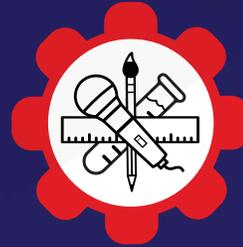


2019

GRADUATE
STUDENT



EXPO

Dr. Marshall “Chip” Montrose

Vice Provost and Dean of the Graduate School

Dr. James Mack

Associate Dean of the Graduate School

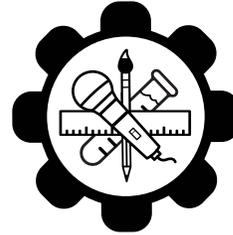
Dr. Yonatan Eyal

Director of Graduate Studies

Megan Tischner

Coordinator, Graduate Student Expo

**GRADUATE
STUDENT**



EXPO

WEDNESDAY, FEBRUARY 20, 2019

Participant Check-In	8 a.m.—9 a.m.
Creative Arts Gallery	9 a.m.—1 p.m.
Poster Session 1	9 a.m.—10:30 a.m.
Poster Session 2	10:30 a.m.—12 p.m.
Pizza Lunch	12 p.m.
Three Minute Thesis Competition	12:15 p.m.

ACKNOWLEDGEMENTS

The Graduate School would like to thank all judges for your time and thoughtful evaluations. The students you judge will use your feedback to craft improved artwork, posters, and research presentations in the future. We truly appreciate your service and hope that you take pride in the impact you've had on graduate student research here at UC.

We would also like to thank the faculty, librarians, departmental staff, fellow students and other persons who directly support the graduate students presenting today. Your continuing efforts make such wonderful graduate research possible.



1819

University of
CINCINNATI

OFFICE OF INNOVATION AWARDS

Since 2000, the Graduate Student Expo (formerly known as the Graduate Poster Forum) has been a venue for graduate students to share their research and scholarship with the UC community, while receiving feedback on their research communication skills. This year, the Graduate School connected with the Venture Lab to offer graduate student researchers additional exposure and opportunities for growth. Part of the 1819 Innovation Hub, the Venture Lab readies students, faculty, staff, and alumni to turn their entrepreneurial ideas into businesses.

From Graduate Student Expo participants, Venture Lab will select students for Office of Innovation Awards. The awards provide automatic entry into the Venture Lab seven-week pre-accelerator program (program participants are eligible for development funding of their project, up to \$5,000); 1819 Innovation Hub and Venture Lab merchandise; and consulting from “entrepreneurs in residence” on how to develop research into business opportunities.

Learn more about the 1819 Innovation Hub at uc1819.com.

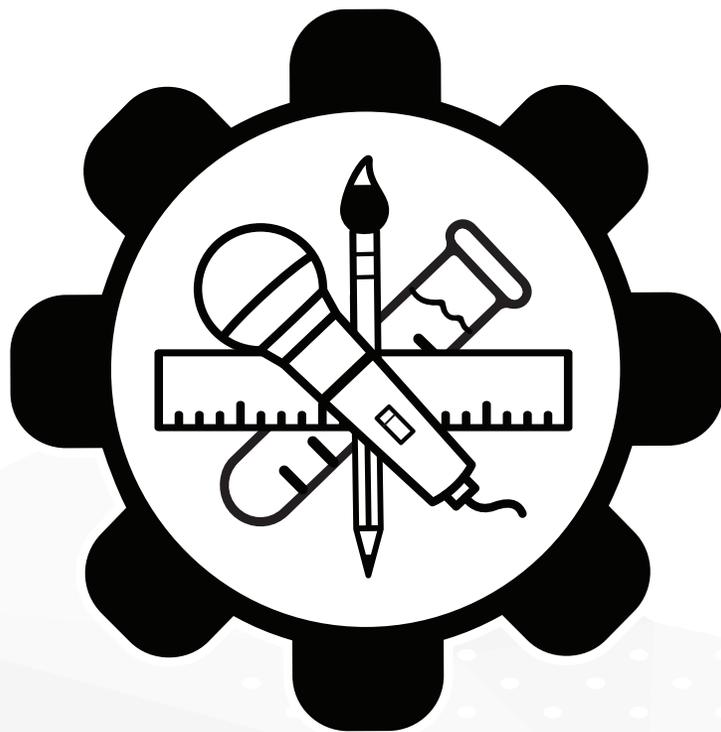


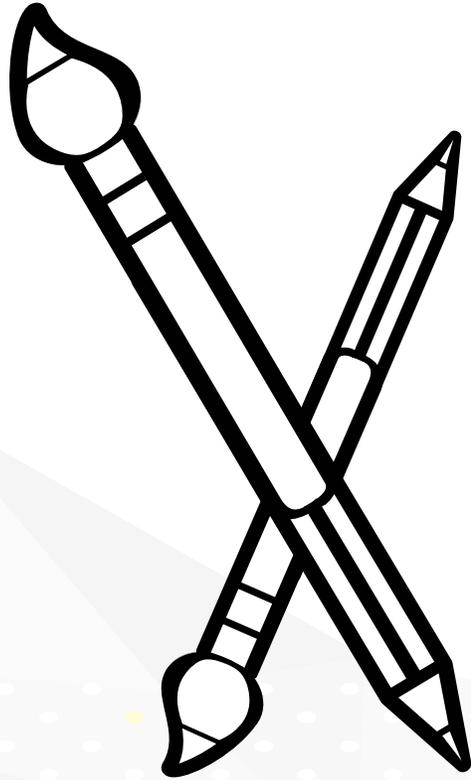
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10 Creative Arts Gallery Artist Statements

18 Poster Forum Abstracts

52 Three Minute Thesis Contestants

**CREATIVE
ARTS
GALLERY**



The Graduate Student Expo's ode to creativity and purely artistic endeavors, the Creative Arts Gallery displays graduate students' art, consisting of any media form. All artwork will be assessed by a single judge, and the judge's decision is final.



1

John Vosel

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Opticube

My work consists of common items related to industrial mass production. I receive objects resulting from surplus, inability to recycle, or material destined to a landfill—rejected to potentially gather dust or disintegrate over time. I digest objects, assembling and transforming the abandoned in to simple, comprehensible forms. I geometrically organize items in to universal shapes. My work is a condensation of wasted material, a way of processing what society does not. I'm interested in assigning new purpose and life to the elements I choose, providing them a unique trajectory and changing their identity. Sculptures I create meander in the delicate balance of beauty and ugliness in our world. In a time of resource inefficiency and mass production, my work is a language I use to navigate my environment of perpetual waste.

2

Jianna Lee

Architecture, MArch

Advisor: Kimberly Lawson

Cultural Corridor along Freedom Way, Cincinnati

The National Underground Railroad Freedom Center is a cultural asset, resting on Cincinnati's doorstep at the base of the historic Roebling Suspension Bridge. As part of ULI competition, the presented cityscape is built off of this anchor institution, creating a Cultural Corridor along Freedom Way that offers a variety of ways to experience the unique Cincinnati culture. The Queen of the West Culture Center in glass curtain wall is designed as a home to the renowned Cincinnati Ballet as well as local professional African dance company Bi-Okoto and LGBTQ youth choir Diverse City. Mosaic Ethnic Food Hall next to a Ferris wheel at riverfront is also a place to actively participate in a variety of cultural culinary traditions.

Amber Wasinski

Architecture, MArch

Advisor: Ed Mitchell, MArch

Casinos: The Performance of Architecture

The current globalized system is chaotic, unstable and nonlinear as a result of the increasing pervasiveness of technology in our daily lives. Our everyday is defined by smart phones, social media, cloud computing, artificial intelligence, large data sets, predictive algorithms, and ever-present sensors and cameras. These invisible networks not only provide the illusions of anonymity and absence of consequences (“promise of Las Vegas”), but the ability for a single person to have an unprecedented level of influence at the touch of their fingertips. What is the role of architecture within an increasingly digitized and globalized world, where the paradox of our contemporary condition is one of instability and disruption meets homogenization, standardization and commercialization? The built world is imagined as a network of architectural nodes across which our identity is dispersed and completely variable in the barrierless global landscape. These nodes are connected by intensity of energy rather than physical / architectural form and exist at a variation of scales (and may not even be architecture). We experience them as emotional narratives that mirror the continual creation/reconstruction and deconstruction of our physical world. A framework exists which defines these spaces, but the thesis investigates the continually changing / temporal architecture which supports the whims of our desires, using the casino and online dating as paradigms of this condition.

Smruti Deoghare

Biomedical Informatics, PhD

Advisor: Surya Prasath, PhD

Altered Identity

Does changing appearances alter who we are? Does it alter our identity or does it alter our essence? These discarded books are symbolic of how something can change in appearance, but in essence, it may or may not cease to be a book; it all depends on the viewer. This raises the question: should we or should we not judge a book by its cover?



5

Matthew Branham

Fine Arts, MFA

Advisor: Katie Parker, MFA

Technosexual Landscapes

Digital video. An absurd vignette of intimate encounters with technology, experienced through my childhood bedroom.

6

Muhammad Rahman

Architecture, PhD

Advisor: Aarati Kanekar, PhD

Photography, “Urban Poetics” & Paper Coasters, “From the Land of Rivers”

Growing up in the dense and rustic core of megacity Dhaka gave me ample exposure to the complexity of a city and its richness of culture. While my interests pulled me to study architecture and graphic design, I was accommodating my inquiry and interest for meaningful synthesis. I was also “reading” those spaces through a complex visual amalgamation of building facades, images, symbols, and tapestry of life—all those surely nurtured my keen and conceit interest towards the city along with its poetic cores. Photography allows me, as a traveler, to contemplate and lets me engage between visual narratives and create urban compositions.

With my interdisciplinary academic background, typography and its cultural connotations have always been my research pursuit. Hence, influence of Bengali letterform as a form of spontaneous calligraphic art found an immediate niche in my research on the significance of Bengali letterforms in Bangladesh. The historical meaning, cultural significance, and formal sophistication of the Bengali letterforms led me to create various arts using them in pattern making.

7

Manal Ahmad

Cosmetic Science, GC

Advisor: Kavssery Ananthapadmanabhan, PhD

Nature Soul

Photography of wild life.

8

Motahareh Saleminik

Design, MDes

Advisor: Claudia Rebola, PhD

Nationality Ban

Why would people's nationality be a barrier towards reaching their goals?



Shruti Arvind Jibhakate

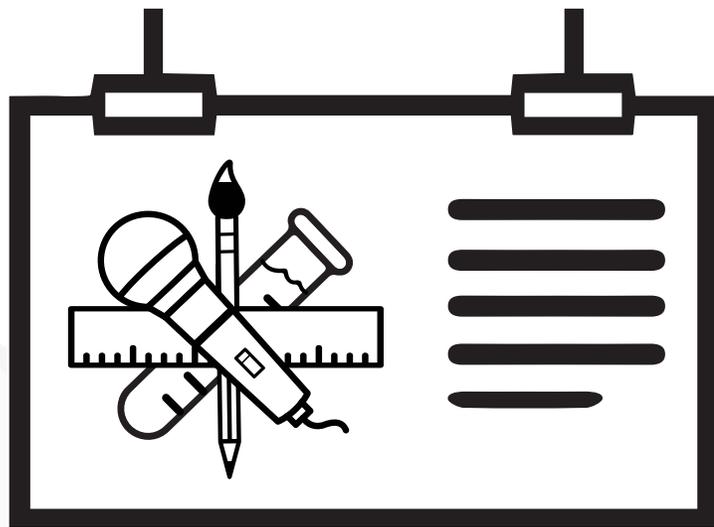
Business Analytics, MS

Advisor: Edward Winkofsky, PhD

Comfortable in My Own Skin

The painting is an expression of my experiences with the skin condition vitiligo over the years. It symbolizes empowerment, acceptance of being beautiful in a non-traditional way and gratitude for the love and support received from family and friends.

POSTER FORUM





All students who present research posters at the Graduate Student Expo are evaluated by two judges from the student's field or a related field. The judges' score sheets with comments and suggestions for improvement will be distributed to the participants following the event.

Hima Patel

Pharmaceutical Sciences/Biopharmaceutics, PhD
 Advisor: Joan Garrett, PhD

Resistance to BRAF and MEK Inhibitors in BRAFV600E-Mutant Melanoma

Melanoma five year survival rates are only 15% for patients with advanced disease. About 50% of melanomas contain the BRAF^{T1799A} transversion, which encodes for the constitutively active BRAF^{V600E} oncoprotein. Co-targeting the downstream MEK protein with a MEK inhibitor along with BRAF inhibitor are now approved as standard of care for patients harboring the BRAF-mutant melanoma. In spite of these successes, their long-term efficacy has been limited due to acquired resistance to these inhibitors. In order to study mechanisms underlying resistance, we generated dabrafenib (BRAF inhibitor) and trametinib (MEK inhibitor) resistant WM115 (WM115 TDR) and WM983 (WM983 TDR) cell lines by adding increasing concentration of the drugs to WM115 and WM983 cells with BRAF^{V600E} mutation (parental cells). We observed that the resistant cells undergo a change in their morphology and continue to remain viable over increasing doses of dabrafenib and trametinib as compared to parental cells demonstrated by MTT cell proliferation assay and Matrigel 3D assay. TDR cells demonstrated maintenance of p-ERK levels at 4 and 24 hours which under the same conditions p-ERK was inhibited in the parental cells. Current studies underway include RNA sequencing in order to decipher differentially expressed genes in the parental and TDR which could mediate resistance to BRAF and MEK inhibitors. Additionally we will examine phosphorylated receptor tyrosine kinases (RTKs) using an array to identify divergences among activation of RTKs in parental versus TDR cells. Deciphering causes of resistance to BRAF and MEK inhibitors will help in the development of novel mechanism-based interventions aiding long-term patient prospects in BRAF-mutant melanoma.

Samar Alanazi

Pharmaceutical Sciences/Biopharmaceutics, PhD
 Advisor: Joan Garrett, PhD

Mechanisms of HER3 Regulation upon Inhibition of HER2

HER2 is amplified in about 25% of breast cancers. HER3 plays a critical role in HER2 mediated tumorigenesis. We wished to investigate the effect of the pan HER inhibitor neratinib on HER2+ breast cancer cells. We examined the effect of neratinib on BT474 and SKBR3 HER2+ breast cancer lines on proliferation via crystal violet staining using 8 nM to 1000 nM neratinib and 1 μ M lapatinib as a control. Proliferation assays showed the inhibitory effect of neratinib on cell growth. We determined the effect of neratinib on HER2/HER3 signaling by immunoblots using antibodies against P-HER3, P-HER2, HER2, P-AKT, AKT, P-ERK, ERK, and actin as a loading control. There was a reduction in P-HER2, HER2, P-HER3, HER3 P-AKT, AKT, and P-ERK1/2 in both cell lines as assessed by immunoblots. We next sought to identify HER3 binding protein partners that could phosphorylate HER3 upon pharmacological inhibition of HER2. We have immunoaffinity-purified HER3 from BT474 and SKBR3 cells treated \pm neratinib. Following immunoprecipitation and washing of cross-linked complexes on beads coated with a HER3 antibody, binding partners were released by incubation with DTT and RIPA buffer. We have identified protein bands that are present upon inhibition of HER2 with neratinib and absent under DMSO control treatment from HER3 immunoprecipitates. Currently, mass spectrometry experiments are underway to determine the identity of proteins that bind HER3 upon neratinib treatment. In conclusion, these studies seek to mechanistically determine regulation of HER3 in the context of inhibition of HER2 in HER2+ breast cancers.

Yu-Jou Pai

Business Administration, PhD
 Advisor: Hui Guo, PhD

On the Stock Market Variance-Return or Price Relations: A Tale of Two Variances

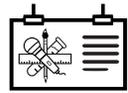
Stock market variance-return or price relations are sometimes negative and sometimes positive. We explain these puzzling findings using a model with two variances, “bad” and “good.” In the model, conditional equity premium depends positively on bad variance and negatively on good variance. Market prices, which correlate negatively with discount rates, decrease with bad variance and increase with good variance. Because market variance is the sum of bad and good variances, its relation to conditional equity premium or market prices can be negative or positive, depending on the relative importance of two variances. Our empirical results support the model’s main implications.

Safa Khodabakhsh

Materials Science, PhD
 Advisor: Ashley Paz y Puente, PhD

Gas Phase Alloying and Sintering Kinetics of Ni-based Scaffolds

In this work, gas-phase alloying of Al to pure Ni and Ni-Cr scaffolds via pack cementation and the resultant phases and Kirkendall pores are investigated. Metallic scaffolds are of interest of a variety applications such as heat exchangers and batteries, due to their low density and high surface area. However, complex hollow structures are difficult, if not impossible, to make using either traditional or newer methods like additive manufacturing due to issues like poor sintering, design difficulties and residual stresses. To overcome mentioned problems and achieve scaffolds with γ and γ' structure, in this work, pure Ni or Ni-Cr scaffolds are printed using particle-based ink extrusion and gas-phase alloyed via pack cementation to desired composition. Upon homogenization, Kirkendall pores and subsequently interconnected channels within the struts can form. The mechanisms and kinetics of sintering and gas-phase alloying and subsequently phase and pore formation and evolution during fabrication process will be discussed.



Elizabeth Jean-Baptiste

Educational Studies, PhD
Advisor: Lisa Vaughn, PhD

Enhancing Sign Language Interpreting Services in Kenya

The Kenya National Association of the Deaf and its stakeholders are engaged in a process to improve sign language interpreting services through a process framed in an Action Research approach. Their aim is to formalize standards that will regulate and guide the work of interpreters. These standards will further professionalize the field of interpreting and by extension, will ensure that deaf Kenyans have access to their linguistic and human rights.

Adam Jones

Geology, MS
Advisor: Daniel Sturmer, PhD

Sediment Routing and Provenance of Deep Marine Sandstones in the Late Paleozoic Oquirrh Basin, Utah

The objective of this study is to determine if diachronous subsidence altered sediment routing into the Late Paleozoic Oquirrh basin of central to northwest Utah using U-Pb detrital zircon geochronology. Middle Pennsylvanian tectonism east of the basin resulted in up to 1.75km of tectonic subsidence whereas Lower Permian tectonism west of the basin resulted in up to 0.5km of tectonic subsidence, contributing to an average total subsidence of 3.5km across the basin but with changing basin depocenters through time. Previous provenance studies have been limited to petrographic analysis leading to inconclusive sediment source areas due to the ubiquitous and mature, quartz-rich nature of facies. Early results from this study are consistent, and indicate mature, medium- to fine-grained quartz arenites, sublitharenites, and quartz wackes from a cratonic interior or recycled orogenic provenance. Published paleocurrent indicators suggest dominantly south-directed transport throughout the life of the basin. Therefore, U will conduct an initial U-Pb detrital zircon geochronology study aimed at identifying the source terrane(s) from which Oquirrh basin detrital zircons originated. These combined tools will provide a better constraint on depositional system evolution, which is critical both evaluating reservoir potential in exploration and populating lithofacies in reservoir models.

Lauren Street

Physics, PhD

Advisor: L.C.R. Wijewardhana, PhD

Analyzing Boson Stars Using the Variational Method

We use the variational method to analyze properties of gravitationally bound Bose Einstein condensates called boson stars which are potential candidates for dark matter. Using a set of qualitative and quantitative measures, we compare various ansatz found in the literature in order to determine the best fit solutions for a given regime or analysis. We then use the best fit ansatz found to further study these systems. Such studies include boson star decay rates and lifetimes, dense configurations, and both special and general relativistic corrections to the relevant equations of motion. We also analyze how multiple flavor dark matter theories can account for the galactic core density-radius scaling relation which can be found in the literature from observations of galactic profiles. Through these analyses we hope to gain insights into the viability of boson stars as possible candidates for dark matter and the possible parameter spaces in which these systems can be detected.

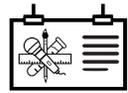
Samuel Garvey

Biological Sciences, MS

Advisor: Bruce C. Jayne, PhD

Unusual Dentition in the Northernmost Specimen of *Tylosaurus* (Squamata: Mosasauridae) Suggests Adaptation for Piscivory

Typically 5 m or more in length, mosasaurs were large aquatic lizards and cosmopolitan apex predators that lived during the Late Cretaceous (c. 100–66 Ma). In the Northern Hemisphere, the challenges of fieldwork in high latitudes have biased mosasaur collections such that a majority of mosasaur fossils are found within 0°–60°N paleolatitude. Herein, we report on the northernmost occurrence of a tylosaurine mosasaur from near Grande Prairie in Alberta, Canada (c. 86–79 Ma). Recovered from 62°N paleolatitude, this material (TMP 2014.011.0001) is assignable to the subfamily Tylosaurinae by exhibiting a cylindrical rostrum, broadly parallel-sided premaxillo-maxillary sutures, and overall homodonty. We further refer this material to *Tylosaurus* based on the lack of a dorsal mid-sagittal ridge on the premaxilla. Unexpectedly, TMP 2014.011.0001 exhibits widely spaced, high-aspect-ratio teeth, a seemingly juvenile condition, despite its adult age based on an estimated body length of at least 6 m. In contrast with the juvenile condition, the tooth sockets themselves are widely separated, a highly unusual characteristic for *Tylosaurus*. The specimen also exhibits interdental pitting and anterior maxillary tooth roots covered by downward extensions of the maxillary cortical bone, both features previously unknown in Tylosaurinae. Analogous dental morphologies in other non-mosasaurid taxa, as well as a standard model of tooth function based on tooth morphology, indicate TMP 2014.011.0001 may have been adapted exclusively for piscivory. This study suggests the possible presence of a Cretaceous boreal marine community that was distinct from those across the more southern stretches of the Western Interior Seaway.



Guillaume Labilloy

Biomedical Informatics, PhD
Advisor: Mayur Sarangdhar, PhD

Predicting Drug Response and Novel Therapeutic Candidates Using Signatures of Molecular Alterations in Hematologic Malignancies

Background: Hematologic malignancies present a varied genetic landscape. We developed a novel approach to determine the impact of signatures of molecular alterations on drug response.

Methods: Cell lines (n = 30) were annotated using Broad CCLE and Gnomad databases. Mutations were ranked into four groups based on predicted variant effect (high, medium, low, modifier). Drugs were annotated using Anatomical Therapeutic Classification, while pathways and targets were annotated using ToppGene Suite. Differential drug activity (DDA) was assessed using unsupervised learning. T-statistic was used to estimate significance of DDA, sensitive (viability <20%) vs resistant (viability >85%).

Results: We identified 25 clusters with significant DDA across the 30 cell lines. Corticosteroids clustered together by activity profile and showed most differential response across five cell lines with highest activity in RS4-11 (ALL) and Kasumi-1 (AML) and minimal activity in NB4 (Acute Myeloid Leukemia, AML), MV4-11 (Biphenotypic Acute Leukemia, BAL) and HL-60 (Acute Lymphoblastic Leukemia, ALL), $p = 6.10\text{-}27$. Loxapine, an antipsychotic that acts as a dopamine and serotonin 5-HT₂ antagonist, shared similar activity profile as corticosteroids ($p = 5.5\ 10\text{-}3$). A unique gene signature common to RS4-11 and Kasumi-1 included mutations in LOXHD1, FBN3, TRIB3, TDRD6, ALX4, ALDH3B2, NT5DC3, TTC3, ZFAT, and GLI2, with moderate variant effects impacting key hematologic processes.

Conclusions: This high-dimensional screening demonstrates a potential for correlating DDA with patient's genomic landscape and provides rationale for novel drug discovery and repositioning in precision medicine.

Samuel Woodburn

Neuroscience/Medical Science Scholars Interdisciplinary, PhD
Advisor: Eric Wohleb, PhD

Antidepressant-like Effects of Ketamine are Associated with Increased Brain-Derived Neurotrophic Factor (BDNF) in Prefrontal Cortical Microglia

Major depressive disorder (MDD) is a recurring psychiatric disease that causes significant disability and socioeconomic burdens. Standard therapies for MDD take weeks to be effective and many patients report no improvement in symptom severity. In contrast, subanesthetic doses of ketamine provide rapid and sustained antidepressant effects, shifting current treatment paradigms. Preclinical studies indicate that ketamine promotes brain-derived neurotrophic factor (BDNF) signaling and reverses synaptic loss in the medial prefrontal cortex (PFC), leading to antidepressant-like behavioral responses. Despite these findings, it is unclear which cell type drives this neurotrophic signaling. Recent studies indicate that brain-resident macrophages, termed microglia, can regulate neuroplasticity through release of BDNF. In this context, we hypothesized that microglial BDNF is a critical regulator of neuroplasticity following ketamine treatment. Here we report antidepressant-like behavioral effects and increased spine density in the medial PFC at 24 hours after ketamine treatment. Further, we show purified PFC microglia have increased mRNA levels of BDNF and decreased expression of immunoregulatory receptors Csf1r and Cd11b at 24 hours following ketamine administration. These initial studies implicate microglial BDNF in the synaptogenic and antidepressant-like effects of rapid-acting antidepressants. Future studies will use cell type-specific BDNF depletion to determine if microglial BDNF mediates these neurobiological responses. In all, these studies highlight an unappreciated neurotrophic role of microglia and suggest microglia may be utilized to promote antidepressant treatments.

Yu Zhang

Chemical Engineering, PhD
Advisor: Maobing Tu, PhD

Effect of Overliming and Activated Carbon Detoxification on Inhibitors Removal and Butanol Fermentation of Poplar Prehydrolysates

Lignocellulosic biomass as the most abundant sustainable resource can be converted into biofuels by enzymatic hydrolysis and subsequent microbial fermentation. However, considerable amount of inhibitory compounds were generated from the dilute acid pretreatment process. The carbonyl aldehydes and ketones have been suggested to the most potent inhibitors in the biomass prehydrolysate, which significantly limit the efficient utilization hemicellulose prehydrolysates. This study was aimed at the identification of these carbonyl inhibitors and their removal by overliming and activated carbon. Forty-six carbonyl compounds (including furans, aliphatic derivatives, aromatic monomers and aromatic dimers) were identified as potential inhibitors by gas chromatography-mass spectrometry (GC-MS). It was observed that overliming and activated carbon treatment could remove 73.9% and 82.2% of carbonyl inhibitors, respectively, but the treated prehydrolysates were still not fermentable. The sequential overliming and activated carbon removed 92.6% of carbonyl inhibitors and resulted in remarkable fermentability and high butanol yield (0.22 g/g sugar). The organic acid in the prehydrolysates were also analyzed by a liquid chromatography connected to a quadrupole time-of-flight (LC-Q-TOF) mass spectrometer. Activated carbon removed 92.9% phenolic acids, while overliming removed 40.2% of them. This study revealed the distinctive effects of overliming and activated carbon treatments on the prehydrolysates detoxification. Overliming removed more dialdehydes and diketones than activated carbon treatment, while activated carbon removed more phenolic acids than overliming.

Shreya Jasrapuria

Architecture, MArch
Advisor: Vincent F. Sansalone, MArch

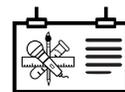
Refugee Rehabilitation Center

Can architecture be political? Pier Vittorio Aureli presents two very contradicting thoughts to answer this question of whether architecture can be political: (I) Architecture cannot be political: Architecture as a profession largely depends on the ideology of consensus. (II) Architecture is always political: Architectural forms always address a spatial condition and any spatial condition always implies an idea of the political.

St. Marks Church is a sanctuary space with a very specific religion and religious aspects associated with it. Changing its spatial conditions for a new program generates multiple political questions. Can a religious space be altered? What can a religious space be altered to while maintaining its sanctity? Should its sanctity be maintained? How would the people associated with that religion react to the alterations? And so on and so forth.

Down by Lake Osborne, deep in suburban Florida, there's a stillness and solitude Mamudul Hasson has not experienced in years. Among the damp grass, tall palms and gentle humidity, the 21-year-old Rohingya refugee takes a seat, staring at the ducks and lapping water. It's another world from what he left behind two weeks ago, and he's still in disbelief that he made it. Like many Rohingya refugees, Mamudul remembers in forensic detail the epic journey it took to get from his village of Maungdaw in Rakhine, Myanmar to Australia. In the final months of the Obama administration, the United States reached an agreement with Australia to resettle up to 1,200 men, women and children languishing in these centers.

Can St. Marks Church become a Rohingya Refugee Rehabilitation Camp?



Sanaiya Islam

Environmental Engineering, MS
Advisor: George A. Sorial, PhD

Removal of a Ternary Mixture of Trihalomethane Using Biotrickling Filter Seeded with Biosurfactant and Fungi

Trihalomethanes (THMs) constitute of chloroform (CF), bromodichloromethane (BDCM), dibromochloromethane (DBCM), and bromoform (BF). These are formed when the hydrogen atoms in methane are replaced with halogen ions like chloride and/or bromide. Humans are exposed to THMs via ingestion, cooking, bathing, swimming, and various other lifestyle factors. According to the Safe Drinking Water Act of 1974, the USEPA has established a maximum contaminant level (MCL) 4 for THMs. THMs concentration observed in groundwater is between 1 and 10 ppb and in surface water between 30 and 150 ppb. The exposure to THMs should be minimized due to their severe health and environmental impacts. In this study, the degradation characteristics of a ternary mixture of CF, BDCM, and DBCM is observed in a state of the art biotrickling filter in the presence of biosurfactant and fungi.

Eunhye Lee

San Sung Aum

Piano, DMA
Advisor: J. Michelle Conda, PhD

Repeat or No Repeat?

“Professor, do I need to repeat my sonata in my recital?”

You might ask this question to your professor or discuss with your friends. You might make your decision depending on the length of recital program. If you have a long program, you will skip it. If you do not have enough program, you might repeat it. However, why is there repeat sign? The repeat sign is not an invention. Over time, the sonata form had been developed and it has been used for making balance between exposition and development with recapitulation in sonata form.

So, do we need to repeat? And how can we play the repeat?

When you repeat, audiences can feel tonic key, and they can feel dominant key in development clearly. Mozart expert Robert Levin describes the repeat sign as back to the past in life. He said some people would live same life, but others would live differently. Like a time-machine, repeating provides an opportunity to express and reinterpret. When you repeat each time, your musical expressions would change. In this presentation, we will discuss the role of the repeat sign and whether to repeat the music or not through the discussion of Schubert sonata D.960. Moreover, we will demonstrate how to play differently when repeating through the music, piano sonata first movement of Mozart K.332, with discussion of a variety of performances. Through this discussion, you will understand repeating in sonata form and it will make for a better performance.

15

Neha Mann

Design, MDes

Advisor: Craig M. Vogel, MID

Demystifying Traditions

This interactive poster challenges the present day notions by retracing their origins with the aim of logically disproving these beliefs in today's context.

In rural India, menstruating women were barred from entering the kitchen and/or temples. Owing to the lack of hygiene products, it was an unmanageable unclean phase, and it rendered women socially isolated. However, in 2019, we have more access to low-cost products and practices, yet menstrual exclusion is practiced, resulting in harassment, low confidence, and reportedly death. This practice has been re-constructed over time, morphing a hygiene challenge into notions of impiety, disgust, and outcasting, which have been widely spread without the aforementioned context.

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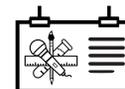
Zhenyuan Xu

Chemical Engineering, PhD

Advisor: Greg Harris, PhD

Deciphering the Interplay between Extracellular Matrix Cues and Schwann Cell Regenerative Capacity

Traumatic peripheral nerve injuries remain a serious problem in healthcare with few solutions for functional recoveries. A number of factors contribute to the lack of current therapies, including a damaged extracellular matrix (ECM) at the injury site and reduced regeneration capacity of cells following long-term denervation. Schwann cells (SCs), the major glial cell in the peripheral nervous system, are critical to nerve regeneration and possess a unique, stem cell-like regenerative capacity. However, the loss of regenerative capacity and how the ECM affects SCs has remained poorly understood. Therefore, we sought to examine the interplay between SCs and the ECM in the context of regenerative potential and cellular function. SC spreading, proliferation, dedifferentiation, and cell/nuclear elongation were monitored, and it was determined that a Young's modulus of 8.67 kPa and the ECM protein Laminin showed optimal promotion of regenerative factors *in vitro*. It was also found that cell spreading area and cell/nuclear elongation can promote SC dedifferentiation through a method of micropatterning highly precise, cell adhesive geometries on biomaterials. This data not only begins to uncover the significant interplay between the ECM and cellular function of SCs, but can also provide cues for the future optimal design of nerve guidance conduits in peripheral nerve repair.



17

Adekunle Adebisi

Civil Engineering, PhD
Advisor: Jiaqi Ma, PhD

Evaluating Opportunities to Provide Training Simulation for Snowplow Drivers

As government continues to decrease, the Ohio Department of Transportation (ODOT) is losing the seasoned full time drivers that have comprised the “snow warriors” of the past. Many of the replacements are auxiliary and seasonal drivers with little training. ODOT would like to enhance the current training offered by integrating a training simulation. The idea of simulation would allow drivers to experience the diverse driving conditions experienced on the road before taking out an actual plow truck. The overall goal of the project is to gain “experienced” drivers before they plow their first snow event. The project should lead to increased safety for the drivers and the motoring public. The purpose of Phase 1 of this research is to conduct an in-depth analysis of the current practices of different Departments of Transportation (DOTs), including ODOT’s current process for training snow and ice drivers, and then provide recommendations on how to enhance snowplow operator training with a driving simulator structure for more effective operations during winter. A benefit-cost analysis is also conducted to this effect to determine which of the alternatives proposed would have the most benefits with the least cost in the long run.

18

Mimi Liu

Physics, PhD
Advisor: Thomas L. Beck, PhD

Molecular Simulations and Computations of Potential Shifts across Water Surface

This poster attempts to show how temperature, cavity size, number of waters, the geometry of the simulation system, periodic boundary condition (PBC) and Ewald potential influence the net potential during the single-ion hydration process. There is more than one way to calculate the electric potential in classical molecular dynamics (MD) simulations. The studies have utilized methods ranging from radial distribution function (RDF), average charge density to direct testing by the program. Similar data gathered by those three different methods suggest that they all work well to get the potential. Besides, by employing zero integral of periodic Ewald potential over the unit simulation cell, approximate values of bulk potentials are calculated in order to avoid noisy fluctuations from the methods above.

Tong Han

Design, MDes

Advisor: Gerald Michaud, MA

How to Study the Audience Cognitive Mechanism of Objects: A Proposal for an Integrated Methodology

Any object that exists objectively in the physical world contains information. The information may be about the object itself or its environment. Humans' mental action or process of acquiring this information is the cognition of things. To understand the cognitive mechanism of the audience is extremely important for design activities. A new integrated method is proposed in this thesis to study the audience cognitive mechanism of objects at the visual level. Then the case studies, in which objects from science-fiction films are tested using the method, are illustrated. Based on the results, the principle, application, and value of the method are discussed.

Jiayao Chen

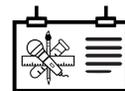
Design, MDes

Advisor: Craig M. Vogel, MID

Cultural Product Innovation: Cultural Transfer Methods as Inspiration for Chinese Product Development

The goal is to follow the culturally based product development process presented by Professor Xin and chose appropriate methods and tools to interpret the underlying meanings of Chinese artifacts, and then to transfer the decoded cultural elements into contemporary product designs. The design process and transfer methods should set an example for designers who aim to create culture-centered design, to guide them how to understand cultural traditions, and bring this knowledge to cultural innovation.

The significance of this thesis rests with the trend of investing in emerging markets and designing products based on unique cultures. Most designers or companies only consider customizing the products in color, pattern, packaging, and language to appeal to different cultures. However, products modified with these superficial changes are “not designed for the culture,” but “to take advantages of the culture.” By understanding the culturally based development process, not only will products resonant with people, but also the designers or companies can explore new opportunities in future markets.



Shima Dalirirad

Physics, PhD

Advisor: Andrew Steckl, PhD

Paper-based Biosensor for On-Site Detection of Stress Hormones in Body Fluids

A new aptamer-based lateral flow biosensor with three channels of strip assay has been designed and developed for on-site rapid detection of stress hormones in body fluids. Cortisol and dopamine in sweat, saliva, and urine have been identified as key biomarkers to monitor physiological stress. A highly sensitive and specific sensor was achieved by conjugating selective aptamers to the surface of gold nanoparticles (AuNPs). The presence of target in sample provides a red band in test lines of the device. The intensity of the red color in test line has a direct relation to the target concentration in sample. This hand-held device successfully exhibited a visual limit of detection of 1 ng/mL of cortisol in sweat (healthy physiological concentration 8–140 ng/mL) and 70 ng/mL (50–140 ng/mL) dopamine in urine. No significant cross reactivity to other stress biomarkers was observed. The resulting LFA aptasensor provides a rapid, sensitive, user-friendly and cost-effective point of care device for stress hormones detection in sweat and other biofluids.

Jason McCoy

Molecular Genetics, Biochemistry, & Microbiology, PhD

Advisor: Thomas B. Thompson, PhD

Structure of the WFIKKN2 Follistatin Domain and GDF8 Antagonism

Growth differentiation factor 8 (GDF8) is a potent negative regulator of skeletal muscle growth. Disruption of GDF8 signaling or injection of GDF8 inhibitors results in muscle hypertrophy. In contrast, overexpression of GDF8 causes muscle wasting. Thus, in animals, the balance of muscle mass is highly regulated by the level of active GDF8, both during development and in the adult. There has been a strong interest in developing therapeutics that target GDF8 to alleviate muscle wasting in a variety of diseases or to treat cancer cachexia. As such, anti-GDF8 therapeutics are within phase II/III clinical trials that target GDF8 or block signaling receptors. GDF8 is inhibited by several extracellular antagonists; one such antagonist, WFIKKN2, exhibits exceptional specificity for GDF8. Similar to the less specific Follistatin family of antagonists, WFIKKN2 utilizes a number of small modular domains including at least one follistatin domain (FSD). Although there is vast knowledge regarding the Follistatin family FSDs and how they contribute to GDF8 antagonism, very little is known about how the WFIKKN2 FSD interacts with GDF8. To address this, we isolated the WFIKKN2 FSD, characterized its binding interaction with GDF8, and solved the crystal structure. The structure revealed conserved, surface-exposed residues that, when mutated, reduced full-length WFIKKN2 antagonism of GDF8. Comparison of the WFIKKN2 FSD to follistatin and FSTL3 indicates that WFIKKN2 adopts a different conformation and utilized a different surface of the FSD to interact with GDF8. Collectively, the results highlight that although FSDs have conserved domain architecture, they exhibit unique functions in biology.

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Yuanhang Sun

Design, MDes

Advisor: Claudia Rebola, PhD

Human-Animal Companionship: Design Affordances of Communicating with Robots

Based on the current theory in human-robot interaction field, this thesis project aims to encourage humans to build long-term relationship with robots. Human-pet relationship is considered as a valuable companionship in this thesis.

The question this thesis aims to address is, "What is people's reactions to robotic pets during short-term interactions, and what kinds of communications during this experience would be possible to benefit establishing companion relationship with robotic pets?"

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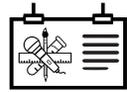
Zhaohu Fan

Business Administration, PhD

Advisor: Yan Yu, PhD

Bayesian Penalized Spline Estimation for Generalized Partially Linear Single Index Models Using JAGS

We develop a fully Bayesian framework for generalized partially linear single index models. We incorporate priors that effectively remove bias and reduce sensitivity to the number of basis. The parameter estimates from our Bayesian approach are numerically identical to the standard OLS estimates, but our approach delivers less standard error as opposed to the classical approach. Computationally scalable posterior inference is achieved using a Gibbs sampler with linear time complexity in the number of linear and nonlinear predictors. Our proposed Bayesian approach coded in JAGS is now readily available.



25

Erica Depasquale

Biomedical Informatics, PhD
Advisor: Nathan Salomonis, PhD

DoubletDecon: Cell-State Aware Removal of Single-Cell RNA-Seq Doublets

Platforms and methods for single-cell RNA sequencing (scRNA-seq) have greatly advanced in recent years. While thousands of single-cells are routinely captured, hybrid cell profiles consisting of two or more cells, also known as doublets, are difficult to distinguish from singlet profiles. We introduce DoubletDecon, a computational workflow that detects doublets with a combination of deconvolution analyses and the identification of unique cell-state gene expression. We demonstrate the ability of DoubletDecon to accurately identify synthetic, cell hashing and microscopy validated cell doublets from scRNA-Seq datasets of varying cellular complexity. DoubletDecon is able to account for covariates, such as cell-cycle effects, and is compatible with diverse species and unsupervised population detection algorithms (e.g., ICGS, Seurat). We believe this approach has the potential to become a standard quality control step for the accurate delineation of cell states.

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Samuel Linser

Physics, PhD
Advisor: Leigh M. Smith, PhD

Band Structure and Carrier Dynamics in InGaAs-InP Core-Shell Nanowires

We employ transient Rayleigh scattering (TRS) and photoluminescence (PL) to characterize the band structure of single Wurtzite InGaAs nanowires and InGaAs-InP core-shell nanowires. Employing ultrafast pump and probe pulses, our TRS measurements show a substantial increase in the carrier lifetime of the core-shell nanowires because of passivation of the InGaAs surface defects by the InP shell. PL measurements and fit TRS spectra indicate a band-edge of ~ 0.84 eV for the core-shell nanowires, blue-shifted by both strain and crystal phase effects relative to the equivalent Zincblende. Fit TRS spectra for the core-only nanowires are consistent with a band-edge ~ 0.80 eV. Preliminary thermalization dynamics extracted from our TRS spectra suggest a more rapid cooling of hot carriers in core-only nanowires compared to core-shell.

Zhaoran Liu

Design, MDes

Advisor: Steven J. Doehler, MA

How Can We Promote Sustainable Tourism-Behaviors Change through Persuasive Design

Tourism development is shifting from mass tourism to sustainable tourism because of its benefits to residents, tourists, and the environment. Persuasion for sustainability is not new. Notions like “green design” and “green technology” consider changing people’s habits through persuasive system design.

Starting from these facts, this thesis project aims to promote sustainable tourism through persuasive technology and the sustainable behavior change support system for tourism. The method of case study showed that some persuasive design exists in tourism programs to influence tourists’ behaviors, but some evaluations found a bad result because people don’t understand what factors trigger behavior change effectively and efficiently. Based on the analysis of behavior change specific theories and models, the tourists are divided into four levels from low to high, according to their current behaviors and attitudes towards tourism.

From the methodology of online questionnaires, in-person paper surveys, and interviews, the stage of the participants were identified. More important, the motivation behind behaviors of each level of tourists and the obstacles for them to behave more sustainably in tours were analyzed. Based on these findings, proper persuasive strategies were applied to create the persuasive system specifically for sustainable tourism.

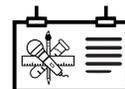
Anna Hutchinson

Curriculum & Instruction, EdD

Advisor: Helen Meyer, PhD

Chasing Scientific Literacy: An Analysis of Preservice Teacher Conceptual Development of the Nature of Science and Scientific Inquiry through Participatory Research

A conflated relationship between the nature of science (NOS) and scientific inquiry (SI) feed misconceptions that impede the advancement of science literacy within the context of the science classroom. The research questions to address the issue are, 1) how does teacher participation in authentic inquiry improve teacher beliefs of the NOS, 2) what changes occur in participant conceptions of inquiry through explicit reflective practice, and 3) what perceptions do teachers articulate concerning the pedagogical impact of authentic inquiry participation? This study is a secondary analysis of research on the effect participation in authentic inquiry had on developing conceptual change for teacher pedagogy. Study data were gathered from 12 preservice teacher participants, who participated in an authentic research experience, explicit reflective topics, and pre- and post-reflections about inquiry beliefs. The data were analyzed to understand the ways in which authentic inquiry shape teachers’ actions and beliefs about inquiry pedagogy and the nature of science. Explicit reflective instruction created the structure within the methods course for teachers to make connections between theory and practice. From using a conceptual change framework to analyze teacher nature of science and scientific inquiry beliefs, results indicated a shift in beliefs about science as a theory and a range of ideas on how to support inquiry-based instruction.



Amanda Miller

Mechanical Engineering, MS
Advisor: Manish Kumar, PhD

Development of a Sensor Frame Harness Gait Assessment Device for Occupational Health in Construction

There are a high number of work related injuries within the construction field related to lifting heavy machinery and supplies. We present a novel approach to movement classification for injury prevention through applying an unscented Kalman filter and the data from seven inertial measurement units (IMU) that are located above and below the ankle, knee, and hip joints, which allows for the estimation of joint angles. Then the user is subjected to both walking movements and lifting objects from the ground where the information is recorded with a motion capture system and the IMU suite itself. Both ergonomic and non-ergonomic movements are studied for each of those cases, where non-ergonomic movements are considered to be repetitive bending and twisting movements, which have an increased risk of injury. The motion capture system will be used to assist in the calibration and validation of the results from the IMU suite. Using information from the IMU sensors, the position of the joints will be estimated, and if the person is in an ergonomically hazardous position, then haptic motors will provide feedback to the user at the problematic segment, alerting the user to adjust their position.

Cara Indiano

Design, MDes
Advisor: Samantha Krukowski, PhD

Rethinking How We Design Clothing for Mobility Disabilities

There is a stark lack of clothing choices for people with disabilities, with one critic making note that there are more clothing lines for pets than there are for those with disabilities. This fact becomes troubling when research shows that a lack of available clothing choices for those with mobility impairments renders them unable to participate in important social functions, which further isolates them from everyday life. To tackle this issue, it is important to address the methodological pitfalls within fashion design.

Chamindu Gunatilaka

Physics, PhD

Advisor: David B. Mast, PhD

Quantitative Analysis of Work of Breathing in Neonates with Bronchopulmonary Dysplasia Using CFD and Self-Gated UTE MRI

Bronchopulmonary dysplasia (BPD) is a chronic lung disease that affects premature newborns. BPD patients often experience airway narrowings and dynamic collapse, which increases the work of breathing. Currently, we do not have any reliable method to evaluate the daily work of breathing. The main objective of this research project is to quantify the effect of the central airway abnormalities on patient breathing effort using the magnetic resonance imaging (MRI) and computational fluid dynamics (CFD). Ultrashort echo time (UTE) MR images were acquired for 14 neonatal intensive care unit (NICU) patients and MRI was gated in to eight images during the breathing cycle. The MR images were registered to determine how the airway moves during the respiration cycle and the airflow rates of the left and right bronchi were determined using the MRI-derived lung volume change between inspiration and expiration; these parameters were used as the boundary conditions for the CFD. The patient specific CFD simulations indicate a wide range of energy expenditure values per day for the upper-airway, 1 J to 128 J, and for the trachea energy expenditure per day, 6 J to 740 J. It is significant that the upper-airway energy expenditure as a fraction of total airway energy expenditure was higher in BPD patients than controls and those with other patients (pulmonary hypoplasia and tracheoesophageal fistula).

Assem Dewidar

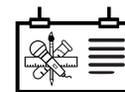
Environmental Engineering, MS

Advisor: George A. Sorial, PhD

Impact of Biosurfactants on Biodegradation of a Binary Mixture of Hydrophilic and Hydrophobic VOCs in Trickle Bed Air Biofilter

A gas-phase biofilter inoculated with aerobic consortia of fungi, isolated from a microbial community grown on hexanol vapor, was used in this study. A trickling bed air biofilter (TBAB) operated under acidic conditions was developed to degrade a binary mixture of hydrophobic and hydrophilic volatile organic compounds (VOCs) emit from a paint booth gaseous waste stream. Bio-additives were used to enhance the microbial transport within the medium bed and thus enhance the biodegradation efficiency. Surfactin (*Bacillus subtilis* cell-filtrate) was added frequently to the TBAB. In this study, we utilize the VSS concentrations and pressure drop measurements as potential markers to estimate the frequency of introducing the surfactin to the TBAB. Evaluation of the biofilter performance was investigated in this study including the following parameters: removal efficiency, elimination capacity, kinetics analysis, leachate TOC content, carbon mass balance, and nitrogen utilization.

Alternated periods of starvation and biosurfactants supply were tested to assess biomass growth and detachment. Pressure drop measurements and biomass content in the leachate water were daily measured to determine the washing efficiency of biosurfactants. Bio-additives were proven to be an efficient technique through washing the excess of biomass accumulated. This phenomenon was further demonstrated by the pressure drop measurements inside the TBAB. Parameters monitored are sensitive to biomass accumulation and expanded the techniques of biofiltration improvement towards an efficient biological system considering sufficient biomass activity and prevent clogging in likewise techniques.



Seyyedasadaf Pournia

Physics, PhD

Advisor: Leigh M. Smith, PhD

Energy Dependence of the Photogalvanic Effect in a Bi_2Se_3 Nanoflake Device

Bi_2Se_3 is a prototypical topological insulator exhibiting gapped bulk states with topologically protected conducting surface states. Here we study the linear photogalvanic effect (LPGE) in a Bi_2Se_3 nanoflake device as a function of energy from 0.3 to 1.8 eV. With the laser polarized parallel to the current, we measure a positive or negative response when the laser excitation is close to one of the contacts. Fixing the laser at the peak response, we measure the energy dependence of the LPGE as we scan from 0.3 eV to 1.8 eV.

Rachel Meyer

Anthropology, MA

Advisor: Brooke Crowley, PhD

Who Let the Dogs Out: An Isotopic Investigation of Canid Remains at a Late Fort Ancient Site in Southwestern Ohio

The Hahn archaeological site, which is located in southeastern Hamilton County, has yielded an unusual abundance of domesticated dog remains. Most of these date to between 1450 and 1690 A.D. (shortly after European contact) and were recovered from trash middens. Moreover, they display evidence of butchery and consumption by people and other canids. Were these dogs raised specifically for consumption or did they serve different purposes? I am using stable carbon and nitrogen isotope ratios in bones to determine the dogs' diet. For comparison, I am also analyzing wolves (a closely related wild faunivore) and deer (a common herbivore) that were also recovered from the Hahn site. Should the dogs have been bred solely for ritual consumption, they would have likely been fed a uniform diet, which may have included corn (an isotopically distinct food). Conversely, if dogs served different purposes, there should be more isotopic variability among individuals. This project will answer long-standing questions about the relationship between people and dogs in the Ohio Valley.

Anne Brant

Mechanical Engineering, PhD
 Advisor: Murali Sundaram, PhD

Molecular Dynamics Study of Direct Localized Overpotential Deposition for Nanoscale Electrochemical Additive Manufacturing of Metals

A quasi-deterministic molecular dynamics simulation was performed to study the migration and deposition behavior of ions under the influence of charged, constant-potential electrodes. The input parameters that were varied include tool radius, applied voltage, and concentration. The output parameters of the deposit that were evaluated included deposition height over time, number of atoms deposited over time, averaged current density, and two custom factors to evaluate quality of the localization of the deposit. The results show the influence of varying each process parameter while keeping the remaining ones fixed. The results show which values of tool radius, tool voltage, and concentration maximize or compromise deposition quality and speed. This work better contributes to predicting and controlling the performance of the nanoscale additive manufacturing process.

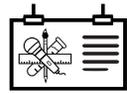
Qiyang Zhou

Design, MDes
 Advisor: Heekyoung Jung, PhD

Knowledge Sharing and E-Learning on Short Video Platform: A Case Study of Drawing

Social media, emphasizing user-generated content, has support knowledge and experience sharing among users. Applying user experience design principles, this thesis investigates the collaborative knowledge learning experience on the short video platform, which is emerging to be one of the most popular social media platforms in Asia. The study specifically chooses drawing, as it is a significant knowledge-sharing topic on the platform.

From the methods of design and content analysis, in-depth interview, comment analysis, survey, and user observation, this research explored users' learning objectives while they were involving on the platform, the actual experiences they had, and challenges they underwent. Findings showed that with the current design and strategy, users faced the problems of appropriate goals setting, approachable progress examination, credible guidance, and consistent motivation. They are the main factors decrease the user experience of knowledge sharing related activities. The design delivery proposed is to emphasize the effective social connection and interaction factors as well as credible evaluation system on the short video.



Zachary Sterner

Biological Sciences, PhD
Advisor: Daniel R. Buchholz, PhD

Role of Glucocorticoid Receptor in Development of *Xenopus tropicalis* tadpoles

All organisms experience stress, whether that is graduate school, temperature shift, or presence of predators. Stress during early life can have negative effects later in life to cause alterations in fitness, health, and development. In any environment, there are stressors, so understanding how this stress is mediated and affects development will allow better understanding of consequences associated with early-life stress. Stress is mediated through stress hormones, mainly corticosterone (CORT) in frogs, which also has a role in development. The main hormone in development that can induce almost all changes observed at metamorphosis is thyroid hormone (TH), but it alone does not account for all changes, which is where CORT may play a role. CORT can act through two different receptors, glucocorticoid receptor (GR) and mineralocorticoid receptor (MR). The goal of this study is to understand the role of GR in development. To answer this question, CRISPR gene disruption technology was utilized to produce a GR knockout line to study an organism lacking GR. Growth and development was measured comparing wild-type animals to knockout animals. Development was measured using an outlined set of stages and growth was measured via snout-vent length (SVL). We have shown that when compared to wild-type animals, GR knockouts develop at a faster rate until a certain stage and then their development stalls. GR knockouts ultimately die before the completion of metamorphosis, while wild-type animals survive. The reason for this switch in developmental rate in GR knockouts is unknown, but gene expression studies and other experiments will be conducted to attempt to answer that question.

Xinyi Cai

Design, MDes
Advisor: Brooke Brandewie, MS

Role-Play Game for STEAM Education

The STEM to STEAM movement has taken root over the past several years in China. As a designer, I saw an opportunity to make my contribution in STEAM education by combining some pedagogical element with game element.

Melanie Mckell

Immunology, PhD

Advisor: Joseph Qualls, PhD

L-Arginine Drives Anti-Mycobacterial Aerobic Glycolysis in Macrophages

An estimated one third of the world's population is currently infected with *Mycobacterium tuberculosis* (Mtb)—a pathogen that is becoming increasingly resistant to antibiotics. Advancing host-directed therapies aimed at boosting the immune system is expected to circumvent resistance and boost current therapies against antibiotic-sensitive mycobacteria. Therefore, a better understanding of how host defense to Mtb is regulated is critical to designing promising host-directed therapies. Upon inhalation, Mtb infects and resides within the lung macrophage—an immune cell critical to killing this pathogen when properly stimulated. A sufficient supply of the amino acid L-arginine to macrophages is necessary for host defense against Mtb. L-arginine-driven antimicrobial activity has previously been attributed to bactericidal nitric oxide (NO) production; however, we observe that NO-deficient macrophages can still facilitate mycobacterial killing in an L-arginine-dependent fashion, illuminating a critical NO-independent killing mechanism regulated by L-arginine. Additionally, we find that this killing mechanism requires glycolysis, linking for the first time L-arginine metabolism to glycolysis-associated mycobacterial defense. In conclusion, we find that L-arginine-mediated macrophage antimicrobial activity is dependent on glycolysis.

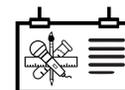
Hashim Aljohani

Molecular Genetics, Biochemistry, & Microbiology, PhD

Advisor: Peter J. Stambrook, PhD

The Role of Nrf2-Keap1 Pathway in the Survival of Circulating Metastatic Cancer Cells

About 90% of all cancer deaths arise from the metastatic spread of primary tumors. Of all the processes involved in carcinogenesis, the formation of metastases is clinically the most relevant, but the least understood at the molecular level. As a barrier to metastasis, cells normally undergo an apoptotic process known as “anoikis” in circulation. The recent technological advances in the isolation and characterization of rare circulating tumor cells (CTCs) will allow a better understanding of anoikis resistance. Detailed molecular and functional analyses of anoikis resistant cells may provide insight and help identify novel targets for prevention of cancer dissemination. To uncover the molecular changes that govern the transition from a primary lung tumor to a secondary metastasis and specifically the mechanisms by which CTCs survive in circulation, we carried out whole genome sequencing (WGS) of normal lung, primary tumors and the corresponding brain metastases from five patients with progressive metastatic NSCLC. We also isolated CTCs from patients with metastatic cancer and subject them to whole genome amplification and Sanger sequencing and quantitative digital PCR. While the primary tumors showed mutations in genes associated with cell adhesion and motility, brain metastases acquired mutations in adaptive and cytoprotective genes involved in the response to cellular stress such as Keap1, Nrf2, and E300, which are key players of the survival pathway. The identified mutations affect regulatory domains in all three proteins, suggesting a functional role in providing a survival advantage to CTCs in the peripheral blood allowing their dissemination to distant organs.



Rupal Jain

Biological Sciences, MS
Advisor: Dennis Grogan, PhD

Understanding DNA Repair and Tolerance Mechanisms in the Hyperthermophilic Crenarchaeon *Sulfolobus acidocaldarius*

Efficient DNA damage repair and tolerance pathways are vital to protect cellular DNA from an array of DNA damaging agents and preserve its integrity for future generations. Reactive oxygen species predominantly lead to the oxidation of deoxyguanosine in DNA to 8-oxo-7,8-dihydro-2'-deoxyguanine (8-oxoG). If left unrepaired, this often leaves a genetic mark in the form of G:C to T:A transversion mutation. The hyperthermophilic archaeon *Sulfolobus acidocaldarius*, despite its extreme optimal growth conditions of about 80°C and pH-3, is very efficient in preserving its genomic integrity, but the precise mechanisms are yet to be confirmed. This study investigated the contributions of two genes, Saci_1367 (ogg, encoding a putative DNA glycosylase) and Saci_0554 (dbh, encoding a translesion synthesis polymerase) to genome stability in *S. acidocaldarius*. A double mutant with disrupted ogg and dbh genes revealed a significant increase in the spontaneous mutation rate when compared to the single-mutant and wild-type strains, which indicates that the two genes operate in two distinct pathways to keep the mutation rate low. Similarly, the corresponding mutation spectra showed a significant increase in G:C to T:A mutations for each of the single mutant strains, but the double-mutant strain accumulated G:C to T:A mutations at a much higher rate, which suggests that in the absence of the two genes the organism is not efficient in avoiding the effects of 8-oxoG. This is the first study to reveal that genes associated with two metabolically different pathways cooperate to prevent the mutagenic effects of reactive oxygen species in one of the archaea.

Radhika Prabhakar

Electrical Engineering, PhD
Advisor: Je-Hyeong Bahk, PhD

Flexible and Scalable Thermoelectric Elastomers Based On Carbon Nanotube-Polydimethylsiloxane (CNT:PDMS) Composites

State-of-the-art thermoelectric (TE) materials are mostly inorganic, which are rigid, toxic, and expensive, and often involve complex high-energy processing. As new thermoelectric materials are extensively researched, there is an increasing interest in the development of flexible thermoelectric materials based on organic materials and carbon nanotubes (CNT). These organic based materials have a lot of advantages such as low cost, non-toxicity, lightweight and mechanical flexibility. However, they still suffer from low carrier mobility, difficulties in doping, and poor scalability to large thicknesses. Therefore, polymer composites comprising an electrically and thermally insulating elastomer matrix with embedded conducting media can be promising candidates for cost-effective flexible thermoelectric materials. In this work, we report scalable solution synthesis and thermoelectric properties of single walled carbon nanotube (SWCNT)-polydimethylsiloxane (PDMS) composites. PDMS is a silicone-based non-conducting elastomer, which is highly flexible, solution-processable, scalable in production, and biocompatible. Randomly distributed SWCNT networks embedded in PDMS matrix provide electrical conduction paths based on percolation transport to achieve high electrical conductivity in the composites.

Motahareh Saleminik

Design, MDes

Advisor: Claudia Rebola, PhD

Companion Pet: Technologies to Extend Life

This project is focused on designing technologies for the older adult population and is funded by the National Science Foundation-NSF partnerships for innovation grant, “Next: Generation Robotic Intelligence that Provides Psycho-Social Support for Older Adults.” The grant is a collaboration with lead institution Brown University, Butler Hospital, University of Cincinnati, and industry partner Ageless Innovation (formerly Hasbro robotics).

In December 2015, Hasbro released the “Joy for All” robotic pet to the market, targeted as a companion to older adults. While the robotic pet has been successfully adopted by the older adult population, there are opportunities to provide novel insights into the nature of advanced human-robot interaction.

My contribution to this project is focusing on expanding the capabilities of the existing small robotic pet based on the results from over 50 one-on-one interviews with older adults accomplished by the Department of Behavioral and Social Sciences at Brown University. The goal is not only to provide companionship but support advanced functionalities related to designing care capabilities for older adults. Possible outcomes include new robots that provide better care for users (e.g., locating a missing object or locations), guide their actions (e.g., check their vitals, take medication), or help alleviate such psychological challenges as loneliness, boredom, and agitation.

Shuai Mu

Design, MDes

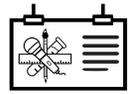
Advisor: Craig M. Vogel, MID

How Traditional Chinese Furniture Informs Modern Office Furniture Design

Traditional Chinese furniture is famous for its thousands of years of history, brilliant technique, attractive appearance, and far-reaching meanings. Ming-style furniture is one such example. However, the development of office furniture in China doesn’t evolve like traditional furniture. China started its office furniture business in modern times and has been deeply influenced by the western counterpart, which means the design of Chinese style office furniture is superficial.

The thesis is divided into two parts. The literature review is to understand the Ming-style furniture from its evident features, the reason behind its appearance, and the social, economic, technological, ideological, and geographical factors that influenced design. The research seeks to understand the physical and emotional needs in the Chinese public institution through observation, shadowing, interview, questionnaire, and so on.

In the conclusion, after interpreting the user’s behavior and the traditional artifact, the connections between them could be found. In the end, guidelines will be provided to instruct modern designers.



Wesley Parker

Geology, PhD

Advisor: Yurena Yanes, PhD

High-Resolution Reconstruction of the Medieval Climate Anomaly in the Subtropical Northeastern Atlantic Ocean

The Medieval Climate Anomaly (MCA; 900-1300 AD) is a well-known rapid climate episode which occurred during the late Holocene. It is characterized by significant warming of Europe and the North Atlantic and significant cooling in Central Asia and North America compared to the late 20th century. This event is recorded in a variety of paleoclimate proxies, however many of the previously studied proxies are single-season or low-resolution and are concentrated in mid to high latitudes of the Northern Hemisphere. Few high-resolution records are available from subtropical latitudes, such as the Canary Island Archipelago of Spain, located between 27 and 29 °N. The archipelago sits at the confluence of the West African upwelling zone and the Canary Current, making it an ideal location to study regional and hemispheric climate variability. In this study, the oxygen isotope composition of radiocarbon-dated archaeological shells of *Phorcus atratus* (Gastropoda: Trochoidea) was studied along shell growth direction to infer seasonal sea surface temperature (SST) over the last two millennia. Preliminary results indicate that the average sea surface temperatures during the MCA were ~2°C cooler than those in the 20th century, directly contradicting observed warming trends in continental Africa. This has been attributed to a strengthening of the NW African Upwelling Zone; however, recent carbon isotope data are inconsistent with enhanced upwelling and rather point to a larger scale hemispheric climatic reorganization during the MCA. Ongoing research is seeking to validate and constrain the causal factors and ecosystem responses to this climatic reorganization.

Samira Gaikwad

Educational Studies, PhD

Advisor: Dong-shin Shin, PhD

Journal of Second Language Writing: An Overview

The purpose of this poster is to provide an understanding of the various research areas being investigated in the field of second language writing during the period of 2014-2018. For this purpose, the *Journal of Second Language Writing* is reviewed. This poster aims to show the various theoretical frameworks used in the studies published in this journal and to understand how various linguistic categories found in L2 writing may relate to pedagogy and teaching. Similar to Juzwick's et al. (2006) study of the major trends within the field of writing research by analyzing journal articles, this poster looks at providing a broad understanding of what are current research areas of interest in L2 writing.

Andrea Schaaf

Communication, MA

Advisor: Pamara Chang, PhD

Tilt Brush: The Utilization of a Virtual Reality Intervention for Evaluating Self-Reported Anxiety, Depression, and Stress

Mental health disorders and concerns are highly prevalent among young adult populations, with specific attention being paid to anxiety, depression, and stress. With the ubiquitous nature of technology, many students utilize information communication technology devices on a daily basis and even more so turn to technology and social networking sites to express or relieve such feelings and/or symptoms. As this area of research grows, technological health interventions continue to become more prevalent and innovative. This particular research study focuses on the potential for Tilt Brush, an arts-based virtual reality application, to be used as a health intervention for college students that identify with symptoms of anxiety, depression, and/or stress. Results of this study will be used not only to identify the impact of Tilt Brush as a health intervention, but also to provide applicable findings for future studies and application designs.

Philippe Chauveau

Communication, MA

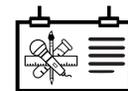
Advisor: Gail Fairhurst, PhD

Putting the Student Back in Student-Athlete? Managing Tensions in a College Sport Environment

The members of college basketball teams and other varsity sports teams are referred to as student-athletes, a term explicitly stating they are students first, and athletes second. However, due to the rising revenues associated with college basketball and especially March Madness, a debate as to whether student-athletes should see a cut of the pie, despite being amateurs, has risen to the forefront (Bilas, 2017; Giles, 2017; Labaton, 2017; Swanson, 2017).

Through a textual analysis of a 50-page document created under the sanction of the NCAA to assess college basketball, I am using Constitutive Paradox Theory (Putnam, Fairhurst, Banghart, 2016) to understand its underlying dynamics. For example, it is possible to see a family of sub-tensions associated with “student-athlete,” and preliminary readings have indicated at least three main sub-tensions stem from this concept (Academics-Athletics, Tradition/Status Quo-Possible Future, Sufficient-Insufficient Compensation). Several of the recommendations proposed by the CCB can be identified into one of the three overarching management strategies (either-or, both-and, more-than) proposed by Putnam et al. (2016).

The implications of this work are both theoretical and practical. Theoretically, I hope to contribute to existing research in paradoxes in the workplace, in a context that is rife with contradictions and difficulties managing them. Practically, the NCAA may use the results of this study as a guide to possible management strategies heretofore not considered by the organization.



Livia Helena de Moraes

Music Education, MM

Advisor: Amy C. Beegle, PhD

The Brazilian Pífano in a Public Elementary School in the United States: A Curriculum for Musical and Cultural Development

The purpose of this project is to create a music curriculum for 4th grade students from a public school in Cincinnati, Ohio using the pífano and World Music Pedagogy to achieve musicianship and cultural awareness. A small number of books indicate the use of pífano in a music education context with Brazilian traditional/regional tunes. For example, the book *Pifercussão* by Dornelles (2010) shows how pífanos and drums are played in Brazilian northeastern traditional culture. Although Dornelles' book is a rich ethnographic source, it is not specially designed to be implemented in an elementary school context. Presently, there is no instructional material that combines the use of Brazilian music with pífanos inside classrooms in the United States classrooms. Considering these issues, the present work addresses the following questions in relation to the population being studied:

- 1) What are the challenges of teaching the pífano (a type of Brazilian fife) to two fourth-grade classes using the World Music Pedagogy approach in a public elementary school in Cincinnati, Ohio?
- 2) How do these fourth-grade students respond to the Brazilian unit curriculum?
 - a. What are they learning about Brazilian music?
 - b. What are they learning about Brazilian culture?

Ahmet Kaynak

Biomedical Engineering, PhD

Advisor: Xiaoyang Qi, PhD

Electric Field Therapy for Glioblastoma: Modulation of Tumor Cell Surface Phosphatidylserine Levels

Glioblastoma multiform (GBM) is the most aggressive and prevalent malignant brain tumor and the median survival of GSB is only about 12–18 months. Phosphatidylserine (PS) is a prominent cancer cell biomarker that is intracellular in normal cells and is exposed on the outer surface of the tumor cells and vessels. In this study, we evaluate the electric fields (EFs) impact on surface PS changes of cancer cells. Although the cell-EFs interactions are poorly understood, one possible mechanism may involve an induced field in the cell membrane that increases the activity of calcium channels. Importantly, intracellular calcium concentration is one of the major regulators of surface PS exposure by regulating flippase activities in cancer cells. Therefore, this tests the hypothesis that EFs will increase the surface PS levels in the GBM cells with the long-term goal to enhance the treatment efficacy of PS-targeting drugs. Our results demonstrate differential effects of cell exposure to low vs. high EFs on the surface PS levels of U87/EGFR-Luc cells. Exposure to low EFs does not significantly affect PS surface levels at the initial time points and results in a significant decrease in the surface PS levels at 6 hrs ($p < 0.05$) (vs. baseline level). In contrast, exposure to high electric field results in the significantly greater surface PS levels for the entire time period ($p < 0.01$) and was significantly larger than the low-field values ($p < 0.05$). Here for the first time, we report that electric field can be used to sensitize the cancer cells against PS-selective targeting therapies, such as SapC-DOPS, by increasing the surface PS of cancer cells.

Tyler Boggs

Biological Sciences, PhD

Advisor: Joshua B. Gross, PhD

Elevated Hemoglobin Production May Mediate Adaptation to the Oxygen-Poor Environment of the Blind Mexican Cavefish, *Astyanax mexicanus*

The extreme cave environment of the Sierra de El Abra region in Mexico has driven many phenotypic adaptations, including pigmentation loss, eye regression, and metabolic efficiency. These traits have likely arisen through positive selection, or neutral mutation, in response to environmental pressures, including total absence of light and limited food. However, many cave pools demonstrate reduced levels of oxygen compared to the rivers and streams inhabited by closely-related surface-dwelling fish. We reason that limited oxygen likely exerts a strong selective pressure and that changes to blood physiology may have evolved in the cave morph. Prior studies revealing differences in blood physiology between cave and surface morphs support this notion. For instance, we discovered in-frame indel mutations in two blood-physiology related genes: myeloid leukemia factor 1 and plasminogen. Transcriptomic analyses similarly revealed significant expression level differences for numerous blood-related genes between morphs. To determine whether oxygen-carrying capacity is impacted in cavefish, we directly measured hemoglobin (Hb) concentrations in both morphotypes. Preliminary data shows that cavefish have significantly elevated Hb levels compared to surface fish. Moreover, this elevation is consistent across three geographically and genetically distinct cave localities. This result suggests that elevated Hb levels have been crucial for adapting to the extreme cave environment and these changes have evolved convergently across the landscape of natural cavefish localities. Further investigation into additional blood physiology dissimilarities will provide additional insight to the mechanisms of adaptation in cave-dwelling organisms.

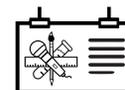
Mark Castleberry

Molecular Genetics, Biochemistry, & Microbiology, PhD

Advisor: William Sean Davidson, PhD

Functional Recombinant Apolipoprotein A5 that is Stable at High Concentrations at Physiological pH

Apolipoprotein (APO) A5 is a low-abundance exchangeable apolipoprotein that plays critical roles in human triglyceride metabolism. Indeed, aberrations in plasma concentration or structure of APOA5 are linked to hypertriglyceridemia, hyperchylomicronemia, myocardial infarction risk, obesity, and coronary artery disease. Given its extremely low levels in plasma, recombinant protein expression of APOA5 is an attractive approach for detailed study of its structure and function. While it has been successfully produced at low yield in bacteria, the resulting protein was of limited use due to low solubility under physiological buffer conditions. We hypothesized that the yield and solubility of this system could be increased by (i) engineering a fusion protein construct in a codon optimized expression vector and (ii) developing novel refolding protocols with screened buffer systems at physiological pH. The result was a high-yield (25 mg/L) bacterial expression system that produces lipid-free monomeric APOA5 at concentrations of up to 10 mg/ml at pH of 7.8 in ammonium bicarbonate buffer. The protein was functional in that it bound and emulsified multilamellar DMPC vesicles similarly to APOA1 on a mass basis. It was also capable of inhibiting a post-prandial increase in plasma triglycerides when injected into C57BL/6 mice gavaged with Intralipid (115±26 vs. 57±31 mg/dl/min with an intravenous injection of APOA5 to a 0.32 μM plasma concentration, P<0.05). Studies are now underway to assess the structure of this protein by crystallography screening and chemical cross-linking analysis. In addition, deletional and site directed mutagenesis studies will determine the regions of the molecule responsible for its lipid modulatory functions.



Dona-Dewmi Ekanayake

Chemistry, PhD

Advisor: Hairong Guan, PhD

Synthesis and Reactivity of Copper Complexes Supported by a Bis(phosphino)amine Ligand

Copper hydride complexes have gained attention due to the high selectivity and mildness in reducing organic molecules. In this study two new copper hydride complexes supported by iso propyl bis(phosphino)amine ligand and cyclohexyl bis(phosphino)amine ligand have been isolated and characterized. The synthesis of these complex involves hydrogenolysis of copper tert-Butoxide species. In the ^1H NMR of the iso propyl copper hydride complex, the assignment of the hydride peak was confirmed by comparing the ^1H NMR spectrum of the related iso propyl copper deuteride complex. Iso propyl copper hydride peak is a septet indicating this neutral copper hydride complex is a multinuclear species. Furthermore, ^{31}P $\{^1\text{H}\}$ NMR shows single peak at 1 ppm implying all the P atoms are equivalent. The X-ray crystal structure shows a hexameric core with $(\text{HN}(\text{CH}_2\text{CH}_2\text{P}(\text{Pr}_2)_2)_3\text{Cu}_6\text{H}_6$ formula. Reduction of carbon dioxide has been carried out with the copper hydride complex and the resulting copper formate complex has been isolated and characterized. Catalytic hydrogenation of aldehyde and ketones has been accomplished. Benzaldehyde and acetophenone insertion into the Cu-H bond also investigated and this afford the corresponding copper alkoxide products. The copper hydride complex also serves as an effective catalyst in the hydrogenation of benzaldehyde. The mechanism of the catalytic hydrogenation reaction is still under investigation.

Evan Reeder

Pharmaceutical Sciences/Biopharmaceutics, PhD

Advisor: Matthew Robson, PhD

Inhibition of Interleukin-1 Receptor Type 1 Signaling Blocks Astrocyte Reactivity Following Blast-Induced Traumatic Brain Injury

Traumatic Brain Injury (TBI) is a leading cause of disability in the United States, resulting in annual economic costs of over \$75 billion. Currently, there are no FDA approved medications aimed at mitigating the effects of acute injury or the chronic comorbidities of TBI. Those affected often suffer from chronic neuropsychiatric deficits including depression and social withdrawal. Neuroinflammation is a major component of secondary injury cascades and results in the generation of several proinflammatory cytokines including interleukin-1 α (IL-1 α) and interleukin-1 β (IL-1 β). IL-1 signaling is hypothesized to contribute to the formation of reactive astrocytes. We hypothesize that TBI increases IL-1 signaling driving reactive astrogliosis and that a blockade of IL-1-mediated signaling is a viable strategy to ameliorate TBI-induced reactive astrogliosis. Blast-induced TBI resulted in increased righting reflex times (RRT), acute decreases in locomotor activity, and prolonged social behavior deficits. Increased mRNA expression of il-1 α , il-1 β , and the IL-1 receptor (il-1r1) was found in cortical and hippocampal samples following TBI. Further, TBI resulted in increased mRNA expression and immunoreactivity of the astrocytic marker glial fibrillary acidic protein (GFAP) as compared to sham animals post-injury, indicative of reactive astrogliosis. Inhibition of interleukin-1 receptor associated kinase-4 (IRAK-4), a kinase downstream of IL-1R1, resulted in a reduction in gfap mRNA expression 24 hrs post-injury. To our knowledge, these are the first studies that indicate the targeting of signaling downstream of IL-1R1 may be a promising avenue for the development of pharmacotherapies aimed at treating the detrimental effects of TBI.

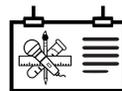
Emma Neybert

Business Administration, PhD

Advisor: Frank Kardes, PhD

Fake News: The Impact of a Distrust Mindset on Omission Neglect

Omission neglect occurs when consumers are insensitive to missing information and therefore form more extreme evaluations of products and ideas than if they possessed the full information set. This research seeks to promote a new procedure for debiasing omission neglect in consumers via the priming of a distrust mindset. Current research suggests that trust is the default mindset of consumers (Mayo, 2017). Trust mindsets encourage congruent processing, confirmatory biases, and accessibility effects, forming stronger associations between familiar concepts and ideas. However, when activated, a distrust mindset promotes the consideration of alternative explanations and incongruent processing. We hypothesize that fake news brings about associations that prime a distrust mindset. We theorize that by priming a distrust mindset via fake news, individuals will become less trusting and therefore more sensitive to omissions of information. The aim of this research is to posit a novel debiasing technique for the inaccurate weighting of attributes. This research contributes to the current understanding of how to activate the distrust mindset, potential mediation of omission neglect, and how fake news influences consumer judgments and evaluations on a daily basis.



Badriah Almutairi

Physics, PhD

Advisor: Punit Boolchand, PhD

Melt Dynamics and Topological Phases in Ternary $\text{Ge}_x\text{As}_x\text{S}_{100-2x}$ Bulk Glasses

Especially homogenized bulk $\text{Ge}_x\text{As}_x\text{S}_{(100-2x)}$ glasses were synthesized using FT-Raman profiling as an ex-situ probe to monitor synthesis. In all glasses synthesized, the variance in S concentration, $\langle x \rangle_S$, across the 1.5 gram batch was about 0.07%. We used Modulated Differential scanning Calorimetry to establish the enthalpy of relaxation at T_g , ΔH_{nr} , and also the fragility index of corresponding melts, $m(x)$. The results reveal ΔH_{nr} displays a square well like behavior, with the walls of the well onset near $x = x_r = 9.0\%$ representing the rigidity transition, and the end near $x = x_s = 16.0\%$ representing the stress transition. The range $x_r < x < x_s$ represents the reversibility window across which glass transitions become thermally reversing in character, and it defines the Intermediate Phase, while compositions at $x < 9\%$ are in the Flexible Phase, while these at $x > 17\%$ in the Stressed-Rigid Phase. The melt fragility index $m(x)$ variation reveal a Gaussian-like minimum with $m < 20$ in the $9.0\% < x < 17.0\%$ range, and $m > 20$ outside that range, thus defining this the fragility window as the $9.0\% < x < 17.0\%$ range. The reversibility window coinciding with the fragility window then carries the following message. Super-strong melts formed in the reversibility window give rise to isostatically rigid glasses. While fragile melts ($m > 20$) formed outside the fragility window give rise to either Flexible glasses or Stressed-rigid glasses.

Longwei Li

Design, MDes

Advisor: Claudia Rebola, PhD

A Study in International Cultural Sensitivity: How to Illuminate Barriers of Chinese International Students at DAAP to Access Better Mental Healthcare

Chinese international students face high rates of mental health (MH) concerns, but they demonstrate less help-seeking behaviors, such as seeking professional counseling. The underutilization of MH resources presents colleges and universities with a challenge.

This study is aimed at assessing the perceptions and the barriers of international Chinese graduate students in preventing them from accessing professional MH services at UC. The goal of this study is to create a toolkit that addresses cultural sensitivity to help these students easily conduct self-directed MH care in an early stage.

This study uses qualitative research methods to allow participants to express their experiences and perceptions of professional MH services extensively. Ten in-depth interviews were conducted with graduate Chinese international students at UC. These interviews included, but were not limited to, College of Design, Architecture, Art, and Planning (DAAP) students.

Two major cultural barriers preventing Chinese graduate students from accessing MH services are fear of stigma (loss of face) and language interpretation, influencing the low help-seeking rates among these students. Other barriers include limited knowledge of symptoms, concerns about therapy costs, lack of regular treatment time due to a busy academic schedule, and shortage of culturally appropriate services.

Yusra Zabarmawi

Physics, PhD

Advisor: Kay Kinoshita, PhD

Ionization Model to Predict the Clustering on Nucleotide Damage after High LET Radiation

This project aims to understand the origins of biological effects caused by different types of ionizing radiation. It is based on understanding the energy loss of charged particles when interacting with DNA. We also developed an experimental method (HPLC) to analyze and quantify damage in DNA (in nanoscale level - damage on nucleotide) by the different type of radiation (low and high LET).

Onyekachi Nwogu

Biomedical Informatics, PhD
 Advisor: Tesfaye Mersha, PhD

Analyzing Racial Disparity and Predicting Hospital Readmission Risk.

The objective of this project is to analyze racial disparities in asthma hospitalization and identify the important predictors for readmission. According to the Centers for Disease Control and Prevention, about 8.3 percent of the United States population are under the burden of asthma. About 46.9 percent of individuals with asthma have reported having one or more asthma attacks and a whopping 1.7 million emergency hospital visits occur because of asthma attacks. The introduction of electronic medical record (EMR) has transformed the healthcare system to one in which clinical data and other vital of information can now be used to help physicians deliver better care to patients and make informed decisions. As such, it has proven essential for clinical research and other research studies.

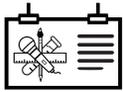
For this project, EMR data relating to patient asthma hospitalization was derived from Cincinnati Children's Hospital Medical Center from 2012 to 2017. The disparity between races (African American and white or Caucasians) was analyzed using descriptive statistics and Wilcox test. Based on each patient's readmission rates, unique patient encounters were grouped into two (frequent readmission and infrequent readmission). Three different machine-learning models (logistic regression, extreme gradient boosting, and random forest) were built, which used clinical and environmental data to predict readmission classes and obtain important predictor variables. A web application tool was built using shiny in R programming to visualize the result of this project and better explore the EMR data.

Steven Palladino

Physics, PhD
 Advisor: Colin Bischoff, PhD

B-Modes and BICEP Array

The theory of cosmic inflation predicts the existence of primordial gravitational waves created in the earliest moments of the universe. These waves would have left a unique imprint on the cosmic microwave background (CMB) known as B-modes. BICEP Array is a telescope currently in development across several institutions that will provide world-leading measurements of CMB B-modes. The group at the University of Cincinnati is developing a subsystem for BICEP Array known as the Housekeeping system. This electronics system will provide temperature control and temperature readout for the telescope which operates a cold stage focal plane at 250mK.



Miaoqi Li

Mathematical Sciences, PhD

Advisor: Emily L. Kang, PhD

Randomized Algorithms of Maximum Likelihood Estimation with Spatial Autoregressive Models for Large-Scale Networks

The spatial autoregressive (SAR) model is a classical model in spatial econometrics and has become an important tool in network analysis. However, with large-scale networks, existing methods of likelihood-based inference for the SAR model becomes computationally infeasible. We investigate maximum likelihood estimation for the SAR model with partially observed responses from large-scale networks. By taking advantage of recent developments in randomized numerical linear algebra, we derive efficient algorithms to estimate the spatial autocorrelation parameter in the SAR model. Compelling experimental results from extensive simulation and real data examples demonstrate empirically that the estimator obtained by our method, called the randomized maximum likelihood estimator (RMLE), outperforms the state of the art by giving smaller bias and standard error especially for large-scale problems with moderate spatial autocorrelation. The theoretical properties of the estimator are explored and consistency results are established.

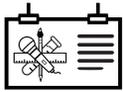
Mary Bedard

Cancer and Cell Biology, PhD

Advisor: Susanne Wells, PhD

3D Organotypic Rafts as an Authentic *In Vitro* Model for Pediatric Recurrent Respiratory Papillomatosis

Recurrent respiratory papillomatosis (RRP) is the most common benign neoplasm of the larynx in children and is characterized by variably sized benign epithelial neoplasms involving the respiratory tract. Frequent recurrence or rare progression to malignancy is associated with significant morbidity and mortality, with pediatric patients undergoing an average of 4 procedures in the first year alone and 20% requiring adjuvant medical therapy. Unfortunately, pharmaceutical options are limited and produce highly variable response. Together, the non-curative nature of surgical interventions and lack of effective therapeutic options place a burden on patient quality of life and the healthcare system. Low risk HPV strains 6 and 11 are known to cause RRP, but it is unclear what aspects of HPV infection and replication are associated with pathogenesis. While 2D monolayer cell systems are routinely used to study diseases *in vitro*, such models do not encompass the differentiated mucosa required for the HPV viral life cycle. To address this gap, we developed 3D organotypic epithelial raft models cultured from fresh RRP tumors and matched normal patient tissue. These 3D models recapitulate the complex differentiated epithelium allowing studies of the HPV life cycle. Characterization of the RRP phenotype in both 2D and 3D culture, framed in the context of an individual's clinical severity, establishes a basis for mechanistic studies to elucidate pathogenesis and for the screening of FDA-approved therapeutics. Preliminary data suggest that RRP and normal primary cells in 2D share a common transcriptome signature, and likewise RRP organotypic 3D rafts share morphologic features with RRP lesions *in vivo*.



Tzu-Chun Wu

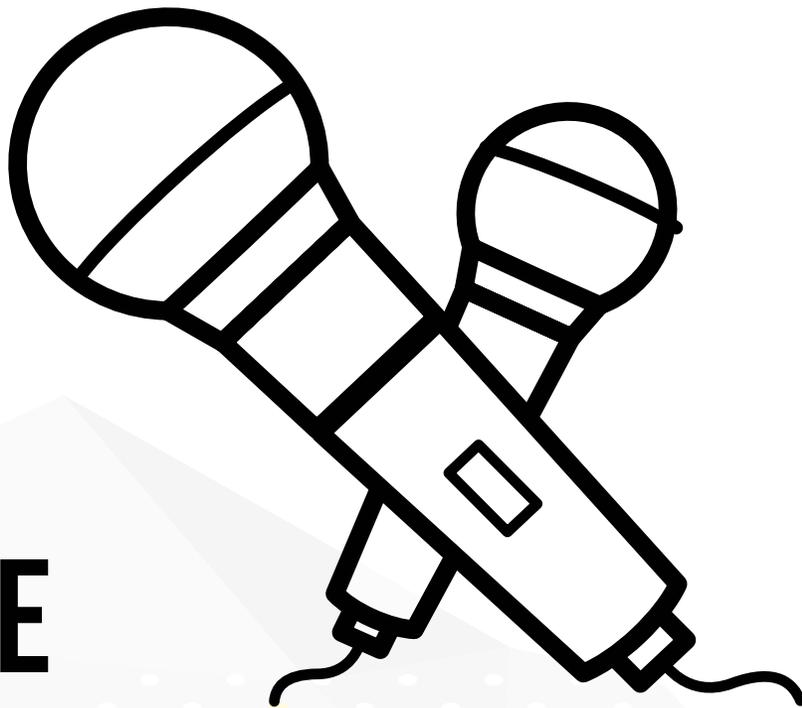
Mathematical Sciences, PhD

Advisor: Emily L. Kang, PhD

Semi-Parametric Dynamic Adaptive Robust Estimations for High-Dimensional Networks

Precision matrices are widely used to depict the dependence structure within a network in many applications. We propose a semiparametric method to estimate dynamic precision matrices in the high-dimensional setting. Our method for dynamic network estimation possesses the flexibility to characterize the changing precision matrix and provides robust inference under various distribution assumptions. An efficient algorithm via linear programming is developed to implement the method. We demonstrate the performance and advantages of the proposed method with extensive numerical studies.

**THREE
MINUTE
THESIS**



First developed by The University of Queensland, Australia in 2008, the international Three Minute Thesis competition challenges students to summarize their research or scholarship for a nonspecialist audience using only three minutes of speech and a single PowerPoint slide.

Three Minute Thesis presenters are listed alphabetically in this booklet. Visit grad.uc.edu/expo/3MT2019 for the presentation schedule.

AJ Adejare

Biomedical Informatics, PhD
Advisor: Mark Eckman, MD

Racial Disparities in Hemodialysis Patient Utilities

Health disparities exist between African Americans and Caucasians. These disparities are apparent in kidney diseases where African Americans are four times as likely to be hospitalized compared to their Caucasian counterparts. We want to investigate these disparities for dialysis patients' preferences and values for various health conditions to improve shared decision making for patients.

Gulnaaz Afzal

Aerospace Engineering and Engineering Mechanics, MS
Advisor: Michael Alexander-Ramos, PhD

Robust Co-Design Methods for Hybrid Electric UAVs

The optimization of dynamic systems requires an integrated approach: one that accounts for the coupling between the physical design and control. These methods are known as combined optimal design and control (co-design), and they offer optimal performance with reduced development time and cost by concurrent design avoiding sequential and iterative design cycles. In dynamic systems, it is pivotal to account for the inherent uncertainties present. Overlooking the uncertainty in the system yields suboptimal or even infeasible results. To address this issue, stochastic problem formulations are used to account for the uncertainties in both the decision variables and the parameters of dynamic systems. Thus, this work aims to determine the optimal design and control strategy solution for a power-split Hybrid Electric Propulsion System (HEPS) in MALE UAV applications under uncertainty using robust co-design methods. Particularly, the robust design optimization problem formulation is implemented within the multi-disciplinary dynamic system design optimization (MDSDO) method to implement and solve the stochastic co-design problem.

Samar Alanazi

Pharmaceutical Sciences, PhD
Advisor: Joan Garrett, PhD

Mechanisms of HER3 Regulation upon Inhibition of HER2

My research project focuses on HER2 positive breast cancer. I am trying to identify mechanisms of HER3 regulation upon inhibition of HER2 with irreversible pan HER inhibitor (Neratinib).

Hashim Aljohani

Molecular Genetics, Biochemistry, and Microbiology, PhD
Advisor: Peter Stambrook, PhD

Aiming at the Achilles Heel of Cancer Spread

Approximately 90% of all cancer deaths arise from the metastatic spread of primary tumors. Of all the processes involved in carcinogenesis, local invasion and the formation of metastases are clinically the most relevant, but they are the least well understood at the molecular level. My research provide insight into the biology of cancer metastasis and helps identify novel targets for prevention of cancer dissemination.



Maryam Alsameen

Physics, PhD

Advisor: Mark DiFrancesco, PhD

Neuronal Activation in Working Memory Induced by Chronic Sleep Restriction in Adolescents

The overall objectives of this research study is to investigate the brain networks in adolescents associated with performance of a working memory task.

Alireza Asgari Hadad

Civil Engineering, PhD

Advisor: Patrick J. Fortney, PhD

A New Resilient Bracing System for Structures

The concept of resilience is routinely used in research in disciplines ranging from environmental research to materials science and engineering, psychology, sociology, and economics. Resilience, according to the dictionary, means “the ability to recover from (or to resist being affected by) some shock, insult, or disturbance.”

Steel frame structural systems have been widely used in the United States for mid- to high-rise structures. The use of traditional structural bracing against seismic (earthquake) loading has its own challenges, such as compression buckling and permanent deformation. It means that they are unable to recover their original shape after unloading, which results in permanent residual deformations in the structure. Not only will these permanent deformations make the repair of the structure more difficult, they will also accumulate from aftershocks or subsequent earthquakes, resulting in severe damage or collapse of the structure.

Thus developing a structural system that remains functional after an earthquake, needs only a short repair time (should damage occur), and finally has multiple load paths to carry the load can bring resiliency to the seismic design of structures.

Mohammad Behtash

Mechanical Engineering, PhD

Advisor: Michael Alexander-Ramos, PhD

A Decomposition-based Multidisciplinary Dynamic System Design Optimization Algorithm for Large-Scale Dynamic System Co-Design

Design of dynamic systems incorporating physical and control parts should be performed in an integrated way to yield system-level optimal solutions. Conventionally, these systems are designed in a sequential way that usually fails to produce system-level optimal solutions; however, combined design and control (co-design) methods are able to find the superior optimal solutions by considering the interactions among the plant and control parts. Small-scale to moderate-scale dynamic systems can be effectively addressed by contemporary co-design methods: simultaneous and nested, nonetheless, these methods might be impractical or even impossible to apply to large-scale systems which may hinder us from obtaining the optimal solutions. To address this issue, this work combines a decomposition-based optimization algorithm with a current co-design method to optimize such systems. Specifically, the proposed formulation combines a decomposition-based optimization strategy known as Analytical Target Cascading (ATC) with a current co-design method known as Multidisciplinary Dynamic System Design Optimization (MDSDO) for co-design of a plug-in hybrid electric vehicle (PHEV) powertrain. Moreover, since most of dynamic systems incorporate time-dependent linking variables among their subsystems, a new consistency measure has also been introduced to manage such quantities. To validate the accuracy of the new formulation, PHEV powertrain co-design has been done with both ATC and the simultaneous formulation to compare the optimal solutions. Results reveal that the proposed formulation for co-design of large-scale dynamic systems is able to capture the system-level optimal solution as well as its contemporary counterpart.

Meryem Belkadi

Community Planning, MCP

Advisor: David Edelman, PhD

Slums in Morocco

Analyzing the financial tools aimed at households in slum clearance policies in Morocco.



Emily Cady

Chemical Engineering, MS
Advisor: Greg Harris, PhD

Engineering a Micropatterned Surface for the Organization of a Cell-Derived ECM for Applications in Dermal Wound Healing

The skin is the largest, most exposed organ in the human body, yet it lacks sufficient therapies for reduced scarring in severe injuries. Therefore, the overall objective of this project is to engineer a micropatterned, biocompatible surface that will guide the organization of a cell-derived extracellular matrix (ECM) surface to aid in dermal wound healing and reduce scarring. A cell-derived bioactive surface holds high potential in wound repair applications by promoting regrowth of skin tissue in severe, large surface area dermal wounds while also minimizing the risk of immune rejection and infection. The ECM is an imperative component to each unique tissue in the body, operating as a bioactive scaffold that organizes and aligns cells based on each tissue's function and characteristics. While the importance and function of the ECM is well discussed in published literature, the effect of substrate topography on the organization of a cell-derived ECM as a potential bioactive surface for guiding alignment and migration of cells has not been well studied. The engineered substrate and guided assembly of a cell-derived ECM holds potential to lead to highly controlled organization and migration of cells for ultimate use in tissue regeneration and healing of skin.

Xinyi Cai

Design, MDes
Advisor: Brooke Brandewie, MS

Educational Game Design

STEAM education is drawing more and more attention in China. In addition, game-based learning is being used in STEAM education a lot. In this study, some analog and digital educational games will be analyzed to find a game model (game elements and game mechanics) which can be used in pedagogy area suitably.

Vasuretha Chandar

Biomedical Engineering, MEng
Advisor: Daria Narmoneva, PhD

Effects of Electrotherapy on Diabetic Wound Healing

Diabetes is a major metabolic disorder affecting nearly 30.3 million people in the U.S. alone, with an annual expenditure of more than \$25 billion for treatment. Chronic non-healing diabetic ulcers represent one of the key complications, responsible for 60% of traumatic lower limb amputations. Existing treatment options for diabetic wounds are often ineffective, invasive, and expensive.

Recent studies by our group have discovered a novel wireless modality of high frequency electric field (EF) that enhances diabetic wound healing by improving vascularization (blood supply) and reducing inflammation as compared to normal wounds. Ultimately, this novel non-contact, non-invasive therapy will result in reduced hospital stay and nursing time and have a significant impact on wound care costs.

Jiayao Chen

Design, MDes
Advisor: Craig Vogel, MID

Culture and Design Elements Research Based on Chinese Dinnerware Innovation: Cultural DNA Analysis in “Yongle Period”

This thesis project examines how to interpret the underlying meaning of Chinese traditions in “Yongle period” and transfer the decoded cultural elements into contemporary product designs. This is a theoretical thesis project supported by Chinese dinnerware innovation. Design discussions were proposed to create a cultural DNA bank for Chinese traditions, which can improve design services for national cultural products.



Tiffanie Clark

Romance Languages and Literatures, PhD
Advisor: Mauricio Espinoza, PhD

Central American Poets in Motion

This thesis explores the works of five Central American poets of the XXI century diaspora whose works center on social aspects of transnational experience. Given that all five poets are activists themselves, this thesis asks what are the differences and similarities stylistically and thematically of their work with that of socially compromised poetic groups formed in three Central American countries in the early XX century.

Sisan Cuervo

Communication Sciences and Disorders, PhD
Advisor: Amy Hobek, PhD, CCC-SLP

Digital Dual Language Books for English Language Learners

This project is analyzing verbal and nonverbal engagement of preschool English language learners (ELL). Using digital dual language books, children have the opportunity to work with their monolingual teachers by hearing a book in both their home language and their school language. The project takes place in Cincinnati Head Start facilities with 20 Hispanic ELL children.

Ayusman Dash

Cancer and Cell Biology, PhD
Advisor: Tom Cunningham, PhD

The Role of PRPS1 Upstream Open Reading Frame in Translational Regulation

Nucleotide biosynthesis is an important process to generate cellular DNA, RNA, protein, and energy. Cancer cells tend to upregulate this process to promote relentless cell growth. PRPS1 (phosphoribosyl pyrophosphate synthetase 1) is a critical enzyme required within this process, and I have found a novel mechanism to regulate its expression via an upstream open reading frame (uORF). Regulating PRPS1 via its uORF will be critical in targeting cancer's dependence on nucleotides to pave way for a precision-based anti-cancer therapy.

Mohammadamin Dashti Moghaddam

Physics, PhD
Advisor: Rostislav Serota, PhD

Physical-Statistical Modeling in Medicine and Finance

Over the last 70 years, physics has branched into many scientific and applied fields, most notably medicine and biology. Insights and techniques developed by physicists makes them uniquely suited to initiate new interdisciplinary areas and make distinct contributions to existing ones. Our group conducts research in cognitive psychology, pharmacology, economics, and finance.



Xenia Davis

Molecular, Cellular and Biochemical Pharmacology, PhD
Advisor: Patrick Tso, PhD

The Role of Apolipoprotein A-V in Chylomicron Metabolism

Cardiovascular disease, diabetes and obesity remain major clinical problems worldwide, and elevated plasma triglyceride (TG) levels constitute an independent risk factor for these chronic disorders. Most humans consume many meals that contain high amounts of TGs. After consumption of these meals, digestion occurs in the small intestines, where the TG is packaged into chylomicrons. Chylomicrons transport the TG from the small intestines throughout the circulation to other tissues and organs in the body to be used as an energy source or stored as fat. It is important that TG is removed from the circulation quickly or many diseases can develop. Discovered in 2001, apolipoprotein A-V (apoA-V) is a protein synthesized and secreted exclusively by the liver and its levels are inversely proportional to plasma TG levels. We hypothesize that apoA-V increases the rate of chylomicron removal from the circulation and that the presence of apoA-V on the chylomicron is important for its removal.

Yash Dawda

Information Systems, MS
Advisor: Binny, Samuel, PhD

Voting on Blockchain

In today's world, electronic voting is not trusted as it can be hampered by a hacker. To maintain the trust, the voting and the election should be transparent. Hence, I have been researching on a technology called blockchain, through which a secured and trusted voting can be conducted with complete transparency.

Smruti Deoghare

Biomedical Informatics, PhD
Advisor: Surya Prasath, PhD

Can Computers See?

With an ever-increasing patient burden on the healthcare system, the radiologists are running against time to accurately interpret results from biomedical images. My work steps in to reduce this workload on the radiologists. I develop workflows using machine learning and deep learning to process these biomedical images such that the computer can identify the organ image and a few key organ parts, as well as identify abnormal structures and classify them.

Demetria Fischesser

Molecular Genetics, Biochemistry, and Molecular Biology, PhD
Advisor: Jeffery Molkentin, PhD

Recapitulating *In Vivo* Cardiac Fibroblast Behavior Using a Novel Hydrogel Cell Culture System

Acute activation of cardiac fibroblasts (CFs) resulting from heart failure characterized by cardiomyocyte loss is essential to maintaining proper cardiac structure and function. Chronic fibroblast activation, however, causes excessive fibrotic response leading to fibrosis and organ failure. These cells activate following mechanical (increasing stiffness) or chemical (eg., TGF- β) cues. This causes the fibroblasts to deposit extracellular matrix proteins, which initially stabilize the ventricular wall but eventually cause fibrosis. *In vivo* studies to understand this process have provided minimal understanding of how cardiac fibroblasts contribute to fibrosis and decreased cardiac function. *In vitro* studies have a greater potential to provide more insight into how these cells work, but the vast majority of these studies are carried out on polystyrene dishes. Because CFs can be mechanically activated and polystyrene is 10^6 times stiffer than the native cardiac environment of CFs, these studies have been found to inaccurately portray the true characteristics of fibroblasts. Therefore, we have developed a novel gelatin-based hydrogel system wherein soft hydrogels mimic healthy heart tissue and stiff hydrogels mimic injured heart tissue. In this system, hydrogel stiffness can not only be initially fine-tuned, but due to its chemical properties, can be altered after fibroblasts are plated. This allows us to study cardiac fibroblasts in an environment similar to the dynamic setting of the heart. Thus far, we have characterized the morphologies, temporal activation and differentiation, stress fiber and focal adhesion formation, and partial gene profiles of CFs plated on these hydrogels of static stiffness. We have also begun to characterize fibroblasts on hydrogels of dynamic stiffness. We have observed that upon reversing the



stiffness of hydrogels, fibroblasts revert to a less differentiated state. Collectively, these data will be used to classify fibroblasts into specific stages of activation and differentiation, as well as to generate a reliable *in vitro* model system to study fibroblast dynamics that more closely reflects their properties *in vivo*. Additionally, these studies have promising potential to understanding and regulating the CF response to injury.

Donald Gaffney

Business Administration (Marketing), PhD

Advisor: Robert Wyer, PhD

Uncertainty within Self: The Impact of Subjective Uncertainty in Marketing

We've all experienced uncertainty, whether it is from taking an exam or from where the world is at currently. This research identifies behavioral consequences of attributing uncertainties to intrinsic or extrinsic sources.

Carlos García León

Arts Administration, MA
Advisor: Jean Hamilton, MM

The Tools of Exclusivity Were Just Read

As an arts administrator, Carlos's personal mission is to fight for diversity, inclusion, and cultural equity in the arts. However, when discussing (and writing) about the arts and cultural policy, he's found that even the language that is used in the discourse is an agent upholding outdated and exclusionary methods to the arts. Carlos hopes to change the way we talk and educate about the arts to ensure a better, more inclusive field for all in the future.

Sean Gower

Music History, MA
Advisor: Jonathan Kregor, PhD

Rehearing Common Sounds: Pauline Viardot and the "Intonation" of Artistic Community

The thesis explores how an 1843 song collection by the composer and opera singer Pauline Viardot reflected creative interaction in Paris and strengthened ties of the Romantic art group.



Lisa Green

Pharmacology and Systems Physiology, PhD
Advisor: Michael Tranter, PhD

The Role of Human Antigen R (HuR) in Heart Failure

Heart failure is one of the leading causes of mortality in the United States and is marked by a chronic, progressive decline in cardiac function due to remodeling of the heart. My project focuses on this remodeling at a cellular level, looking at how the myocytes (the contractile muscle cells) and the fibroblasts (the support, matrix-producing cells) change and signal during the progression of heart failure. My lab has found that an RNA binding protein called human antigen R (HuR) may play a pathological role the progression of heart failure through stabilizing RNA involved in the changes in gene expression that lead to adverse cardiac remodeling. Therefore, the long-term goal of this research is to establish HuR as a therapeutic target for the treatment of heart failure.

Tong Han

Design, MDes
Advisor: Eva Lutz, MDes

Furniture in the Science-Fiction Film: A Case Study on Understanding the Audience Cognitive Mechanism

Any object that exists objectively in the physical world contains information. The information may be about the object itself or its environment. Human's mental action or process of acquiring this information is the cognition of things. To understand the cognitive mechanism of the audience is extremely important for design activities. A new integrated method is proposed in this thesis to study the audience cognitive mechanism of objects at the visual level. Then the case studies in which one object from science-fiction films is tested using the method are illustrated. Based on the results, the principle, application, and value of the method are discussed.

Kaitlin Hart

Pharmacology and Systems Physiology, PhD
Advisor: Tom Thompson, PhD

Understanding Anti-Mullerian Hormone

AMH is a protein of the TGF β superfamily with unique characteristics. Recently, AMH has been shown to be involved in the development of polycystic ovarian syndrome. PCOS is the number one cause of infertility in women of reproductive age worldwide. By understanding AMH, we may have a target for therapies for treatment of PCOS.

Kim Hartley

Nursing Research, PhD
Advisor: Gordon Gillespie, PhD, DNP, RN

Greening Neighborhoods to Eliminate Health Disparities

What is a healthy neighborhood? Do we know one when we see one? One factor for healthy neighborhoods may not come first to your mind, but it may be right outside your window. Find out how greenness contributes to healthy environments and may play a part in eliminating health disparities for urban residents.



Emily Igel

Molecular, Cellular and Biochemical Pharmacology, PhD
Advisor: David Hui, PhD

LRP1 Dileucine Mutation Impairs Lipoprotein Clearance and Exacerbates High-Fat Diet Induced Obesity

Impaired clearance of VLDL and IDL by liver lipoprotein receptor LRP1 is associated with central obesity and insulin resistance. LRP1 uses motifs such as LL that signal for lipoprotein uptake and receptor recycling. Our study tested the hypothesis that mutation of LRP1 from LL to AA can alter development of metabolic disease and obesity in mice fed a high-fat diet. The data show that mice with the LL to AA mutation have more IDL and LDL in the blood, as well as a larger percentage of body fat compared to wild-type controls. We conclude that mutation of the LL motif of LRP1 may increase adiposity on a high-fat diet through impaired liver clearance of lipoprotein remnants, leading to increased triglyceride uptake into the adipose.

Cara Indiano

Design, MDes
Advisor: Samantha Krukowski, PhD

Rethinking How We Design Clothing for Mobility Disabilities

There is a stark lack of clothing choices for people with disabilities, with one critic making note that there are more clothing lines for pets than there are for those with disabilities. This fact becomes troubling when research shows that a lack of available clothing choices for those with mobility impairments renders them unable to participate in important social functions, which further isolates them from everyday life. To tackle this issue, it is important to address the methodological pitfalls within fashion design.

Sanaiya Islam

Environmental Engineering, MS
Advisor: George Sorial, PhD

Degradation of Ternary Mixture of Trihalomethanes in a Biotrickling Filter in the Presence of Biosurfactant and Fungi

Trihalomethanes (THMs) constitute of chloroform (CF), bromodichloromethane (BDCM), dibromochloromethane (DBCM) and bromoform (BF). These are formed when the hydrogen atoms in methane are replaced with halogen ions like chloride and/or bromide. Humans are exposed to THMs via ingestion, cooking, bathing, swimming, and various other lifestyle factors. According to the Safe Drinking Water Act of 1974, the USEPA has established a maximum contaminant level (MCL) 4 for THMs. THMs concentration observed in groundwater is between 1 and 10 ppb and in surface water between 30 and 150 ppb. The exposure to THMs should be minimized due to their severe health and environmental impacts. In this study, the degradation characteristics of a ternary mixture of CF, BDCM, and DBCM is observed in a state of the art biotrickling filter in the presence of biosurfactant and fungi.

Rupal Jain

Biological Sciences, MS
Advisor: Dennis Grogan, PhD

Understanding DNA Repair Pathways in Hyperthermophilic Microorganism *Sulfolobus acidocaldarius*

DNA, the blueprint of life for majority of lifeforms on earth, is constantly under attack by innumerable internal as well as external agents such as ultraviolet radiation, oxidative radicals, etc. *Sulfolobus acidocaldarius* grows optimally at environmentally extreme conditions of 80° C and pH-3, which are otherwise lethal to a majority of lifeforms. Since it inhabits extreme conditions, it was predicted it might be experiencing a higher degree of DNA damage when compared to organisms growing at significantly lower temperatures. However, a detailed study concluded that *Sulfolobus acidocaldarius* (grows at 80° C) is as efficient as *Escherichia coli* (grows at 37° C) in maintaining its genomic integrity, intriguing scientists in understanding DNA repair in *S. acidocaldarius*. This study will concentrate on determining the potential functional genes involved in protecting *S. acidocaldarius* particularly from the damaging effects of oxidative stress.



Safa Khodabakhsh

Materials Engineering, PhD
Advisor: Ashley Paz y Puente, PhD

3D Printed Ni-based Scaffolds

3D printing of Ni-based scaffolds at room temperature is made possible by using the direct ink writing method. We are making Ni-based scaffolds light and strong for all sorts of applications.

Michelle Leon

Communication Sciences and Disorders, PhD
Advisor: Karla Washington, PhD

Discriminant Accuracy of the Intelligibility in Context Scale for Bilingual Preschoolers

There is a need for bilingual speech diagnostic tools as the bilingual population continues to grow. The purpose of my project is to establish the discriminant accuracy of the Intelligibility in Context Scale and Intelligibility in Context Scale-Jamaican Creole screening tools. We will look at data from a sample of Jamaican Creole and Standard English 4- and 5-years old bilingual preschoolers with speech disorders.

Longwei Li

Design, MDes

Advisor: Claudia Rebola, PhD

Addressing Culturally Sensitivity to Improve Counseling Services for Chinese International Students at DAAP

The underutilization of mental health resources by Chinese international students presents college and universities with a challenge. As the amount of Chinese international students continues to grow, institutions of higher education may find themselves with an increasing percentage of their students not utilizing mental health resources. This study is aimed at assessing the perceptions of graduate Chinese international students and exploring their barriers to accessing professional mental health service at UC. The purpose of this study is to improve counselors' understanding of Chinese international students' mental health needs and to create a tool with addressing cultural sensitivity that can provide professional mental health service in time for this population.

Sarah Li

Biomedical Engineering, MS

Advisor: Douglas Mast, PhD

Tongue Tells: Speech Therapy with Simpler Ultrasound Feedback

Children with residual speech sound disorders cannot pronounce all the sounds in their language beyond the typical years of speech acquisition, potentially affecting social and academic achievement. Ultrasound imaging provides real-time feedback on tongue motion, but interpreting these complex images at the quick speed of speech can be difficult. Additionally, multiple tongue shapes can produce correct pronunciations for one of the hardest sounds: /r/. Our system will offer simpler real-time feedback by tracking the tongue during ultrasound imaging, quantifying the movement of the three different parts of the tongue, and measuring progress towards targets signifying correct /r/ production, potentially improving speech therapy outcomes.



Mimi Liu

Physics, PhD

Advisor: Thomas Beck, PhD

Potential Shifts across Water Surface

In a water slab model with a cavity inside, I will show how to get the potential shift across the water surface and how several key factors would impact the potential shift.

Zhaoran Liu

Design, MDes

Advisor: Steven Doehler, MA

How Can We Promote Sustainable Tourism Behaviors Change through Persuasive Design?

To respond to the negative impacts on the environment for tourist destinations, sustainable tourism has been claimed as the shift in developing the tourism industry. It was observed that the adverse impacts come from tourists' uninformed and delinquent behaviors, and managing tourists' behavior has been confirmed as a strategy to minimize the impacts. This thesis focuses on promoting sustainable behaviors for tourism based on the understanding of tourists' behaviors and attitudes.

Shuai Mu

Design, MDes

Advisor: Craig Vogel, MID

How Traditional Chinese Furniture Instructs the Modern Office Furniture Design

This project identifies the gap between traditional Chinese furniture and modern office furniture, focuses on a certain group of Chinese people to understand their physical and emotional needs towards the office furniture, and draws the creation theory in light of the traditional furniture.

Ponaravind Muthaiah

Aerospace Engineering, MS

Advisor: Catharine McGhan, PhD

Steps towards Automatic Evaluation of UAV Delivery Operations Using ROS and Gazebo

We discuss the creation of a set of scenarios and tools useful for developing and testing a multi-trip, multi-UAV package delivery system with autonomous UAVs that can interact and replan among themselves. Hardware testing tends to take significant time and cost, so we seek to be able to evaluate and potentially validate as much of the single-UAV and full system capabilities in simulation to support this and similar robotic teaming problems. One way to do this is to determine the different types of test scenarios that can and should be tested for certain types of tools for evaluation purposes, and then have a support system set up that will automatically generate and run these tests in simulation for us, storing the data so that it can be correspondingly evaluated automatically as well. This ongoing work focuses on the process of determining what needs to be tested for a given set of project goals, determining the characteristics that need to be tested versus controlled, the metrics and benchmarks for evaluation, and the “pass” versus “fail” criteria. This includes the rationale and the procedures, techniques, and tools for formally capturing this information. For our target system, we use the Robot Operating System (ROS) and the Gazebo simulation environment. ROS is a set of open-source libraries and a messaging system, which provides a collaborative environment for researchers to more easily develop software for a wide range of robotic systems. ROS also includes Gazebo, a mid-fidelity 3D robotics simulator, allowing users to run tests in an environment that supports basic physics and also “bag” the data for offline analysis of the results.



Nilesh Naik

Aerospace Engineering, MS
Advisor: Shabban Abdallah, PhD

Health Monitoring of Hyperloop Systems

The objective of my thesis is to develop a health monitoring system for Hyperloop UC that can be used to schedule maintenance of the POD.

Emma Neybert

Business Administration (Marketing), PhD
Advisor: Ryan Rahinel, PhD

Do We Need All the Answers? Defining Anticipation and the Mediation of Curiosity for Positive Experiences

What is anticipation? Anticipation, as defined by Merriam-Webster, is “the act of looking forward, especially [in] pleasurable expectation”. Anticipation is not looking at the expected affect, but rather at the behavioral readiness and desire for an event to occur. My research begs the question: do we need all the answers? I hypothesize that we don’t and in fact, higher levels of anticipation can be achieved via the intentional deprivation of some information, but only when coupled with the specific divulgence of when their curiosity will be resolved. This increased anticipation, via the teasing effect, will increase positive feelings and overall experiences upon the resolution of their curiosity.

Daniel Peat

Business Administration (Management), PhD
Advisor: Rhett Brymer, PhD

Rucksack to Backpack: Exploring Psychological Contracts between Veterans and “Military Friendly” Campuses

As one result of the longest period of war in U.S. history (i.e., Afghanistan), approximately 500,000 Gulf War II era military veterans are currently utilizing educational benefits to pursue higher education. Student veterans often choose universities that advertise the label of “military” or “veteran” friendly to attract them and their external sources of funding. The students and the universities enter into an unwritten contract, rooted in social exchange theory known as a psychological contract. We use an inductive, grounded theory approach to explore how university policies shape and affect student veterans’ psychological contracts, predominantly examining how this special class of nontraditional student responds to psychological contract breach by modifying their contracts or exiting the organization.

Radhika Prabhakar

Electrical Engineering, PhD
Advisor: Je-Hyeong Bahk, PhD

Transverse Thermoelectric Generators (TEG) for Wearable Applications: A Novel Approach to Human Body Heat Energy Harvesting

As smart wearable devices gain popularity, their need for energy autonomy becomes crucial. Human body heat, an excellent energy source, is most easily available for wearable devices. Thermoelectric energy harvesters/generators (TEGs), which convert heat to electrical energy, are therefore very interesting for realization of such energy autonomous devices. State-of-the-art wearable TEGs are based on a longitudinal pi structure, which is complex, both in terms of electrical connections and manufacturing limiting their use for wearable applications. This work is a novel approach to human body-heat energy harvesting by the design of a transverse structure thermoelectric device using flexible TE material. The inherently low complexity of the device leads to a lower cost of manufacturing and mechanical flexibility, and the planar design allows it to be suitable for wearable applications. This work can spark an interest in further research and development of transverse structure TEGs for human body heat harvesting.



Lauren Prather

Communication Sciences and Disorders, PhD
Advisor: Sandra Combs, PhD

A Comparison of African American English in Story Retell using Bidialectal Stories

The thesis I will be presenting is a pilot research study that compares the use of African American English use and narrative features through the retell of stories read in the home and school dialect. The data in the study is currently being collected.

Norberto Sanchez

Design, MDes
Advisor: Claudia Rebola, PhD

Designing Engagement

This project analyzes the role of aesthetics for product adoption. The project centers its attention on how to improve medical device adoption by older adults, and it integrates VR into the design process for concept creation and product validation.

Gracia Silva

Anthropology, MA

Advisor: C. Jeffrey Jacobson, PhD

Understanding Social Trauma and Social Suffering as a Sociopolitical Event: The Experience of Nicaraguan Political Refugees in Costa Rica

This work is an attempt to understand the situation of social trauma and social suffering lived by Nicaraguan students that fled to Costa Rica due to political persecution during the context of political violence and repression that is being lived in Nicaragua. To do this, I will reside for approximately 6 weeks (June and July 2019) in San José, Costa Rica where I will participate in the meetings and actions of the UCR's Solidarity Group for Nicaragua (Grupo de Solidaridad con Nicaragua de la Universidad de Costa Rica), a mix of a support group for refugees and a group that develops actions to help Nicaragua, and I will collect data using participant observation, focus groups and interviews. As a theoretical framework, I will use liberation psychology, a social psychology approach, and I will address trauma as a sociopolitical event, an emotional experience, and a type of situation that breaks bodies and minds. I will locate this particular experience in a frame of structural injustice, political violence, and civil and political rights violations. My goal is that this research's findings will contribute to make people aware of what is happening in Nicaragua and about the effects of political violence and repression.

Nani Sumanth Maddirala

Information Technology, MS

Advisor: Jess Kropczynski, PhD

Roommate Recommendation System

Your roommate is often your first friend on campus. Therefore, it is important that you are matched with a student who has similar interests and preferences. My research aims to discover the minimal criteria students consider when selecting potential college roommates. The minimal criteria will be used in the RoomUP apps' recommendation system to provide roommate recommendations.



Vasiliki Tsikritea

Classics, MA

Advisor: Eleni Hatzaki, PhD

A Motif is Worth a Thousand Words: The Social Function of Minoan Textile and Pottery Decoration

Motifs are everywhere around us. They can be powerful symbols that represent and communicate meaningful messages, as long as the viewers of the motifs are cognizant of the symbolic language. Past societies used motifs extensively in their material culture in order to convey messages of social and/or religious status, hierarchy, and power. The study of elite textile motifs of the prehistoric Aegean, specifically of Minoan Crete, reveals similar social functions. Elites, by exclusively using certain textile motifs, made strong social statements of exclusive participation in elite activities. When comparing contemporary pottery decoration to the textile motifs, parts of the political and social history of the prehistoric Aegean are revealed. The use of textile motifs as pottery decoration changed over time as a result of the rule of different elites on the island of Crete. This thesis discusses the social function of Minoan textile motifs, as revealed through their exclusion from or inclusion in contemporary pottery decoration. The same motifs are used for different purposes at different times, and their meaning changes from elite-exclusive motifs to symbols of expression of popular identity.

Latia Tucker

Molecular, Cellular & Biochemical Pharmacology, PhD

Advisor: Hong-Sheng Wang, PhD

Role of Endocrine Disruptors in Hemostasis and Thrombosis

To elucidate the nature and mechanism of changes to the hematologic system following rapid and chronic exposure to estrogenic endocrine disrupting chemicals.

Skye van Duuren

Music Performance, DMA
Advisor: Alan Siebert, MM

Bridging Worlds: New Techniques for Microtonal Music on Acoustic Instruments

Musical instruments have been limited to the same twelve notes for centuries. Recent advancements have challenged this system, producing remarkably fresh and innovative music, but these pieces are often extremely difficult to play, or can only be played by synthesizers. I describe a way to use traditional acoustic instruments in the composition of music beyond the standard twelve tones and the fascinating new ways to think about music that are facilitated by this method.

Chenggang Wang

Computer Science, PhD
Advisor: Boyang Wang, PhD

Malware Defense with Machine-Learning Methods

I am using machine-learning methods to identify and defend malware on Android platform.



The logo consists of the letters '3MT' in a white, stylized, sans-serif font, set against a solid black rectangular background.

Crystal Whetstone

Political Science, PhD
Advisor: Rina Williams, PhD

Political Motherhood

This 3MT will describe my dissertation, “Nurturing Democracy through Political Motherhood in Armed Conflict,” which examines who is remembered in peace activism in armed conflicts through a comparative case study of two women’s groups that deployed political motherhood, or women’s maternal activism, to challenge authoritarian and/or oppressive states.

The logo consists of the letters '3MT' in a white, stylized, sans-serif font, set against a solid black rectangular background.

Zixuan Yang

Design, MDes
Advisor: Ashley Kubley, MFA

Build Up Active Heavy Metal Subculture Community

With a 50-year-long history, heavy metal music has developed into a diversified subculture all over the world. However, due to the lack of mature organizational strategy and incorrect stereotypes, the market is still limited. Through the research on heavy metal’s history in different regions, published arts and stakeholders, this thesis reveals the trend of heavy metal subculture’s development and core values, and proposes new operation model based on the understanding of current community map.



Yu Zhang

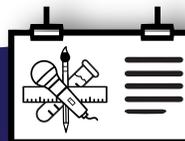
Chemical Engineering, PhD

Advisor: Maobing Tu, PhD

Effect of Overliming and Activated Carbon Detoxification on Inhibitors Removal and Butanol Fermentation of Poplar Prehydrolysates

Lignocellulosic biomass as the most abundant sustainable resource can be converted into biofuels by enzymatic hydrolysis and subsequent microbial fermentation. However, considerable amount of inhibitory compounds were generated from the dilute acid pretreatment process. The carbonyl aldehydes and ketones have been suggested to the most potent inhibitors in the biomass prehydrolysate, which significantly limit the efficient utilization hemicellulose prehydrolysates. This study was aimed at the identification of these carbonyl inhibitors and their removal by overliming and activated carbon. Forty-six carbonyl compounds (including furans, aliphatic derivatives, aromatic monomers and aromatic dimers) were identified as potential inhibitors by gas chromatography-mass spectrometry (GC-MS). It was observed that overliming and activated carbon treatment could remove 73.9% and 82.2% of carbonyl inhibitors, respectively, but the treated prehydrolysates were still not fermentable. The sequential overliming and activated carbon removed 92.6% of carbonyl inhibitors and resulted in remarkable fermentability and high butanol yield (0.22 g/g sugar). The organic acid in the prehydrolysates were also analyzed by a liquid chromatography connected to a quadrupole time-of-flight (LC-Q-TOF) mass spectrometer. Activated carbon removed 92.9% phenolic acids, while overliming removed 40.2% of them. This study revealed the distinctive effects of overliming and activated carbon treatments on the prehydrolysates detoxification. Overliming removed more dialdehydes and diketones than activated carbon treatment, while activated carbon removed more phenolic acids than overliming.

Creative Arts Gallery



Poster Forum

Three Minute Thesis

