UTSA
The Graduate School

UTSA Postdoctoral Affairs

POSTDOC APPRECIATION WEEK 2023

Keynote Speaker

JoAnn Browning, Ph.D.

Interim Vice President for Research, Economic Development, and Knowledge Enterprise (REDKE)

September 22nd, 2023

UTSA
The Graduate School

MESSAGE FROM THE GRADUATE SCHOOL

Dear Postdoctoral Colleagues!

The University of Texas at San Antonio Graduate School is delighted to welcome you to the 2023 Postdoctoral Appreciation Week (PAW) at UTSA.

This week is all about YOU – the incredible contributions, passion, and expertise you bring to our academic community. Together, we will not only celebrate your accomplishments but also lay the foundation for a bright future filled with groundbreaking research, innovation, and academic excellence.

Thank you for being an essential part of our academic community, and please know that your contributions are deeply valued and cherished.

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The University of Texas at San Antonio

Office of the Vice President for Research, Economic Development, and Knowledge Enterprise

JoAnn Browning, Ph.D.

Interim Vice President for Research, Economic Development and Knowledge

P.E. Kansas & Texas

Dr. Browning was appointed UTSA's Interim Vice President for Research, Economic Development and Knowledge Enterprise, effective June 1, 2023. Dr. Browning had served as Dean of UTSA's Margie & Bill Klesse College of Engineering and Integrated Design and the David and Jennifer Spencer Distinguished Chair in Engineering since September 2021. She had previously held the position of Dean of the UTSA College of Engineering since August 2014. Dr. Browning came to UTSA from the University of Kansas, where she served on the faculty for 16 years, including 2 years as Associate Dean of Administration. Purdue University named her a Distinguished Woman Scholar in 2015. In 2016, INSIGHT into Diversity magazine presented her with an Inspiring Women in STEM award, and in 2018 she received the San Antonio Business Journal Women's Leadership Award.

Dr. Browning has been active in the engineering community, as President of the Kansas Chapter of the American Concrete Institute (ACI), member of the Earthquake Engineering Research Institute, the American Society of Civil Engineers, and the American Society of Engineering Education. She has served on the National Board of Directors of ACI and has chaired a subcommittee of the ACI 318 Building Code Committee since 2014. She also serves on the Board of Directors for NIBS BSSC (Vice Chair).

Her own research interests include structural engineering, earthquake engineering, engineering materials, reinforced concrete design and analysis, and engineering education. She received the American Concrete Institute's Young Member Award for Professional Achievement in 2008 and was named an ACI Fellow in 2009. Browning is a Professional Engineer in the states of Kansas and Texas.

UTSA Postdoc Appreciation Week Research Symposium

September 22, 2023 | 8:30 a.m. – 4:30 p.m.
Student Union Denman Room

8:30 – 9:15 a.m.	***Check-in & Registration*** Professional Headshots Available
9:15 – 9:45 a.m.	***Welcome & Opening Remarks*** **Dr. Ambika Mathur** Senior Vice Provost for Graduate and Postdoctoral Studies and Graduate Dean
9:45 – 10:00 a.m.	***Coffee Break***
10:00- 11:00 a.m.	***Workshop*** *"Leveraging Adobe to Creative Visually Stimulating Content for Higher Education and Beyond"* **Willie Schaefer, M.F.A., Adobe Specialist** Teaching, Learning & Digital Transformation
11:00 – 12:00 p.m.	***Networking Lunch*** Professional Headshots Available
12:00 – 12:15 p.m.	***Break***
12:15 – 1:25 p.m.	***Poster Session***
1:30 – 2:30 p.m.	***Keynote Speaker*** *"UTSA: a great public research institution"* **Dr. JoAnn Browning** Interim Vice-President Research, Economic Development, and Knowledge Enterprise
2:30 – 2:45 p.m.	***Break***
2:45 – 3:30 p.m.	***Awards Presentation*** Poster, Postdoctoral Research Fellow of the Year, Postdoctoral Research Mentor of the Year
3:30 – 3:45 p.m.	***Closing Remarks*** **Dr. Madhumita Joshi** Director of Postdoctoral Success The Graduate School Office of Postdoctoral Affairs
3:45 – 4:30 p.m.	***Reception***

SPECIAL THANKS TO OUR JUDGES

Poster Judges

Lacy Barton, Ph.D.

Kristen Brown, Ph.D.

Althea Campuzano, Ph.D.

Sandra Cardona, Ph.D.

Hugo Giambini, Ph.D.

Maria A. Gonzalez Porras, Ph.D.

Teja Guda, Ph.D.

Rosalind Horowitz, Ph.D.

Lindsey Macpherson, Ph.D.

George Perry, Ph.D.

Ramin Sahba, Ph.D.

Fidel Santamaria, Ph.D.

Erica Sosa, Ph.D.

Alexey Soshnev, Ph.D.

Jeffrey Vedanayagam, Ph.D.

Marissa Wechsler, Ph.D.

Xhavit Zogaj, Ph.D.

Postdoctoral Research Fellow of the Year Judging Committee

Althea Campuzano, Ph.D.

Nancy Cheak-Zamora, Ph.D.

George Perry, Ph.D.

Hatim Sharif, Ph.D.

Marissa Wechsler, Ph.D.

Rebecca Weston, Ph.D.

Rosalind Horowitz, Ph.D.

Saugata Datta, Ph.D.

Postdoctoral Research Mentor of the Year Judging Committee

Teja Guda, Ph.D.

Fred Martin, Ph.D.

Lynne Cossman, Ph.D.

John McCarrey, Ph.D.

PAW RESEARCH SYMPOSIUM ORGANIZING COMMITTEE

CO-CHAIR: Eva Diaz Guerra, Ph.D.

Postdoctoral Fellow

Department of Neuroscience, Developmental and Regenerative Biology, College of Science

Mentor: Jenny Hsieh, Ph.D.

Dr. Eva Diaz Guerra is a UTSA postdoctoral fellow studying sporadic Alzheimer's disease and genetic epilepsy using 3D brain organoids in Dr. Hsieh's lab. She was born and raised in Madrid, Spain, where she obtained her Ph.D. in Biochemistry and Molecular Biology, investigating the role of hormones in the mouse mammary gland stem cells. Before joining UTSA, she studied the role of Tbr1 and Nurr1 transcription factors in olfactory bulb development and investigated APOE polymorphism's effects on Alzheimer's disease using iPSC technology at the Cajal Institute, Spain. Outside of the lab, she enjoys traveling with her family and friends.

CO-CHAIR: Daniela Monje Reyna, Ph.D.

Postdoctoral Fellow

Department of Neuroscience, Developmental and Regenerative Biology, College of Science

Mentor: Fidel Santamaria, Ph.D.

Dr. Daniela Monje was born in Xalapa, Veracruz, México. She holds a background in Music and Psychology from the Universidad Veracruzana (UV), where she obtained her degree in 2006. She pursued a Master's degree in Musical Cognition from the Universidad Autónoma de México (UNAM) in 2008 and earned her Ph.D. in Brain Research from the UV in 2018. Over the years, Dr. Monje has actively participated in various national and international forums, presenting topics related to the brain cognition, and arts, and she has been involved in teaching at different educational levels.

Currently, she is a postdoctoral fellow at UTSA within the NDRB Department, working in the laboratory of Dr. Fidel Santamaria. Her research focuses on investigating Autism Spectrum Disorders with a molecular and electrophysiological approach, specifically targeting the structure of the cerebellum.

Daniela loves outdoor activities, especially those involving water. She has a passion for movies, loves animals, and is highly interested in their well-being.

CO-CHAIR: Nicolás Muzzio, Ph.D.

Postdoctoral Fellow

Department of Biomedical Engineering and Chemical Engineering, College of Science

Mentor: Gabriela Romero, Ph.D.

Dr. Nicolás Muzzio is a UTSA postdoctoral fellow conducting research in soft biomedical materials for neural modulation. He was born and raised in Buenos Aires, Argentina. He obtained his degree in Biochemistry in 2013 and his Ph.D. in Chemistry in 2017 from the National University of La Plata. He joined Dr. Romero's Macromolecular Bio-Interfaces Lab as a postdoc in Spain where he developed biomaterials and coatings for tissue engineering and a postdoc in Buenos Aires where he conducted research in cell mechano-transduction. Dr. Muzzio has been actively participating in UTSA Postdoctoral Association since 2022. In his free time, Nicolás loves to travel, walk, learn new stuff (he has just completed Le Wagon Data Science Bootcamp) and play video games. He has also collaborated in Church as a catechist for several years.

CHAIR: Lorena Roa de la Cruz, Ph.D.

Postdoctoral Fellow

Department of Neuroscience, Developmental and Regenerative Biology, College of Science

Mentor: Lacy Barton, Ph.D.

Lorena Roa-de la Cruz was born and raised in Mexico, where she obtained her bachelor's degree in clinical biochemistry before pursuing a master's degree in Genetics in Barcelona, Spain. Dr. Roa's love for science led her to enroll in the Cell and Molecular Ph.D. program at UTSA where she conducted research on the mechanisms that characterize the foundational spermatogonial stem cells in mice. Currently, Dr. Roa is working as a postdoctoral fellow in Dr. Lacy Barton's lab at the UTSA, researching the role of calcium signaling in germline biology using *Drosophila melanogaster* as a model organism.

CO-CHAIR: Mohamed Shahid Usen Nazreen, Ph.D.

Postdoctoral Fellow

Department of Biomedical and Chemical Engineering, Klesse College of Engineering

Mentor: Shrihari Sankarasubramanian, Ph.D.

Md. Shahid was born and raised in India, where he obtained his bachelor's degree in petroleum refining and petrochemical technology before pursuing a master's degree in chemical engineering in Indian Institute of Technology, Madras. Dr. Md. Shahid's interest on energy storage and conversion technologies led him to enroll in the chemical engineering (Ph.D.) program at the Indian Institute of Technology, Delhi, where he developed hydrocarbon driven solid oxide fuel cells operating on gas compositions similar to petroleum wells for industrial electrification. Currently, Dr. Md. Shahid is working as a postdoctoral fellow in Dr. Shrihari Sankarasubramanian's lab at the University of Texas at San Antonio, researching strategies to develop an economically viable low temperature electrolyzer operating at Martian atmospheric conditions.

Althea Campuzano, Ph.D.

Assistant Professor of Research

Department of Molecular Microbiology and Immunology

College of Science

We extend our deepest gratitude to Dr. Althea Campuzano, former Postdoctoral Fellow, and Postdoctoral Association Leader, for her invaluable support and insights in organizing this event. Dr. Campuzano recently became an Assistant Professor of Research in the Department of Molecular Microbiology and Immunology and her research interests include medical mycology, host-pathogen interactions and vaccine development.

UTSA POSTDOCTORAL ASSOCIATION TEAMS CHANNEL

Join our group and stay up to date on all the latest info, events, and more!

To join, scan the QR code or click on the link below, and you'll instantly gain access to our group.

We're excited to have you join us and can't wait to see you there!

UTSA Postdoctoral Association Teams Channel

UTSA
THE GRADUATE SCHOOL
OFFICE OF POSTDOCTORAL AFFAIRS

Ambika Mathur, Ph.D.

Senior Vice Provost for Graduate and Postdoctoral Studies

Dean of the Graduate School

Ambika Mathur, Ph.D., is Senior Vice Provost for Graduate and Postdoctoral Studies and Dean of the Graduate School at UTSA. Dr. Mathur was born in Jaipur, grew up in Delhi and Mumbai, received her doctoral degree from the University of Iowa and has held faculty positions at the University of Minnesota and Wayne State University. She is currently a Professor in the Departments of Biology and Chemistry at UTSA. Dr. Mathur is deeply committed to the advancement of all aspects of training for high school, undergraduate, medical, master's, doctoral and postdoctoral trainees. She was appointed the first permanent director of the combined M.D./Ph.D. combined degree program, and the founding director of the Office of Postdoctoral Affairs at her previous institution in Michigan and served for six years as its Graduate School Dean prior to moving to Texas three years ago to serve in the current roles at UTSA. A cancer immunologist by training, Ambika has received over $30 million in grant funding by the National Institutes of Health (NIH) and several other agencies in support of her research in cancer immunology, the immunological basis for complementary and alternative medicine interventions in pediatric patients, and graduate training, and has over 400 research publications and presentations in these areas. Because of her expertise, she was invited to brief the U.S. Congress on health and educational equity. Dr. Mathur is also a published author of a medical mystery suspense thriller and a series of books for children. She enjoys spending time with her pediatrician husband Dr. Deepak Kamat, and her twin children Dr. Aarti Kamat (a pediatric oncologist) and Dr. Amol Kamat (surgery resident in the U.S Navy), and her daughter in law Dr. Katie Kasper. Her favorite role is by far that of grandmom to her new granddaughter Tulsi Kamat!

Madhumita Joshi, Ph.D.

Director of Postdoctoral Success

Office of Postdoctoral Affairs

The Graduate School

Madhumita Joshi is the Director of Postdoctoral Success at the UTSA. She was born in India and completed her Bachelor's and Master's degrees in India. She jointly worked at the National Chemical Laboratory (NCL, Pune, India) and the University of Georgia for her research and received a doctorate in Plant Biotechnology. She completed her postdoctoral training at Cornell University in Molecular Microbiology and Plant Biotechnology/Bioinformatics. Before moving to the UTSA, Madhumita worked at the University of Georgia, Tifton; Cornell University, Ithaca; and Texas A&M University AgriLife Research Center in Uvalde. She has published her research in over 35 high-impact scientific journals and at several conferences. She has actively mentored and coached undergraduate, graduate students, and postdoctoral researchers in research, academics, and career development.

Madhumita is an active volunteer of the 4-H youth development program and has initiated and run a STEM program for Uvalde Middle and High School students. She likes to spend time with her best friend and husband, Dr. Vijay Joshi (Asso. Professor at Texas A&M), and practice tennis and taekwondo with her son Arin (Black Belt) when free.

John W. Shaffer, M.A.

Associate Director, Student Success & Professional Development

The Graduate School

Chair – Pride Faculty and Staff Association

John Shaffer is the Associate Director for Student Success and Professional Development with The Graduate School at UTSA. He is a two-time alumnus of UTSA with a Bachelor of Arts in Communication - Public Relations and a Master of Arts in Higher Education Administration. He has worked at UTSA for 17 years.

During his 15-year tenure with The Graduate School, John has developed new graduate orientation models, incorporated collaborative models for the development and success of international graduate students, and has implemented special programs such as the 3MT Research Competition, Dissertation Writing Camp, Graduate Student Appreciation Week, and the incredibly popular First Friday series. He has presented over the topics of leadership, communication, presentation delivery, cross-campus collaborations, and the implementation of a graduate student center, among others.

In 2019, and again in 2021, John was invited as a guest speaker for the Humanities Without Walls Pre-Doctoral Summer Workshop; presenting over the topics of career trajectories and leadership in higher education. Currently, he is Chair of the UTSA Pride Faculty and Staff Association. In 2020, John completed his 1-year term as Chair of UTSA's Staff Senate shared-governance body and, more recently, he completed his 3-year term as a member of the UT System Employee Advisory Council.

John has been recognized for his contributions to UTSA, receiving the University of Texas System Regents' Outstanding Employee Award in 2018, and the UTSA Order of the Roadrunner in 2020.

Tim Palese

Senior Program Coordinator

The Graduate School

Treasurer – Pride Faculty and Staff Association

Tim Palese is the Senior Program Coordinator for the Graduate School at UTSA. Before coming to the Graduate School, Tim worked as a full-time staff member at UTSA Libraries for three years, beginning in 2019, after graduating from Simpson College in Indianola Iowa. Tim graduated with a Bachelor of Arts Degree, having majored in History and Chemistry and minored in Art History, and with Honors in History, having written and defended an undergraduate Honors Thesis on the Great Leap Forward.

Tim was born and raised in Denver, Colorado. He loves spending time outside; gardening, running, hiking, and swimming in his free time.

Giselle Villalpando

Communications Manager

The Graduate School

Giselle Villalpando is the Communications Manager for the Graduate School at UTSA. Giselle has more than 7 years of experience in communications at UTSA and previously worked at the Carlos Alvarez College of Business. She earned a Bachelor of Arts in Journalism/Public Relations from Baylor University and a Master of Business Administration in Marketing Management from UTSA. Giselle was born and raised in San Antonio, Texas. In her free time, she enjoys volunteering in the community through the Junior League of San Antonio, baking, and staying physically active.

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Office of Postdoctoral Affairs

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The Office of Postdoctoral Affairs (OPA) at UTSA serves as a central resource for postdoctoral scholars on-campus. By providing a variety of services, from annual postdoc orientations to professional development programs, OPA promotes postdoctoral training and preparation for successful careers in academia and industry.

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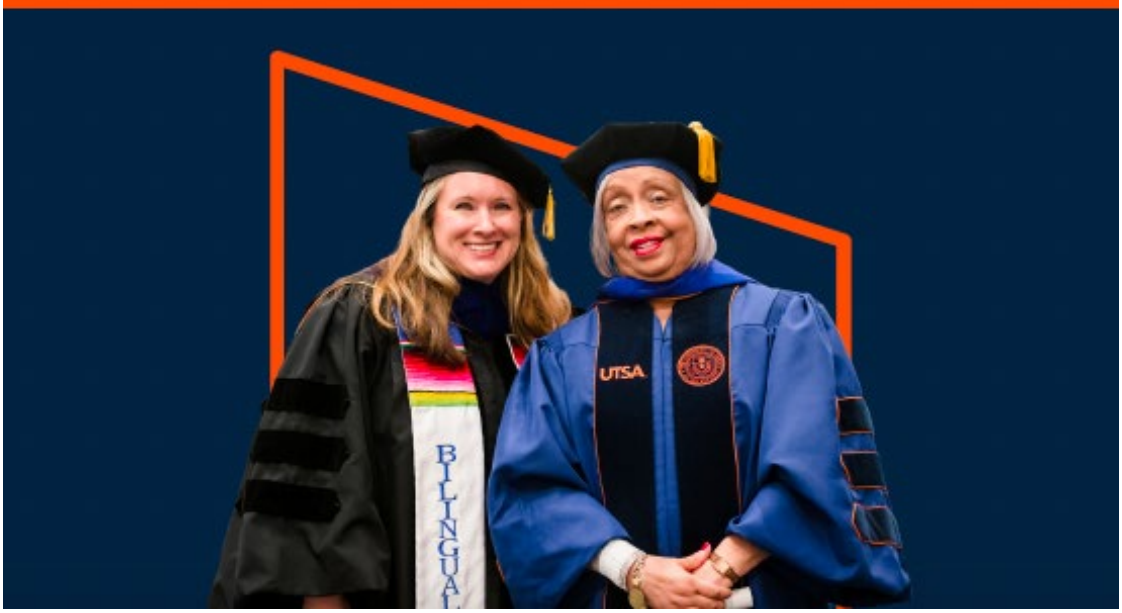

ABSTRACTS

POSTER ASSIGNMENTS

POSTER 101

Design Requirements for Mechanically Spliced High-Strength Reinforcing Bars in Hinge Regions of Concrete Shear Walls

Wrya Abdullah, Ph.D. wrya.abdullah@utsa.edu

Engineering

In recent years, to facilitate construction efficiency high strength reinforcing bars (HSRBs) have emerged into the construction industry, however, the application of mechanically spliced HSRBs is restricted in the hinge region of the concrete shear walls due to the absence of experimental validation. For this reason, this paper comprises testing of four full-scale shear walls. The walls are 16 feet high, 7 feet long, and 16 inches thick. Each wall has a foundation measuring 10 feet in length, 6 feet in width, and 3 feet in thickness. Additionally, a beam crowns top of the wall, spanning 7 feet in length, 4.6 feet in width, and 2 feet in thickness. The target compressive strength of the concrete at 28 days is 8 ksi. The control wall features HSRBs exclusively at the hinge region, while the remaining walls incorporate couplers of varying lengths, ranging from 3 inches to 14 inches, at their respective hinge regions. The walls will be tested under cyclic loading tests to assess the structural response, deformability, energy dissipation capacity, and failure modes. A set of design requirements and recommendations will be proposed for effectively utilizing mechanically spliced HSRBs in the hinge regions of concrete shear walls. These guidelines cover aspects such as coupler type, concrete cover requirements, detailing at spliced regions, and anchorage lengths to ensure robust performance and compatibility with existing design codes and standards.

POSTER 102

Efficient and scalable method to generate reduced order models of non-linear Finite Element problems using Hypercomplex Numbers

Mauricio Aristizabal Cano, Ph.D. Mauricio.AristizabalCano@utsa.edu

Mechanical Engineering

Reduced order models (ROMs) are fundamental in applications like uncertainty quantification and optimization for complex models. Its generation is difficult and time-consuming as most methods are based on sampling the high-fidelity model at many points. In this work, we explore the use of first and higher-order derivatives to reduce the cost of generating reduced-order models of non-linear finite element problems. We propose a novel and scalable method for computing high-order Taylor series expansions of the Finite Element solutions. The derivatives are computed in three steps: first, the standard finite element problem is solved using a traditional method/software. Second, the exact Jacobian (tangent matrix) is computed and assembled. Finally, the problem residual is elevated to hypercomplex algebra and is evaluated with imaginary-perturbed input parameters and nodal solution values from step 1 to compute derivatives in ascending order. The performance of the new methodology was evaluated in a 3D thermal simulation of a single laser pass over a bare metal plate for metal-based additive manufacturing uncertainty quantification applications. Results show that the first-order Taylor series expansion with respect to 22 parameters (22 first order) can be computed within 1.8x the time of the traditional Finite element simulation and provides similar results to those of Monte Carlo simulation with 495 sample points.

POSTER 103

Improving human perception and computer vision identification of malignant melanoma

Murray Bennett, Ph.D. murray.bennett@utsa.edu

Psychology

Melanoma is a deadly skin cancer, but early detection improves survival rates. Dermatologists rely on visual scans to diagnose melanoma by assessing the primary perceptual characteristics of skin lesions. The ABCDE heuristic suggests the evaluation of shape (A)symmetry, (B)order irregularity, number of unique (C)olours, and (E)volution over time. This heuristic provides a practical guide but is limited as perceptual features of lesion vary and only subset of features may present. Further, the combination of features can complicate the diagnostic process and lead to errors. Computer vision algorithms (CVA) have emerged as a powerful approach to melanoma identification. CVAs can generate accurate and objective assessments, yet CVAs can only be used in conjunction with an expert assessment. Thus, the perceptual expertise of dermatologists remains a critical component in the accurate and timely detection of melanoma. Our project aims to improve the early detection of melanoma by investigating the perceptual judgments of skin lesion colour and shape made by humans and comparing them with the feature representations generated by computer vision algorithms. We recruited non-expert participants online to complete a two-alternative forced-choice task. Participants were instructed to choose the skin lesion image that exhibited a greater frequency of unique colours in one condition and greater border regularity in another. We estimated the relative 'strength' of each lesion image along the perceptual dimensions of colour and shape using the Bradley-Terry-Luce (BTL). Estimates were compared to computer vision assessments of the same perceptual features. The methodological approach, preliminary results, and future directions are discussed.

POSTER 104

A novel layer 4 corticofugal projection involved in cortico-thalamo-striatal sensory processing

Alice Bertero, Ph.D. alice.bertero@utsa.edu

Neuroscience

In sensory cortices, the information flow has been thought to be processed vertically across cortical layers, with layer 4 being the major thalamo-recipient one which relays thalamic signals to layer 2/3, which in turn transmit thalamic information to layer 5 and 6 to then leave the cortex to reach subcortical and cortical long-range structures. Although several exceptions to this model have been described, neurons in layer 4 are still considered to establish only local (i.e., interlaminar and short-range) connections. Here, taking advantage of anatomical, electrophysiological, optogenetic techniques, we describe for the first time a long-range corticostriatal class of pyramidal neurons in layer 4 (CS-L4) of the mouse auditory cortex that receive direct thalamic inputs. The CS-L4 neurons are embedded in a feedforward inhibitory circuit involving local parvalbumin neurons and establish connections in the posterior striatum in yet another feedforward inhibitory thalamo→cortico(L4)→striatal circuit to potentially contribute to control the output of striatal spiny projection neurons. Here we propose a new wiring diagram that implemented the old one, in which layer 4 is not only involved in the transfer of thalamic input to the upper layer 2/3 but can exert a direct top-down control, bypassing intracortical processing, of subcortical structure such as the posterior part of the dorsal striatum posing a new conceptual cell element (CS-L4 neurons) for experimental and theoretical work of the cortical function. We also have established a new functional role of CS-L4.

POSTER 105

Meaning to Multiply: Electrophysiological Evidence of Semantic Memory Access and Organization for Multiplication in Children

Amandine Grenier, Ph.D. amandine.grenier@utsa.edu

Neuroscience

An analogy can be made between language and math. Language is composed of words that can be combined to form sentences that convey a message. Math is composed of numbers that can be combined with symbols (+, -, x, ÷) to form an equation (e.g., 2 x 4 = 8). These structure similarities might suggest that the brain processes math and language in similar ways. Event-related potentials (ERPs) provide a continuous measure of brain activity to address the cognitive mechanisms engaged during math processing in children. The current dissertation work found evidence that children treat multiplication facts as they would read words in a sentence whereas adults use a target detection strategy to verify multiplication equations quickly and efficiently. A series of experiments also explored how different experimental conditions (e.g., format of operands, different types of incorrect solutions, problems of varying difficulty) might influence how children treat and retrieve multiplication from memory. This research provides a foundation for bilingual arithmetic research in the developing brain and informs best practices for math education in the classroom.

POSTER 106

Investigating the Role of Matrix Mechanics, Pore Size, and Stromal Cell Density on Vascularization and Osteogenesis of Bone Tissue Engineering Constructs

Alisa Isaac, Ph.D. alisaisaac@rocketmail.com

Biomedical Engineering

Osteogenesis and angiogenesis are foundational interconnected events necessary for bone regeneration. Mesenchymal stem cells (MSCs) provide bio-physical and -chemical cues for the development of a robust vascular network. It has been hypothesized that factors such as temporal matrix mechanics, scaffold stiffness, and porosity come together to influence osteogenesis and vessel sprouting and growth over time. Hydroxyapatite (HA) porous scaffolds with porosity levels of 45 pores per inch (ppi) or 60 ppi, form the structural model system that we seed with MSCs to initiate osteogenic differentiation. 25:75 or 75:25 collagen:fibrin hydrogel blends seeded with microvascular fragments (MVFs), which are capillary fragments extracted from adipose tissue, are used as the vessel network source within the scaffold's porous interior. The objective of this study was to investigate the magnitude and potential coordinated effects of MSC number, matrix mechanics, and the changes in stiffness and mechanical strain fields created within different scaffold pore sizes, on the regulation of vessel network formation within developing bone matrix over time. Independent of pore size and MSC confluency, alkaline phosphatase (ALP) activity in 25:75 gels was immediate and sustained across time while in 75:25 gel groups, it was consistently lower until 7 days. ALP activity is indicative of osteogenic differentiation; thus, the 25:75 gels significantly supported osteogenesis compared to the 75:25 gels. Greater vascularization was observed for the 25:75 group when compared across 75:25 groups. For both groups however, greater vascularization was observed at lower MSC confluency, likely a result of less residual matrix contraction upon scaffold decalcification.

POSTER 107

EVE: Environmental Adaptive Neural Network Models for Low-power Energy Harvesting System

Sahidul Islam, Ph.D. sahidul.islam@utsa.edu

Computer Science

There are increasing demands on executing the deep neural network (DNN) models on Energy harvesting (EH) devices with limited memory and computing resource. A DNN inference need to adapt with they varying environment, since the latency on energy harvesting device highly depends on the environment it is performing. Therefore, an inference adapting to the environment is much more intelligent inference, bringing out the direction of scalable adaptive inference. Adaptive inference requires multiple models to be deployed in same device which is difficult to achieve because even a single model requires rigorous compression to deploy in EH device. Pattern-based pruning not only opens up the opportunity to eliminate redundant information but also allowed us to provide flexible scalability of a deep neural network.

POSTER 108

Quantifying the Effects of Seismic Loading History on the Collapse Behavior of Concrete Columns

Seyed Sasan Khedmatgozar Dolati, seyedsasan.khedmatgozardolati@utsa.edu

Ph.D. Candidate - Structural Engineering

Experimental studies have indicated that the lateral and axial behaviors of concrete columns under seismic excitation can be highly dependent on loading history, particularly at high-damage states. However, due to cost limitations, most experiments on concrete columns have used fully reversed cyclic loading protocols, with only limited tests in the literature exploring the effects of loading history on behavior. Consequently, current modeling parameters and acceptance criteria for assessing seismic vulnerability are based on typical reversed cyclic loading protocols, which can make them overly conservative for short duration or near-field motions, and possibly unconservative for long-duration ground motions generated in basins or subduction regions. Due to lack of experimental data, continuum finite element models were constructed covering a relatively wide range of column parameters and failure modes to explore the effects of loading history on both lateral and axial degradation of concrete columns. A first set of over 30 column models were constructed to replicate tested columns and calibrated to those experimental tests, which were conducted under varying lateral loading protocols. Selected columns sustained flexural-shear, shear, and flexural modes of lateral strength degradation. Columns were selected to cover a range of shear stresses, axial loads, transverse reinforcement spacings and ratios, and longitudinal reinforcement ratios. All tested columns sustained axial collapse. Calibrated column models were then subjected to a series of loading protocols, including monotonic pushover, and non-symmetric ratcheting protocols. The effects of the lateral loading protocols on damage progression, strength, and deformation capacities are identified and discussed for the columns.

POSTER 109

Comparative genomics reveal pathogen- and symbiont-specific genes in Francisella and Coxiella

Agatha Kolo, Ph.D. agatha.kolo@utsa.edu

Molecular Parasitology/Evolutionary genomics

Ticks are vectors of human and animal pathogens. Additionally, ticks harbor endosymbionts and other commensal bacteria. Coxiella and Francisella endosymbionts are tick-associated bacteria closely related to human pathogens Coxiella burnetii, the agent of Q fever, and Francisella tularensis, which causes tularemia. Prior studies showed genomes of endosymbionts encode genes for the synthesis of B vitamins and cofactors but have lost virulence-related genes. The aim of this study was to compare the genes present in pathogens and endosymbionts to identify metabolic pathways that have been differentially retained between the two lineages. The genome portal BioCyc was used to analyze the genomes of Francisella endosymbionts in Ornithodoros moubata and Argas arboreus ticks, pathogens F. tularensis subsp. tularensis and F. tularensis subsp. novicida, Coxiella endosymbiont in Rhipicephalus microplus, human pathogen C. burnetii RSA 493 Nine Mile phase I and laboratory strain C. burnetii RSA 439 Nine Mile phase II. Analysis showed that endosymbionts possess pathways for the biosynthesis of amino acids, transporters of inorganic ions, LolA-lipoprotein complex and Lipopolysaccharide (LPS). Some genes for the transport of LPS a major structural unit of gram-negative bacteria were notably absent in the genomes of pathogens. Metabolic processes absent from tick symbionts but present in pathogens include pathways for the metabolism of 2'-deoxycytidine, thymidine, inorganic nutrients, pyruvate and glucose oxidation. Additionally, virulence genes for outer membrane and periplasmic proteins were absent in symbiont genomes. This knowledge from the biochemical processes in endosymbionts could be useful in designing new approaches towards the control of ticks and tick-borne diseases.

POSTER 110

EV Charging Load Prediction Using a Hybrid Deep Learning Method: A Bi-LSTM Embedding Denoising Auto Encoder Transformer

Sahar Koohfar, sahar.koohfar@my.utsa.edu

Ph.D. Candidate - Civil Engineering

Time series data is a prevalent form of data found in various fields. It consists of a series of measurements taken over time. Forecasting is a crucial application of time series models, where future values are predicted based on historical data. Accurate forecasting is essential for making well-informed decisions across industries. When it comes to electric vehicles (EVs), precise predictions play a key role in planning infrastructure development, load balancing, and energy management. This study introduces a BI-LSTM embedding denoising autoencoder model (BDM) designed to address time series problems, focusing on short-term EV charging load prediction. The performance of the proposed model is evaluated by comparing it with benchmark models like Transformer, CNN, RNN, LSTM, and GRU. Based on the results of the study, the proposed model outperforms the benchmark models in four of the five-time steps, demonstrating its effectiveness for time series forecasting. This research makes a significant contribution to enhancing time series forecasting, thereby improving decision-making processes.

POSTER 111

AI-driven Transformer Model for Fault Prediction in Non-Linear Dynamic Automotive System

Priyanka Kumar, Ph.D. priyanka.kumar@utsa.edu

Computer Science

Fault detection in automotive engine systems is one of the most promising research areas. Several works have been done in the field of model-based fault diagnosis. Many researchers have discovered more advanced methods and algorithms for better fault detection on the highly nonlinear dynamic engine of any automotive system. In the modern era, misdiagnosis and robustness are major concerns in any automotive or diesel engine system for critical applications. The reason behind this is, that many manufacturers make their products and sell their vehicles all across the world. So, it is a challenging problem for manufacturers to come up with one resilient fault detection method with respect to wide variations in weather, different driving styles, heavy traffic conditions, etc. Second, with the advancement of technologies, the development of autonomous vehicles/engines is a special concern. The onboard computer needs to keep track of the engine's health without aid from a human operative. So, it is of utmost importance to come up with a self-aware system that will take care of their occupant's life and health by self-diagnosis and self-healing continuously. Here, we propose an AI–based fault classification and prediction model in the diesel engine. The main contribution of this paper is the diesel engine dataset and AI-based Transformer fault prediction model.

POSTER 112

FairFnSched: Mitigate Resource Contention between Serverless Functions

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Ph.D. Candidate - Computer Science

A looming obstacle in the realm of serverless computing involves the rising expenses linked to the infrastructure essential for managing the expanding scale of incoming traffic. This study introduces FairFnSched, a scheduler operating at the granularity of individual functions, with the primary objective of establishing equitable treatment among colocated functions in relation to the deterioration of performance. FairFnSched operates by intricately managing the allocation of CPU resources among colocated functions. The study demonstrates the effectiveness of FairFnSched and illustrates that, when compared to a heuristic approach, a method founded on the multi-armed bandit algorithm significantly enhances the impartiality among colocated functions.

POSTER 113

Supporting Latinx Student Success in STEM: Lesson Study at a Hispanic-Serving Institution

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Bicultural-Bilingual Studies

As Hispanic-Serving Institutions (HSI) strive to effectively support an increasingly diverse student body, efforts to create inclusive and equitable learning environments are imperative in STEM classrooms where retention and persistence of underrepresented students has been a long-standing challenge. The current study draws from a longitudinal National Science Foundation (NSF) funded project focused on curriculum reform and instructional innovation through STEM Lesson Study (LS) at an HSI in South Central Texas. This qualitative study aims to examine how Latinx students perceived and experienced the implementation of target lessons designed through Lesson Study (LS) in a lower-division engineering course. Data are drawn from student interviews (n=23) conducted immediately following each target lesson (n=4) across three semesters. Preliminary findings from this analysis showed Latinx students' positive attitudes towards increased interaction and peer-work in the classroom, instructors' modeling of problem solving, and access to academic support through tutoring. However, Latinx students reported gaps in their understanding of connections between theory and practice in the context of real-world situations and future career. Overall, findings suggest that shifts in traditional pedagogical approaches in large gateway engineering courses along with support structures like tutoring can enhance Latinx student learning experiences and foster inclusive learning environments.

POSTER 114

Exploring the Role of Motivation in Interdisciplinary Collaborations

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STEM Education

In STEM (Science, Technology, Engineering, and Mathematics) Education, there have been calls for STEM and Education departments to collaborate to secure funding and improve educational programs and outcomes. However, little is known about what drives and motivates individuals to participate in these interdisciplinary collaborations, beyond receiving grant funding. Given that intrinsic motivation can result in better performance, satisfaction, and well-being than extrinsic motivation, this study was guided by the Self-Determination Theory of Motivation (SDT) theoretical framework to explore individuals' motivations for engaging in Science/Engineering and Education interdisciplinary collaborations, and to what extent they perceived their collaboration supported autonomy, relatedness, and competence. Using a qualitative case study approach, 19 faculty, staff, postdocs, and graduate students were purposefully sampled using maximum variation from interdisciplinary collaborations across the U.S. Participants completed an interview, a card sort activity via Zoom, and an online Qualtrics survey. Interviews covered topics such as: the participant's background, involvement with their interdisciplinary project, the most/least interesting aspects of their work, autonomy (e.g., decision-making on their team), competence (e.g., accomplishing goals, learning), and relatedness (e.g., relationships with other team members). During the card sort activity, participants talked aloud as they arranged cards to describe what motivated their participation in their interdisciplinary collaboration. Data analysis with a co-coder will be guided by a priori SDT constructs, and patterns and themes will be constructed across participants. The findings of this study have the potential to inform faculty and universities on implementing and sustaining productive, supportive, and motivating interdisciplinary collaborations.

POSTER 115

Conductive Polymer Nanoparticles as Biocompatible Coatings for Neuronal Interfaces

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Biomedical and Chemical Engineering

The nervous system is characterized by its limited capacity for spontaneous regeneration and functional recovery after injury due to trauma or disease. Though it is known that neurons are electrogenic cells, electrical stimulation and conductive cues have been disregarded in tissue engineering and regenerative medicine approaches until recently. In this work, biomimetically synthesized conjugated conductive polymer nanoparticles (CCP-NPs) composed of 3,4-ethylenedioxythiophene (EDOT)-pyrrole copolymer were used as biocompatible hydrogel coatings for enhancing neuronal attachment and promoting cell differentiation. The biomimetic synthesis of EDOT-pyrrole copolymers doped with p-toluenesulfonic acid and poly(styrene sulfonate) (PSS) was carried out using hematin as catalyst. The obtained CCP-NPs were characterized by Raman spectroscopy, transmission electron microscopy and dynamic light scattering. Electrochemical properties were characterized by galvanostatic charge discharge, cyclic voltammetry, and electrochemical impedance spectroscopy. Hydrogels were further functionalized by covalent bonding of fibronectin or adsorption of CCP-NPs. The effect of hydrogel functionalization on mouse neuroblastoma x rat dorsal root ganglion neuron hybrid cell line (ND7/23) viability, attachment and differentiations was evaluated. CCP-NPs presented sizes in the range of 350-650 nm, good conductivity and pseudocapacitive behavior. Electrochemical properties could be further tuned by adjusting PSS molecular weight. ND7/23 cells seeded on non-coated hydrogels presented scarce attachment, while cells seeded on hydrogels coated with CCP-NPs presented good attachment and were able to differentiate. Moreover, cells seeded on CCP-NPs coated hydrogels presented viability values close to those found on cells seeded on conventional fibronectin-coated hydrogels. Biocompatible CCP-NPs fabricated here are appealing materials for obtaining electroconductive coatings and neuronal bio interfaces.

POSTER 116

Sensitivity-Enhanced Non-Destructive Evaluation Computations for Structural Health Monitoring (SHM)

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Mechanical Engineering

Traditional methods for obtaining the Probability of Detection (POD) curves in Structural Health Monitoring (SHM) systems are often costly and time-consuming. In this paper, we address these limitations and propose a new computational framework based on sensitivity analysis for obtaining the POD curve in guided-wave SHM systems. The new framework leverages the HYPercomplex Automatic Differentiation method (HYPAD) in conjunction with the Spectral Finite Elements Method (SFEM) to compute highly accurate derivatives of wave propagation phenomena with respect to mechanical properties, geometry, electrical properties of the piezoelectric transducers, and boundary conditions. The derivatives computed with HYPAD-SFEM are used in a Taylor Series-based Uncertainty Quantification (UQ) method to estimate the POD curve under nominal input conditions. Furthermore, we developed a surrogate model based on Taylor series expansion to predict the POD curve under varying input conditions without the need for additional simulations or experiments. The proposed methodology was demonstrated through an application study conducted on a plate with a localized defect using two piezoelectric transducers in a pitch and catch configuration. Overall, our proposed HYPAD-SFEM-UQ framework, and the Taylor series-based surrogate model presents a novel and time-efficient approach for computing accurate POD curves in guided-wave SHM systems. Furthermore, this approach facilitates the development of POD transfer functions to bridge the gap between controlled laboratory testing and the real-world operational conditions.

POSTER 117

Computational models of oscillatory neurons in the basal ganglia

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Computational Neuroscience

Basal ganglia circuits are thought to be important for movement, volition, and reinforcement learning. In a simplified picture, inputs arriving from cortical areas of the brain to the striatum are processed by many nuclei in the funnel-like architecture of the basal ganglia. All nuclei in the basal ganglia are populated by oscillatory neurons that fire spikes even in the absence of any input. The highly conserved firing properties of these neurons in the mammalian brain suggest they may provide an evolutionary advantage for its computational process; however, the advantage oscillatory firing confers remains unknown. In our laboratory, we found that synaptic inputs to these neurons alter spike timing with little or no effect on their mean spike rate. In addition, the effectiveness of an input at altering spike timing depends on the timing of the input on the oscillation. We captured the response of these neurons to input by experimentally measuring the phase resetting curve (PRC). The PRC describes how the neuron's responses to external inputs vary across the inter-spike interval. We then used the PRC to construct a phase model of each neuron. For the phase modeling approach, the neuron is fully described by its PRC and its intrinsic rate, which, when measured experimentally, are quite heterogeneous across neurons. Our phase models of each neuron provide accurate predictions of that neuron's spike timing responses to a wide range of stimuli.

POSTER 118

Assessing the impact of weathering, lithology and fluvial transport on Molybdenum and its isotopic composition (^{98}Mo) in Indian tropical river

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Earth Science

The stable molybdenum isotopes (^{98}Mo) in organic-rich marine sediments are often used as an important proxy to understand the changes in redox state of the earth's oceans and atmosphere over the past. However, these assessments are heavily dependent on the flux and isotopic composition of terrestrial Mo supply to the ocean derived from the dissolved riverine load. Some of the earlier studies have assumed that the isotopic composition of the dissolved Mo supply to the ocean has remained constant through the geological history of the earth, and very similar to the crustal components (^{98}Mo ~ 0‰). However, some of the recent studies have shown that the Mo isotopic composition of the riverine component is significantly heavier than the average continental crust, and susceptible to climatically and tectonically driven changes in weathering regimes. In order to understand the impact of lithology, redox transformations and terrestrial processes (e.g., weathering, secondary mineral formation, surface water-ground water interactions, anthropogenic input) on the Mo supply and ^{98}Mo isotopic composition on a spatial scale in tropical rivers, water samples from the Narmada and Tapi mainstream and tributaries of Narmada were collected. The contrasting variations documented in dissolved Mo composition in the Narmada and Tapi river water showed significant control of the congruent and incongruent weathering of differential bedrocks occurring at the drainage basin. An additional influence of redox transformation and ground water discharge was highlighted on the riverine Mo distribution. Further, riverine Mo flux into the ocean during dry pre-monsoon time was estimated in this study.

POSTER 119

CEO Performance-based Environmental, Social, and Governance (ESG) Vesting Provisions and Earnings Attributes

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Accounting

In this study, I examine the influence of CEO's performance-based options, stocks, and cash grants with environment, social, and governance (ESG) vesting provisions on seven attributes of earnings: accrual quality, predictability, smoothness, persistence, value relevance, timeliness, and conservatism. I find that grants with vesting provisions based on ESG performance metrics are associated with poorer earnings quality. When examining other attributes of earnings, I find some evidence that firms that award performance-based grants to their CEOs with ESG vesting provisions have less predictable earnings, less smooth earnings, less persistent earnings, and less relevant earnings. However, these results seem to be sensitive to model specifications. Supplementary analyses suggest that these findings are robust to alternate model specifications, including using a Heckman two-step approach to control for self-selection issues and fixed effects regressions, which control for time-invariant omitted factors. The findings from my study provide important insights regarding innovative ESG-based performance measures in contracting practices, which may be of interest to regulators and investors.

POSTER 120

Enantioconvergent Direct Decarboxylative Cyanation Enabled By Acridine And Copper Merged Catalysis

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Chemistry

Herein, we present a dual catalytic system for the direct decarboxylative cyanation from readily available carboxylic acids using acridine and copper catalysis. This simple yet efficient protocol averts the difficulties associated with pre-activation of carboxylic acids to redox active esters and sophisticated electocatalytic set up to perform this process. The reaction enables access to a broad range of functionalized benzylic cyanides in good to excellent yield and excellent enantioselectivity.

POSTER 121

Automatic Segmentation Of Abdominal Aortic Aneurysms From Computed Tomography Angiography Using A Deep Learning Algorithm

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Mechanical Engineering

Abdominal Aortic Aneurysm (AAA) is a significant public health problem that led to 172,427 deaths in 2019, which was an increase of 82.1% compared to 1990. Computed Tomography (CT) is the imaging modality of choice in most clinical centers to follow up AAA patients and for pre-surgical planning. Automated segmentation algorithms are typically efficient for lumen segmentation in contrast-enhanced CT images but are not reliable for outer wall segmentation. A deep learning pipeline is proposed to automate the segmentation of AAA in abdominal contrast-enhanced CT images. The lumen and outer wall segmentations of the AAA were trained using 3608 CT images, and validation was performed on 20 AAA patients' CT datasets. Moreover, the diameter and area of the lumen and outer wall were calculated automatically, showing high correspondence with ground truth images [r = 0.97 (area), r = 0.98 (diameter) for lumen] and [r = 0.98 (area), r = 0.98 (diameter) for outer wall], where r is the correlation coefficient. The segmentation analyses yielded average accuracies of 0.99 and 0.99, sensitivities of 0.96 and 0.96, precision of 0.95 and 0.96, Matthew's correlation coefficients of 0.95 and 0.96, dice coefficients of 0.95 and 0.96, specificities of 0.99 and 0.99, and Intersection Over Union scores of 0.91 and 0.92, for the lumen and outer wall, respectively. The time taken by the deep learning algorithm for a single CT image was 17±0.02 milliseconds when running on a computational platform with one GPU. This study was supported in part by NIH Award R01HL159300.

POSTER 122

Teaching Old Drugs New Tricks to Find Novel Anti-Coccidioides Antifungals

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PhD Candidate - Molecular Microbiology and Immunology

Annually ~350,000 people in the southwestern deserts of the United States are exposed to the dimorphic primary fungal pathogen Coccidioides the etiologic agents of coccidioidomycosis or Valley Fever. Spores are aerosolized by soil disturbance, and inhalation initiates a switch from a saprobic hyphae to parasitic spherules which will release hundreds of spores within the host. 40% of infections present flu-like symptoms, 5-10% will develop pulmonary sequelae, and 1-7% demonstrate progressive dissemination into the skin, bone marrow, joints, brain and other organs with mortality being >50%.

Only 11 drugs from 4 classes are FDA-approved for systemic mycoses, but treatment for coccidioidomycosis is limited to only two; the triazoles like Fluconazole (FLU) over the course of months or with Amphotericin B (AmB) in disseminated cases. In 2019 in Arizona, average treatment cost $64,800, ranging from $23,200 for uncomplicated pneumonia to $1.26 million in disseminated cases. Due to limited therapies, risk of drug resistance, high lifetime cost burden and the rapidly increasing incidence of coccidioidomycosis attributed to desertification, the need for novel anti-Coccidioides drugs is urgent. De novo antifungals are developed at a glacial pace of 12-20 years and cost billions of dollars to pass through clinical trials. To circumvent these issues our lab repurposes FDA-approved compounds to reduce the time, cost, and efforts to develop antifungals. This study seeks to delineate hit compounds in terms of inhibition, cytotoxicity, cytological profiles, and mechanism of action (MOA) to prepare for further preclinical analysis."

POSTER 123

Electrochemical Recovery of Cobalt from Lithium Cobalt Oxide in Choline Chloride:Ethylene Glycol Deep Eutectic Solvent

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Biomedical and Chemical Engineering

Herein, we study the process for energy efficient leaching of cobalt from LiCoO2 (LCO) using tailored ethaline DES and analyze the stability of, electrode and electrolyte components, for cobalt recovery using electro-deposition under high, - faradaic efficiencies and recovery rates. The composition of ethaline was altered from 1:2 to 1:5 by varying the mole fraction of ethylene glycol (HBD) to choline chloride (HBA) in the DES. Increase of HBD mole fraction decreases the surface tension of the ethaline DES which potentially increases the leaching and electrodeposition efficiencies. Optimum conditions like 160 °C and 48 hours were found to be effective in leaching ~100% of cobalt from LCO. The stability of the electrodes in ethaline DES was studied at different temperatures (20 °C, 35 °C, 50 °C and 70 °C) and time intervals (40 min, 60 min, 100 min and 180 min) of the electrodeposition process. The optimized system (copper cathode and stainless-steel anode) employing leachate obtained using 1:5 DES exhibited a faradaic efficiency of ~80 % with a specific metal recovery of ~0.8 mg hr-1 cm-2 at 50 °C under DC plating. The pulse plating on 1:5 DES leachate was also studied by controlling the pulse parameters (average current density (JAV), time for cathodic pulse (tc), time for anodic pulse (ta) and frequency (f)) to enhance the faradaic efficiency at 50 °C. The quality of film deposits and their purity and microstructure for uniform deposition were analyzed between DC plating and pulse plating.

POSTER 124

Spiking neuronal circuits with history dependence

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Neuroscience

Spiking models, typically memory-less due to spike resetting, contrast with evidence suggesting neurons exhibit history dependence. In this study, we designed a spiking neuronal analog circuit that incorporates history dependence. Building upon prior research showing scale-free, history-dependent adaptation in fractional order leaky integrate-and-fire and Hodgkin_Huxley models, we harnessed fractional order dynamics. This intrinsic memory trace mirrors neuron excitability. Utilizing super-capacitors, we constructed a history-dependent fractional order analog spiking circuit, capitalizing on their fractional order differentiation and memcapacitive memory properties. This analog circuits emulate various nonlinear firing rate attributes of neocortical neurons and optimizes encoding of natural stimuli. Notably, the circuit's response to constant input evinces prolonged first-spike latency and power-law adaptation. Additional analyses unveil history-dependent features in the firing rate response to oscillatory and square inputs. Our findings illuminate how a solitary spiking neuron can execute nonlinear computations sans intricate network interactions.

POSTER 125

Deep Transfer Learning for Prediction of Mechanical Behavior of Trabecular Bone

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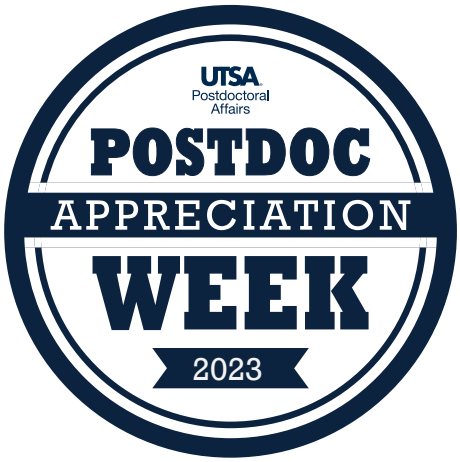
Mechanical Engineering

Current clinical prognosis/diagnosis of bone fracture risks mainly relies on measurement of bone mineral density (BMD). However, BMD is not reliable in bone fractures because such fractures are also sensitive to trabecular bone microstructures. Recent successes of deep learning in biomedical image-based diagnosis/prognosis of diseases have motivated us to investigate the possibility of using Deep learning (DL) techniques to build high-fidelity predictive models to assess bone fractures risks. The key obstacle for use of DL in clinical practices is that training a meaningful DL model requires a large dataset inclusive of all possible scenarios including input data and the associated labels or output data, which is difficult, if not impossible, to obtain. To address this challenge, our lab has recently developed a novel digital model to generate digital trabecular bone samples that can preserve major microarchitectural features of real bone samples at different anatomic locations. With this generative model, one can synthesize a large variety of trabecular microstructures. However, some discrepancy still exists between the digital and real bone samples. Dealing with similar problems, recent studies showed that transfer learning could relax the requirement that the training dataset must be independent and identically distributed with the test dataset, thus motivating us to use transfer learning to solve the problem. In this study, we intended to prove the concept of training a high fidelity QCT image-based deep transfer DL model using a sufficient source of generative data and limited number of real bone samples in prediction of the mechanical behavior of trabecular bone.



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We hope to see you again next year!