, and Cyber Systems at Northern Arizona University, the President of Ruddell Environmental consulting, and the Director of the FEWSION project. His PhD is in Civil and Environmental Engineering from the University of Illinois at Urbana-Champaign. His professional experiences are in the fields of civil engineering, water resources, systems analysis, ecology/ecohydrology, and engineering research and education in an interdisciplinary university setting. He works with a variety of federal, local, and private partners to accomplish cutting-edge projects. His research interests fall broadly in the area of the quantification and management of complex coupled natural-human systems, including regional water and climate systems strongly influenced by the human economy and society- such as in cities, energy, and agriculture. His professional goals are the advancement of the science and management of complex systems, and excellence in education in a university setting. https://csil.rc.nau.edu/

Project Description:
FloodAware: Crowdsourcing Urban Flooding Data
http://floodaware.net/
FloodAware is a multi-university project to assess the effectiveness of several real-time flood detection, reporting, and communication technologies for cities and local communities. The project is supported by the National Science Foundation's Smart and Connected Communities program (award 1831475)

Dr. Miguel Jose Yacaman
Professor, Applied Physics & Materials Science
Core Faculty of ¡MIRA!

Miguel José Yacamán obtuvo su licenciatura en Física en 1968, su maestría en 1971, y concluyó su doctorado en 1973 en la Facultad de Ciencias de la Universidad Nacional Autónoma de México. Hizo estancias de investigación y posdoctorado en las Universidades de Cambridge, Warwick y en la Universidad de Oxford en la Gran Bretaña, así como en el NASA-AMES Research Center de Mountain View, California. Ha sido profesor de la Facultad de Ciencias de la UNAM (1968-1970), investigador del Instituto de Física de la UNAM (1970-2004) y profesor de la Universidad de Texas en Austin (2000-2008). A profesor de la Universidad de Texas en San Antonio (2008-2019),.Actualmente es Profesor de Ciencia De materiales en Nothern Arizona University profesor afiliado de la Universidad Autónoma de San Luis Potosí.

Miguel José Yacamán ha impartido clases durante 40 años, incluyendo cursos de licenciatura y posgrado. Ha ocupado diversos cargos como jefe de departamento y director del Instituto de Física de la UNAM, director adjunto de investigación científica del CONACYT, director general del ININ, jefe del departamento de física y astronomía en la Universidad de Texas en San Antonio. Ha sido miembro del consejo asesor o de la junta directiva de centros del CONACYT como CIMAV, CIO, CICA, Instituto de Ecología, IPCYT, CISI, entre otros. Fue durante una década miembro de la junta de gobierno de la Universidad Veracruzana. Ha sido miembro de comités internacionales del ICSU, Unesco, OECD. Ha sido editor asociado de Acta Materialia, Scripta Materialia y de Microscopy and Microanalisis, entre otras. Fue miembro del comité ejecutivo de la Unión Internacional de Sociedades de Materiales y de la Federación Internacional de Sociedades de Microscopia Electrónica. Ha sido Chairman de 10 congresos internacionales incluyendo el Congreso Internacional de Microscopia Electrónica. Fue fundador de la Sociedad Mexicana de Materiales, de la Sociedad Mexicana de Superficies y Vacío, de la Academia de Catálisis y de la Sociedad Mexicana de Microscopía. Asimismo, ha sido investigador al nivel III del SNI desde la primera promoción (1984) y en 2013 fue nombrado Investigador Nacional Emérito. Ha recibido la Presea del Estado de México, el Premio de Investigación de la Academia de Ciencias, el Premio Nacional de Ciencias en el área de ciencias exactas, The Mehl Award de la TMS (The Metals Society), el Premio Wheatly y el Bouchet Award de la American Physical Society (APS) y el Premio al Investigador Distinguido de SACNAS. Es fellow de la APS y la AAAS. Ha recibido la Beca Guggenheim y la Medalla al Desarrollo de la Física de la Sociedad Mexicana de Física. Es miembro del Consejo Consultivo de Ciencias. Ha recibido Doctorado Honoris Causa de la Universidad Autónoma de Nuevo León de México y de La Universidad de Córdoba de Argentina.

El Doctor José Yacamán ha publicado más de 580 artículos en revistas de investigación. Ha escrito o editado 8 libros técnicos. Su trabajo ha tenido más de 28,000 citas y su factor H es de 71. Ha también dirigido 45 tesis de doctorado, 25 de maestría y 45 de licenciatura. Ha supervisado a más de 90 post-doctorantes. Tiene además 3 patentes. Su artículo sobre actividad antimicrobial de nano partículas de plata ha tenido 4500 citas. Su artículo sobre nano partículas y HIV-1 ha sido bajado de la red más de 100,000 veces y tiene 450 referencias. Ha tenido la portada principal en 20 artículos en revistas de alto impacto, una de ellas en Science. Ha sido conferencista invitado en mas de 150 congresos científicos internacionales.

Project Description(s):

1) Early detection of breast and ovarian cancer using nanotechnology and Raman spectroscopy.
2) Synthesis of multimetallic nanoparticles with High Entropy
3) Use of nanoparticles to heal wounds on diabetic patients