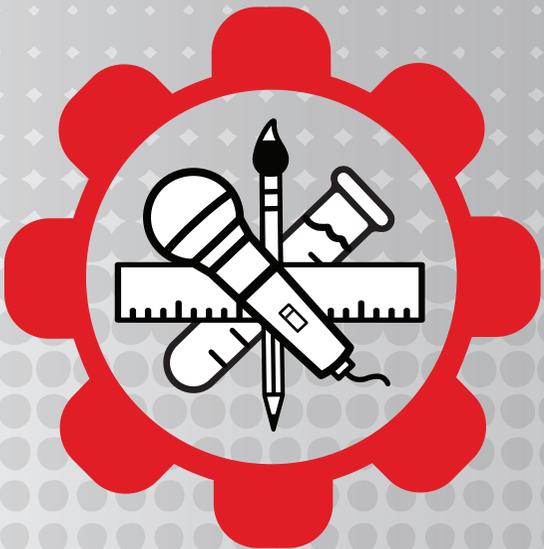
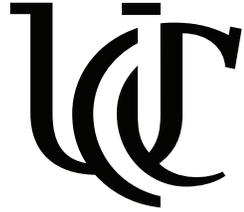


2017



GRADUATE STUDENT
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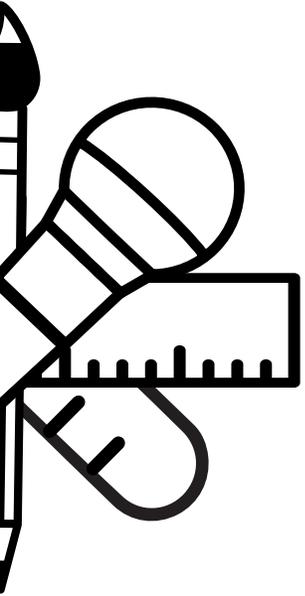


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2017

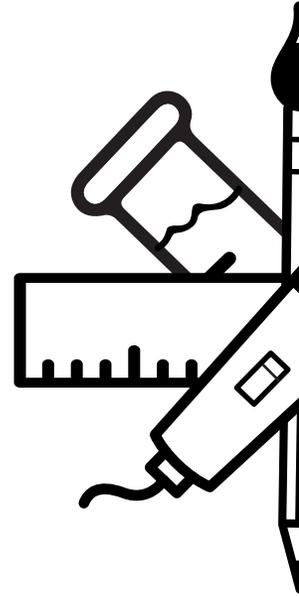


DR. MARSHALL "CHIP" MONTROSE
Vice Provost and Dean of the Graduate School

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**

FRIDAY, FEBRUARY 10, 2017

Participant Check-In	8 a.m.—9 a.m.
Fine Art Gallery	9 a.m.—2 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 p.m.—2 p.m.
Awards Ceremony	2 p.m.—2:30 p.m.

2017

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PARTICIPANT

Zuhair Abdulla

Neuroscience/Medical Science Scholars
Interdisciplinary, PhD

Noma Agbonifo

Occupational Safety and Ergonomics, PhD

Bina Ajay

Business Administration, PhD

Upasana Banerjee

Chemistry, PhD

Shraddha Barawkar

Mechanical Engineering, MS

Markaisa Black

Molecular & Developmental Biology, PhD

Caroline Bozzi

Architecture, MArch

PARTICIPANT NUMBER

19-P

29-P

74-P

83-P

6-T

78-P

1-F

Caroline Bozzi

Architecture, MArch

Anthony Bridgewater

Community Planning, MCP

Anthony Bridgewater

Community Planning, MCP

Caroline Bozzi

Architecture, MArch

Olivia Bruner

Design, MDes

David Scoggins

Design, MDes

Bryan Buechner

Business Administration, PhD

Michelle Burbage

Health Education, PhD

Jenny Burton

Communication Sciences and Disorders, PhD

Brittany Swint

Communication Sciences and Disorders, MA

31-P

31-P

2-F

25-P

66-P

81-P

F = FINE ART GALLERY
P = POSTER FORUM
T = THREE MINUTE THESIS

PARTICIPANT

Kaitlin Carroll

Immunology, PhD

Melissa Carroll

Communication, MA

Abbey Klever

Communication, MA

Lauren Fattlar

Communication, MA

Jennie Cox

Industrial Hygiene (Environmental Health), PhD

Jeremy Cox

Computer Science & Engineering, PhD

Shima Dalirirad

Physics, PhD

Sarah Davidson

Biostatistics (Environmental Health), PhD

**PARTICIPANT
NUMBER**

53-P

76-P

42-P

9-T

24-P

82-P

Pankaj Dwivedi

Cancer and Cell Biology, PhD

David Muench

Molecular & Developmental Biology, PhD

Pankaj Dwivedi

Cancer and Cell Biology, PhD

Joshua Eby

Physics, PhD

Nehal Elmeligy

Women's, Gender, and Sexuality Studies, MA

Brianna Escoe

Business Administration (Marketing), PhD

Ahmed Fahad

Literacy and Second Language Studies, EdD

Kathryn Falcon-Davidson

Communication Sciences and Disorders, PhD

10-P

12-T

8-P

1-T

26-T

14-P

89-P

Lauren Fattlar Communication, MA	76-P	Julian Gartner Germanic Languages & Literature, MA	7-P
Melissa Carroll Communication, MA		Enas Ghulam Biostatistics (Environmental Health), PhD	40-P
Abbey Klever Communication, MA		Rachel Gilbert Biological Sciences, PhD	36-P
Hallie Fetterman School Psychology, PhD	54-P	Deeptha Girish Electrical Engineering, PhD	21-T
Carla Luevano School Psychology, PhD		Alicia Goldschmidt Biological Sciences, MS	72-P
Hannah Flood Cancer and Cell Biology, PhD	3-F	Rhemecka Graham Educational Studies, MA	24-T
Hannah Flood Cancer and Cell Biology, PhD	43-P	Sounak Gupta Computer Science & Engineering, PhD	18-T
Hannah Flood Cancer and Cell Biology, PhD	23-T	Ivayla Gyurova Pathobiology & Molecular Medicine, PhD	30-P
Lori Foote Educational Studies, PhD	35-P	Ivayla Gyurova Pathobiology & Molecular Medicine, PhD	3-T
Jamie Fritz Health Services Management, MPH	7-T		

PARTICIPANT

	PARTICIPANT NUMBER
Ahmad Hanandeh Mathematical Sciences, PhD	32-P
Angelica Hardee Health Promotion & Education, PhD	15-T
Hedieh Hashemi Hosseinabad Communication Sciences and Disorders, PhD	67-P
María Carmen Hernández Romance Languages & Literatures, PhD	44-P
Eugenia Mazur Romance Languages & Literatures, PhD	
Shaimaa Ibrahim Molecular, Cellular & Biochemical Pharmacology, PhD	6-P
Rajeswari Jayavaradhan Pathobiology & Molecular Medicine, PhD	27-P
Emily Jennings Biological Sciences, PhD	17-P

Robert Johnson Community Planning, MCP	27-T
Najlaa Kareem Architecture, PhD	4-T
Jennifer Keelor Communication Sciences and Disorders, PhD	5-P
Safa Khodabakhsh Materials Science, MS	46-P
Stephani Kim Epidemiology (Environmental Health), PhD	52-P
Georganne Kincer Nursing Research, PhD	17-T
Abbey Klever Communication, MA	76-P
Lauren Fattlar Communication, MA	
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Sean Leavell Fine Arts, MFA	4-F
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Chun Liang Communication Sciences and Disorders, PhD	38-P
Todd Lingren Biomedical Informatics, PhD	15-P
Xiaobang Liu Electrical Engineering, PhD	79-P
Zachary Long Physics, PhD	56-P
Matteo Lotito Physics, PhD	21-P
Carla Luevano School Psychology, PhD	54-P
Hallie Fetterman School Psychology, PhD	

Pulong Ma Mathematical Sciences, PhD	9-P
Samantha Marita Educational Studies, PhD	4-P
Eugenia Mazur Romance Languages & Literatures, PhD	44-P
María Carmen Hernández Romance Languages & Literatures, PhD	
Nathan McGee Counseling, Mental Health, MA	85-P
Nathan McGee Counseling, Mental Health, MA	2-T
Benjamin Merritt Biological Sciences, PhD	80-P
Fatemesadat Mohammadi Physics, PhD	26-P

PARTICIPANT

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Pankaj Dwivedi

Cancer and Cell Biology, PhD

J. Meredith Murphy

School Psychology, PhD

Chelsea Ritter

School Psychology, PhD

Arunkumar Muthusamy

Biological Sciences, PhD

Toritseju Omaghomi

Environmental Engineering, PhD

Onyinye Osisioma

Chemistry, PhD

Matthew Owen

Mechanical Engineering, MS

**PARTICIPANT
NUMBER**

10-P

13-P

87-P

48-P

84-P

65-P

Wesley Parker

Geology, MS

Gaurav Patil

Mechanical Engineering, PhD

Lillian Rigoli

Psychology, PhD

Gaurav Patil

Mechanical Engineering, PhD

Katherine Paul

Germanic Languages & Literature, PhD

Daniel Peat

Business Administration, PhD

Nicole Phillips

Communication Sciences and Disorders, MA

Alexis Wolf

Communication Sciences and Disorders, MA

Amanda Powers

Biological Sciences, PhD

57-P

64-P

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34-P

10 F = FINE ART GALLERY

P = POSTER FORUM

T = THREE MINUTE THESIS

Lucas Powers Chemistry, PhD	3-P
Salwa Ragab Pharmaceutical Sciences/Biopharmaceutics, PhD	12-P
Ankit Rana Electrical Engineering, MS	18-P
Prajokta Ray Electrical Engineering, PhD	2-P
Prajokta Ray Electrical Engineering, PhD	22-T
Maryanne Refaei Chemistry, PhD	61-P
M. Sadegh Riasi Environmental Engineering, PhD	62-P
M. Sadegh Riasi Environmental Engineering, PhD	11-T
Abigail Richard Mathematical Sciences, PhD	39-P

Abigail Richard Mathematical Sciences, PhD	25-T
Stephen Riffle Molecular & Developmental Biology, PhD	23-P
Stephen Riffle Molecular & Developmental Biology, PhD	5-T
Lillian Rigoli Psychology, PhD	64-P
Gaurav Patil Mechanical Engineering, PhD	
Chelsea Ritter School Psychology, PhD	13-P
J. Meredith Murphy School Psychology, PhD	
Thomas Ruhl Geography, PhD	11-P
Mohammad Sarim Mechanical Engineering, PhD	63-P

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Sarah Schwab
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Olivia Bruner
Design, MDes

Davida Scoggins
Design, MDes

Connor Sears
Biological Sciences, PhD

Sanjana Sekar
Electrical Engineering, MS

Christopher Sheehan
Geology, PhD

Leilei Shi
Electrical Engineering, PhD

PARTICIPANT NUMBER

10-T

2-F

71-P

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14-T

88-P

16-P

Dylan Shields
Chemistry, PhD

Vineeta Singh
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Suzanne Summer
Epidemiology (Environmental Health), PhD

Arvind Sundararajan
Fine Arts, MFA

Brittany Swint
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Jenny Burton
Communication Sciences and Disorders, PhD

Jonathan Thompson
Physics, PhD

Christine Uebel-Niemeier
Industrial Hygiene (Environmental Health), PhD

Karthik Vadambacheri Manian
Computer Science & Engineering, PhD

70-P

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68-P

5-F

81-P

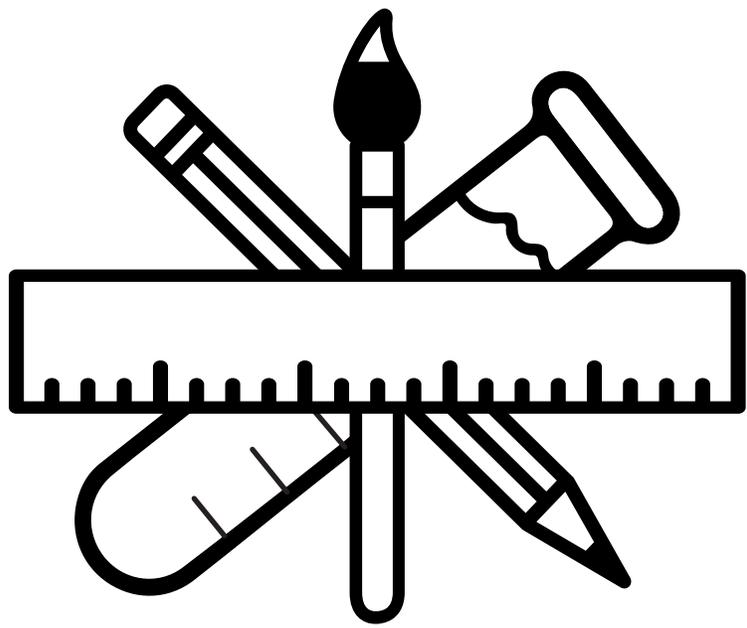
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90-P

Nataraja Sarma Vaitinadin Epidemiology (Environmental Health), PhD	73-P
Nataraja Sarma Vaitinadin Epidemiology (Environmental Health), PhD	8-T
Sushmitha Vallabh Immunology, MS	51-P
Ashley Vaughn Educational Studies, PhD	20-P
Andrew Vonhandorf Toxicology (Environmental Health), PhD	69-P
Carolyn Wagner Fine Arts, MFA	6-F
Chi Wei Biostatistics, MPH	59-P
Kristen Welker Health Education, PhD	86-P
Crystal Whetstone Political Science, PhD	19-T

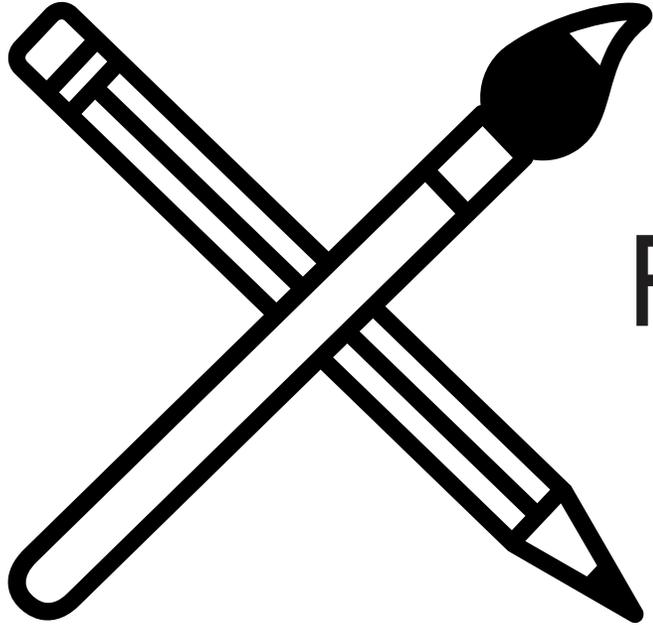
Shana White Biostatistics (Environmental Health), PhD	50-P
Caroline Williams Chemistry, PhD	41-P
Kelsi Wood Health Education, PhD	55-P
Bingbing Wu Industrial Hygiene (Environmental Health), PhD	58-P
Alican Yildiz Community Planning, MCP	22-P
Allison Young Geology, PhD	49-P
Wenlong Zhang Civil Engineering, PhD	37-P
Yuqian Zhang Electrical Engineering, PhD	28-P



ACKNOWLEDGEMENTS

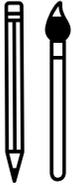
The Graduate School would like to thank all judges for your time and thoughtful evaluations. The students you judge will use your feedback to craft improved artwork, posters and research presentations in the future. We truly appreciate your service and hope that you take pride in the impact you've had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



FINE ARTS GALLERY





Caroline Bozzi

Architecture, MA

Advisor: Kim Lawson

Weaving Vicissitude

when my mother was pregnant
with her second child i was four
i pointed at her swollen belly confused at how
my mother had gotten so big in such little time
my father scooped me in his tree trunk arms and
said the closest thing to god on this earth
is a woman's body it's where life comes from
and to have a grown man tell me something
so powerful at such a young age
changed me to see the entire universe
rested at my mother's feet.



Olivia Bruner

Design, MDes

Advisor: Vicki Daiello, PhD

Davida Scoggins

Design, MDes

Advisor: Vicki Daiello, PhD

Dual Becomings: Expressions Inspired by the Power of Writing's Tactility, the Lure of Embodied Meaning-Making, and the Art of Words

If writing is a method of inquiry for qualitative researchers (Richardson, 1994), then how does writing function for designers who engage in research? Our (im)possible portfolios represent two possibilities of writing's "becoming-inquiry" through our desires as designers while researching our master's thesis topics.

Olivia:

Inspired by the power of writing's tactility and the lure of embodied meaning-making, I began a dialogue with philosophers Deleuze and Guattari (1987) while researching my master's thesis topic. Deleuze and Guattari's concepts of desire, becoming, and haecceities were provocations that challenged me to reflect on my writing process and, in time, persuaded me to conceptualize my writing and design research as a relational space—

a locus where the impossibilities of ever-expressing my ideas completely or perfectly revealed surprising new forms of creative possibility: a cantaloupe inscribed, a mirrored text, and a tiny package of drawings, among others. Contained in this book, my (im)possible portfolio, and illustrated in the accompanying posters, are glimpses of the ephemeral affects, (im)possibilities, and impasses that shaped my relational writing process.

David:

Writing is creative discovery. I have come to understand how writing, like all art forms, has many mediums, and these mediums can and should be encountered to help broaden one's understanding of the pathways they are embarking upon. My final creative expression is a tapestry of collective encounters with childhood, teenage pregnancy and adulthood as my thesis focuses on the relationships between teen mothers and social workers. This project from its conception was an exploration of the lenses people see through—a collage of narratives intertwined to highlight perceptions, misconceptions, judgements and praises within society. The end product was not fully imagined at the beginning, only in pieces—loose endings of threads that rethreaded themselves into the final tapestry as I continued to understand. The journal complements these pieces as the synthesis of my lingerings as I read course material and reflected on their relevance to my topic. I found that poetry, free prose and even creative visual expression were helpful along with traditionally scholastic textual encounters to fully immerse myself in this thought space.

03



Hannah Flood

Cancer and Cell Biology, PhD
Advisor: Vladimir Kalinichenko, MD, PhD

The Science of Sodium Silicate

As a researcher, I cannot seem to step away from science, even in my hobbies. This art piece is a result of sodium silicate, fire, and what little free time I have outside of the lab.

04



Sean Leavell

Painting, MFA
Advisor: Joseph Girandola, MFA

Mother's Milk

This work is a representation of my struggle to understand the ideal normal family relationship and how the passing of my mother has removed any hope of trying to create the ideal norm.

05



Arvind Sundararajan

Studio Art, MFA

Advisor: Joseph Girandola, MFA

Untitled (Palimpsest)

In this series of secco panel (dry plaster) paintings, I am trying to build bridges between contemporary concerns and Italian religious paintings of 14th and 15th century. A Palimpsest is a manuscript or piece of writing material on which the original writing has been effaced to make room for later writing but of which traces remain. As mentioned earlier, my paintings are Palimpsests in which medieval art is effaced to make room for contemporary mark-making, but traces remain which give them a temporal quality.

06



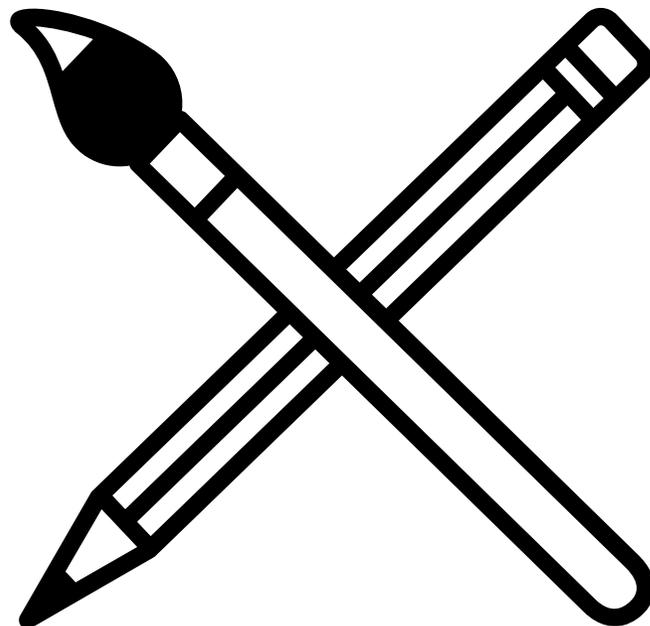
Carolyn Wagner

Fine Arts, MFA

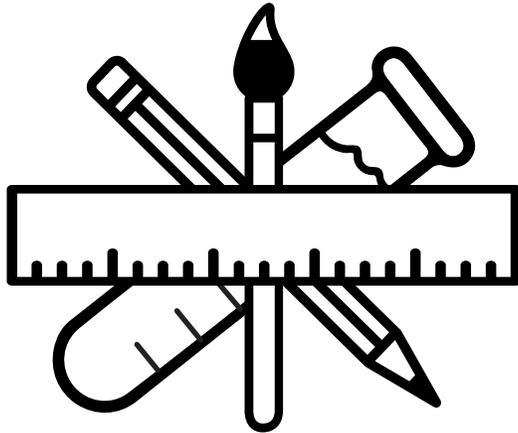
Advisor: Denise Burge, MFA

Something Borrowed

A short documentary about a World War II parachute wedding dress.



POSTER FORUM



ARTS & HUMANITIES

LIFE SCIENCES & MEDICINE

PHYSICAL SCIENCES & ENGINEERING

SOCIAL & BEHAVIORAL SCIENCES

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.

01

Betul Kocaoglu

Anthropology, MA

Advisor: Leila Rodriguez Soto, PhD

The Migration of Georgian Women to Turkey

This study addresses how gender norms under different political-economic contexts have shaped Georgian immigrant women's lives and experiences as immigrants in Turkey. After the collapse of the Soviet Union, many post-Soviet countries had serious threats in terms of economic development and political stability. These countries faced high unemployment and privatization because of these problems, and Georgia has also been influenced due to these problems. As a result, women of Georgia striving to better their economic conditions often have to leave their homes and families.

The aim of this study is to listen to the personal experiences of immigrant women so as to understand their working conditions and social life experiences in Turkey. Georgian women began migrating to Turkey in the 1990s. Turkey has been a popular destination country for Georgian immigrant women, due to the geographical closeness and flexible visa regime between Georgia and Turkey. Georgian female migrants have endured at least two enormous politico-economic changes in their lives: first, the transition from Soviet Georgia to a post-socialist, free market economy; and second, the transition from Georgia to Turkey. Therefore, in my presentation, I examine first the women's lives and roles in Soviet Georgia; second, how these were affected with the transition to the Republic of Georgia; and finally, how their lives changed again with differing gender norms as immigrants in Turkey.

02

Prajokta Ray

Electrical Engineering, PhD

Advisor: Andrew Steckl, PhD

Label Free Point of Care Multiple Stress Biomarker Detection in Sweat, Blood and Urine Using Lateral Flow Assay

Point of care rapid detection of stress biomarkers through lateral flow assay and rapid spectroscopy for multiple biomarker detection from single sample is being reported. Physical and psychological stress in day to day life causes release of certain molecular markers also known as biomarkers into the blood stream, which gets transported to body fluids such as sweat, urine and saliva. Cortisol, serotonin, dopamine, adrenaline and norepinephrine are few such markers. The steps for the detection process are as follows:

1. Detection of stress biomarker in the blood using lateral flow assay front
 - a. Through blood coagulation
 - b. Optical detection of single or multiple biomarker in blood
2. Detection of stress biomarker in sweat using lateral flow assay front
 - a. Effect of sweat on rehydrated blood
 - b. Optical detection of single or multiple biomarker in sweat

03

Lucas Powers

Chemistry, PhD

Advisor: David B. Smithrud, PhD

Novel MRI Imaging Agent Based on Rotaxane Architecture

Magnetic resonance imaging (MRI) is a powerful tool for detecting abnormalities or diseases in the soft tissues of the body. Contrast agents enhance the MRI signal at sites wherever the agent resides. Creating a sensor that selectively turns on a contrast agent at a diseased site would greatly improve diagnosis. Towards this end, we are developing a sensor, based on the rotaxane architecture, that keeps a contrast agent silent until its switch is activated via enzymatic cleavage. Herein, we present a new method to construct rotaxanes that readily disassemble upon covalent bond cleavage. Also presented are our preliminary results for a sensor that turns on a contrast agent upon covalent bond cleavage after acidic activation, as well as the general synthetic scheme for the compounds.

04

Samantha Marita

Educational Studies, PhD

Advisor: Casey Hord, PhD

Understanding Student Experience for Adapting Mathematics

Instruction: A Case Study of a Student with a Learning Disability

There are a variety of factors that impact academic achievement for students with learning disabilities (LD) in middle school, including increased anxiety and concern around peer acceptance. This poster argues that when educators understand the experiences of their students, they are better able to adjust instruction to meet their situational needs. To gain insight into this phenomenon, we utilized a qualitative case study to explore the mathematical and social situations of an eighth-grade student with LD. Findings indicated that the participant assumed different roles in each situation, which influenced his attitude, motivation and behavior. These findings suggest that understanding of the experiences of middle school students could better allow teachers to adapt instruction to maximize student learning potential. Implications include discussion of the potential benefits of taking a holistic approach to understanding the factors that impact each student's success in middle school mathematics.

05

Jennifer Keelor

Communication Sciences and Disorders, PhD

Advisor: Nancy Creaghead, PhD

Text-to-Speech Technology: Applications for Children with Reading Difficulties

Text-to-Speech (TTS) technology can be useful as a compensatory reading strategy; however, the array of TTS presentational features that

is most efficacious is uncertain. This study investigated the impact of five conditions with and without TTS on reading comprehension of 29 struggling readers in grades three through six.

06

Shaimaa Ibrahim

Molecular, Cellular & Biochemical Pharmacology, PhD

Advisor: Jun-Ming Zhang, MD

Glucocorticoid Receptor Expression is Decreased in the Dorsal Root Ganglia in a Rat Model of Inflammatory Low Back Pain

Low back pain is a major health condition. It can progress to be chronic in many cases. It increases the burden on the society due to the direct cost of the treatment and the indirect cost of lowering the worker productivity. Low back pain can be caused by disorders of the lumbar intervertebral discs and compression of nerve roots. Because these conditions include inflammation, local injection of anti-inflammatory corticosteroids is a common treatment. However, current medications fail to work in many patients. Therefore, there is a need to optimize the treatments. Clinically used steroids for back pain injections target the glucocorticoid receptor (GR). However, *in vitro* studies show that they can also activate the mineralocorticoid receptor (MR) with significant potency. The MR is expressed in kidney, brain neurons and dorsal root ganglia (DRG). It plays an important role in water and electrolyte balance in kidneys, but in other tissues it has a pro-inflammatory role that may offset the anti-inflammatory effects of GR activation. Hence, we hypothesize that blocking the MR locally will improve the efficacy of clinically used steroids

for treatment of low back pain. To address our hypothesis, we propose the following specific aims: To characterize the expression/activation of GR and MR in the inflamed or compressed DRGs and to determine the role of combined GR agonist with MR antagonist on pain behaviors in two different rat models. This preclinical research will explore potential therapeutic target for low back pain which can be swiftly translated into

07

Julian Gartner

Germanic Languages & Literature, MA

Advisor: Tanja Nusser, Dr Habil

Heimat als Medialer Erinnerungsraum: Edgar Reitz Die Andere Heimat 2014

The term “homeland” exists in almost every language, yet it is a most specific and emotional term in different cultures. German film-maker Edgar Reitz’ tv-series “Heimat” (German for homeland) can be regarded as his opus magnum. Over thirty years, several seasons and more than 50 hours of film went into it. In my presentation of his 2014 movie “Die andere Heimat” (German for the other homeland), I will focus on 5 aspects of the German concept of homeland as seen in Reitz’ movie. I argue that movies offer a specific medial space of memory.

08

Joshua Eby

Physics, PhD

Advisor: L.C.R. Wijewardhana, PhD

Astrophysics of Collapsing and Colliding Axion Stars

Axion stars are condensed states of large numbers of axion particles, bound by self-gravitation and quantum self-interactions. The mass of weakly bound axion stars is limited by gravitational stability, with condensates exceeding the maximum mass subject to collapse. During the collapse process, the axion density increases and self-interactions become increasingly relevant. By taking additional interaction terms into account, we provide evidence that collapsing axion stars stabilize in a dense state that is larger than its Schwarzschild radius and so do not form black holes. During the last moments of collapse, number changing processes take place in the axion star with a very large rate, leading to emission of many highly energetic axions, which escape from galaxies and galaxy clusters. Finally, if axion stars are a significant fraction of cold dark matter, then frequent collisions with each other or with ordinary stars could catalyze this collapse process as well.

09

Pulong Ma

Mathematical Sciences, PhD

Advisor: Lei Kang, PhD

A New Class of Nonseparable Covariance Functions for Multivariate Gaussian Processes

Gaussian process is widely used as a surrogate to emulate many computationally expensive simulators (deterministic computer models) in uncertainty quantification field due to its good theoretic properties and computational convenience with separable covariance functions, which, however, ignores the interaction among input dimensions and performs very poor when quantifying uncertainties in outputs. We consider an additive Gaussian process with its covariance function coming from two parts, one of which is resulted from predictive process to capture large-scale variations, and the other of which has separable form with any covariance function for each input subspace. The resulting covariance function for the Gaussian process emulator is nonseparable and computationally efficient for very large datasets. Bayesian inference is adopted to quantify uncertainties in the outputs.

10

Pankaj Dwivedi

Cancer and Cell Biology, PhD

Advisor: Kenneth D. Greis, PhD

David Muench

Molecular & Developmental Biology, PhD

Advisor: H. Leighton Grimes, PhD

Quantitative Phosphoproteomic Analysis Reveals the Aberrant Receptor Trafficking in Mutated Granulocyte-Colony Stimulating Factor Receptors (G-CSFRs)

Granulocyte-colony stimulating factor receptor (G-CSFR) signaling plays a seminal role in neutrophil production through activation by its ligand, granulocyte colony stimulating factor (G-CSF). A series of CSF3R mutations have been reported to cause neutropenia and/or leukemia, and can be classified as either proximal point or distal truncation mutations based on where they occur in G-CSFR. A proximal point mutation, T618I, has been reported in >80% of the chronic neutrophilic leukemia (CNL) patients. Several distal truncation mutations of CSF3R are recorded in acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS) patient groups progressed from neutropenic condition. It is not clear how these two types of the mutated receptor signal differently compare to the normal receptor and lead to the leukemic condition. To address this, we developed an *in vitro* model system using virally transduced BaF3 cells expressing WT, proximal mutation T618I and distal truncation mutation

Q741x. The model was validated using immunoblots and phosphokinase array for STAT3/5 after G-CSF activation. To study phospho-signaling cascades, SILAC-based quantitative phosphoproteomics studies were performed with WT and mutant receptors by sequential enrichment for pTyr with pY1000 antibodies and pSer/pThr on TiO₂ followed by nanoLC-MS/MS analyses. We identified over 12,000 unique phosphorylation sites with quantitative changes in 60-70 pTyr sites and over 1,600 pSer/pThr sites in response to G-CSF stimulation and/or in WT versus mutant cell types. Our findings showed an upregulation of phospho-sites for the proteins involved in the receptor recycling/degradation mechanism by WT but not the mutant G-CSF receptors.

11

Thomas Ruhl

Geography, PhD

Advisor: Nicholas P. Dunning, PhD

Maya Water Management: Decentralized and Small-Scale Features

A study was undertaken with the intention of determining the nature and extent of ancient Maya elite-level control over water, through engineering and resource centralization. Water is particularly scarce in the area, which is subject to highly seasonal rainfall, and its availability throughout the year must have been a constant concern for the ancient Maya. Theories, based on data obtained from major cities and architectural works, suggests that the ability to store water during the rainy season and allocate it during the dry

season was a key factor for centralization and the rise of elite political power in the Maya Lowlands.

Despite impressive landscape engineering, obvious planning and centralized management in some major cities, evidence for such elite control as a coercive force is nowhere to be found. In addition, while data from the hinterlands—where the vast majority of the ancient population resided—are critically missing, examples of crude water management features have been found through ground survey, lucky excavations and now remote sensing, which is revolutionizing the field. As part of a current trend in ancient Maya studies, this research aims to provide information about commoners, expanding the general corpus of data, and give insight that could nuance theories that are built upon data mainly extracted from city centers and their centralized water management systems, which are biased reflections of an elite segment of the ancient Maya population more than of the civilization as a whole.

12

Salwa Ragab

Pharmaceutical Sciences/Biopharmaceutics, PhD

Advisor: Steve Danzer, PhD

Increase in Synaptic Input and Spontaneous EPSCs in PTEN KO Cells in Epileptic Mice is Associated with a Higher Dendritic Spine Density in KO Cells

Previously, we showed that knocking out the PTEN gene in the dentate granule cells (DGCs) of the hippocampus is sufficient to cause epilepsy in

mice. To evaluate how enhanced excitability occurs in the hippocampus when an animal becomes epileptic, we performed single cell recordings from PTEN knockout (PTEN KO) and control animals. Recorded cells were filled with biocytin and their morphology examined. Three different cell types were identified: normal cells from controls, PTEN KO cells and PTEN wild type (WT) cells from knockouts. Our results indicate that PTEN KO cells have profound physiological and morphological changes that could account for the increase in excitability of DGCs. Among the morphological changes is the appearance of hilar basal dendrite, hypertrophy of the soma and increased dendritic branching. In addition, PTEN KO cells had lower threshold to generate action potentials (AP) following the stimulation of the input pathway, perforant pathway (PP), and particularly a higher frequency of spontaneous currents (sEPSCs). To account for the increase in inputs to the KO cells, I investigated whether there is an increase in dendritic spine density since dendritic spines receive inputs from the PP. Results indicate that there is a statistically significant difference in spine density in the KO cells (3.14 ± 0.52 , mean \pm s.d., $n=14$), versus WT and control cells (1.69 ± 0.29 , $n=13$ and 1.86 ± 0.46 , $n=14$, respectively). The increase in inputs to the KO cells could be a plausible mechanism by which the cell becomes hyper excitable.

13

Chelsea Ritter

School Psychology, PhD

Advisor: Julie Morrison, PhD

J. Meredith Murphy

School Psychology, PhD

Advisor: Janet Lee Graden, PhD

The Use of Functional Analysis in Reducing Aggressive Behavior in a Seventh Grade Student with Autism Spectrum Disorder

A brief functional analysis (BFA) was conducted for aggressive behaviors exhibited by a seventh grade male with autism spectrum disorder. The results of the BFA indicated that the aggressive behaviors were maintained by a clear function of escape from task demand. Based on the results of the BFA, scheduled breaks were incorporated into the student's daily routine, as well as a visual schedule and access to additional breaks through the use of break cards. Reinforcement was provided to the student for using less than ten break cards per day. This intervention was shown to be effective at both increasing the student's engagement and decreasing unresponsive, non-compliant and aggressive behaviors. Fading and re-intensifying of this intervention was explored.

14

Ahmed Fahad

Literacy and Second Language Studies, EdD

Advisor: Holly A. Johnson, PhD

Understanding How Power and Identity Work in Interaction between Native and Non-native English Speakers

This study investigated power relations, identity development and shifting in the discourse of non-native speakers (NNSs) communicating with native speakers (NSs) in a U.S. Embassy grant program called the Alumni University Program (AUP). The communication among the NSs and NNSs participants was conducted via online platforms and face to face modes. The analysis followed Fairclough's (2001) Critical Discourse Analysis (CDA) approach using a three-dimension model that analyzed data that consisted of interviews, focus groups, reflective essays and artifacts of online communication. The purpose of this qualitative study was to understand how NNSs perceived their sense of identity and agency as they continued communicating with NSs over time via online and face to face interactions. The study focused on Iraqi citizens working in an academic program in which communications, both face-to-face and online, with NSs was necessary. Study findings revealed that the interplay of power and identity in the NSs and NNSs was clear through following specific discourse strategies from both the NS and NNS participants. The results of this qualitative study could assist in understanding the sociocultural factors surrounding online and face-to-face intercultural communication in an academic setting and how it could improve curriculum of L2 learning, especially in incorporating more authentic and comprehensible input into ESL and English as a Foreign Language (EFL) classrooms.

15

Todd Lingren

Biomedical Informatics, PhD

Advisor: John Harley, MD, PhD

Evaluating Difficulty of Gold Standard Generation for Machine Learning Prediction: ADHD Methylphenidate Response

Introduction: Up to 30% of attention-deficit/hyperactivity disorder (ADHD) patients receiving methylphenidate (MPH) do not demonstrate adequate therapeutic effects. To date, no phenotypic factors or patient characteristics have been identified that predict MPH response. We designed a chart review process to create gold standard annotation of MPH response, in order to develop personalized phenotypic response prediction algorithms.

Data & Method: Double annotation-based chart review chart review for 80 patients included four clinicians. We identified all patients with diagnoses of ADHD, MPH prescriptions and concurrent Vanderbilt score assessment (VSA). We defined a time event as an encounter with a VSA paired with a prior MPH order. Notes and VSAs were evaluated chronologically: 1) symptomatic response; 2) relation of response to MPH; 3) overall responder. Symptomatic response values range between 0 (worsen) and 3 (significant improvement). Judgments were adjudicated to create a gold standard. Pairwise inter annotator agreement (IAA) was measured using raw agreement and F1. We also conducted F1 on consecutive scales.

Results & Discussion: Raw agreement between chart reviewers was highly variant: symptomatic response (0.43-0.56, exact) and MPH response (0.66-0.82). There was a marked disagreement with significant

improvement judgments (0.40 ave F1). The low IAA derived in annotation suggested further difficulties in successfully developing a machine learning prediction model. Confounding factors in the IAA include discrepant VSAs from multiple sources, contradictory statements in the EHR notes and medication non-adherence. Future work includes investigating continuity of MPH treatment as a measure of response.

16

Leilei Shi

Electrical Engineering, PhD

Advisor: Leyla Esfandiari, PhD

Molecular Entrapment and Sensing by a Novel DEP-Nanopore

Most dielectrophoretic (DEP) trapping and sorting of cells, nanoparticles, DNA and other entities are carried out on microelectrode arrays or in microfluidic device formats. To realize trapping and sorting, peculiar design and complicated fabrication process, such as lithography, is needed in microelectrode arrays. In addition, the conventional methods require high operational voltage, which could be an issue for biological sorting and sensing. In recent years, nanopore has been used for DNA sequencing and sensing due to its low price, label-free criteria, high sensitivity and relatively easy fabrication process. However, less work has been done in utilizing a nanopore for molecular entrapment and sorting. Here, we reported a new method using a nanopipette to selectively trap molecules of interest with significantly low voltage. The sample with different surface charge density and diameters can be trapped by the nanopores. Moreover, as the target molecules were trapped by the pore, the unique conductance changes across

the pore indicated the sensing and entrapment of the specific molecule. octave intervals between 0.4 and 62 kHz. The results showed that octave-band chirps elicited higher CAP amplitudes than did tonebursts. Neural activation patterns indicated greater neural firing density at the peak location for octave-band chirps than for tonebursts across all frequencies. However, these patterns also showed a broader bandwidth of activation for the octave-band chirp stimuli than for tonebursts, opposite of what was hypothesized. This finding suggests that octave-band chirps could be the most optimal stimuli for assessing regional auditory nerve integrity.

17

Emily Jennings

Biological Sciences, PhD

Advisor: Joshua Benoit, PhD

RNA-Seq Analysis Sheds Light on the Molecular Mechanisms Underlying Pregnancy in the Live-Bearing Cockroach, *Diploptera punctata*

Viviparous reproduction is characterized by maternal retention of developing offspring within her reproductive tract during gestation, culminating in live birth. In some cases a mother will provide nutrition beyond that present in the yolk; this is known as matrotrophic viviparity. While this phenomenon is best associated with mammals, it is observed in insects such as the viviparous cockroach, *Diploptera punctata*. Female *D. punctata* carry developing embryos in the brood sac, a reproductive organ that acts as both a uterus and placenta by protecting and providing a nutritive secretion to the intrauterine developing progeny. While the basic physiology

of *D. punctata* pregnancy has been characterized, little is known about the molecular mechanisms underlying this phenomenon. This study combines RNA-seq analysis, RNA interference and other assays to characterize molecular changes associated with *D. punctata* reproduction and provides the most complete gene set to date for this species. A comparison of four stages of the female reproductive cycle revealed unique gene expression profiles corresponding to each stage. Differentially regulated transcripts of interest include the previously identified family of milk proteins, transcripts associated with juvenile hormone metabolism and other reproduction-associated transcripts. RNA interference experiments reveal potential impacts of juvenile hormone breakdown in maintaining pregnancy in *D. punctata*. Additional experiments explore the potential use of DNA methylation as an epigenetic mechanism in *D. punctata*.

18

Ankit Rana

Electrical Engineering, MS

Advisor: Leyla Esfandiari, PhD

Optimization of a Capillary Electrophoresis Sensor by Reducing the Induced Electro-Osmosis Flow and Successful Detection of Particles with Various Surface Charge Density

Biomolecular sensing applications are widely using the nanopipette-based sensor owing to its improved sensitivity, easy fabrication and cost-effectiveness. The two major forces which govern the sensor operation are electrophoresis and electro-osmosis, as charged macromolecules

travel toward the pore and block the passage of ionic current. Sequence-specific nucleic acid has been sensed using nanopores; though at the lower concentration, the sensitivity of the sensor is greatly reduced due to the induced opposing electroosmotic flow in glass nanopipettes. This relates to smaller field interaction and hence reduced or zero detection. In this work, we optimized our sensor's performance by analyzing the impact of electroosmotic force with changes in the salt concentration in electrolyte solution for particles with lower surface charge. As the charge was substantially reduced on the particle surface, in lower salt concentration regime at 1 mM, the electroosmotic force was prevailing and hindered the field driven microspheres and eventually detection. Further, as the concentration increased ten-folds to 10 mM, the electrophoretic force increased and overcame the electro-osmosis. This caused the blocking of the solid-state pore leading to effective detection of molecules. Over several trials in the higher salt concentration regime, the observed average percentage conductance change at the pore was 18.2%. The fluid flow patterns for varying salt concentrations resulting from finite element analysis were in treaty with the observed phenomenon. This is promising for real world sensor applications in the case of low concentration of target species to be detected.

19

Zuhair Abdulla

Neuroscience/Medical Science Scholars Interdisciplinary, PhD

Advisor: Matthew Skelton, PhD

Evaluating a Lack of Creatine in the Dopaminergic Neurotransmitter System

Creatine (Cr) is an intracellular buffer that maintains high levels of ATP through the Cr/Phosphocreatine (PCr) shuttle, where PCr donates its phosphate group to ADP, yielding ATP. Reductions in ATP and PCr are observed in the brains of people with Parkinson's disease (PD). Cr is also mitochondria-protective, and dysfunctional mitochondria have been observed in the brains of those with PD. Cr relies upon the Cr transporter (Crt) to enter cells. Mutation in the SLC6A8 gene, which encodes the Crt, result in Crt deficiency (CTD), a developmental disorder featuring intellectual disability, epilepsy, autistic-like symptoms, and a high comorbidity of ADHD—often attributed to dysfunctions in dopamine (DA) modulation. With this in mind, we generated DA-specific Crt knockout mice (DAT-Crt) and assessed them for PD-like symptoms and hyperactivity. Brain specific Crt knockout (BKO) were also included. Motor function was tested monthly from P90 until P360 in both light and dark phases. In the challenging beam (CB) task, mice traverse a four-segment beam, each 25 cm and 1 cm narrower than the previous. Errors, latency to transverse the beam and steps taken are recorded. Spontaneous activity was also assessed and number of fore and hind limb steps, rears and grooming events were recorded. No differences were found in parkinsonian measures. However, both DAT-CrT and BKO mice display

hyperactivity, evidenced by their quickness to cross the CB as well as increased locomotion during both light and dark phases. The hyperactivity in DAT-CrT mice suggests that depleting Cr in DA neurons results in hyperactivity. This also suggests energetic impairments in the DA system as a mechanistic factor of ADHD in CTD.

20

Ashley Vaughn

Educational Studies, PhD

Advisor: Marcus Johnson, PhD

Effectiveness of a Refutational Text on Teachers' Understanding of Influenza

Influenza is a potentially life threatening and costly viral infection. The Centers for Disease Control and Prevention (2016) recommends a yearly influenza vaccine to all individuals age six months or older. During the 2014–15 influenza season, the United States saw at least 40 million flu infections, 19 million medical visits due to influenza related problems and 970,000 hospitalizations (Centers for Disease Control and Prevention, 2016). Despite CDC (2016) recommendations, only one third of adults aged 18–49 were vaccinated. The CDC (2016) also estimates that nearly 7 million school age children (5–17 years) were infected by the influenza virus during the 2014–15 season. These individuals have a 30–50% influenza attack rate as well as remain contagious longer; because of this, schools play an important role in the management of influenza outbreaks (Ha, Rios and Pannaraj, 2013). As such, school age children and their teachers are an important subpopulation for disease control and education. However,

there is a dearth of research currently on the rate of influenza vaccination among teachers. Jones and Rua (2008) found that teachers hold similar understandings of microbes as their students, and that both teachers and students have a general lack of understanding about microbial pathogens and immune response (such as in influenza).

21

Matteo Lotito

Physics, PhD

Advisor: Philip C. Argyres, PhD

Uncovering Flavor Symmetries Through Geometry

We present a program to analyze the structure of 4d rank-1 $N=2$ Super-Conformal Field Theories, with the main goal of determining their flavor structure. The focus will be on trying to use the purely geometrical data available on the Coulomb Branch of their moduli space. This is in contrast to the classification we previously introduced, which relies on some additional algebraic structures. Once established, this program will allow us to extend the results in a more straightforward way to higher rank theories.

22

Alican Yildiz

Community Planning, MCP

Advisor: Christopher Auffrey, PhD

Seeking a Transformative Model for Food Access: A Mixed Methods Study of Cincinnati, OH

This thesis research intended to assess the association between the determinants of food access disparities and community-driven interventions in several Cincinnati neighborhoods, and to identify the food-related issues in urban areas that are symptoms of structural inequities within the U.S. food system. The research process is broken down into three sections:

1. Spatial analysis of food outlet locations in Cincinnati;
2. Spatial-statistical analysis of spatial disparities and socio-economic determinants; and
3. Explanatory-embedded case study of community-driven food access interventions.

The first section will provide spatial and quantitative outputs to understand where the disparities occur in regard to food outlet locations in Cincinnati. The second section identifies the factors associated with spatial disparities and socio-economic contexts of city residents, such as income and community capacity variables, which could be significantly associated with food access and the decisions of community-driven interventions in neighborhoods. The third section uses case studies of community interventions to test the factors identified in the second section using historical document analysis from web-based sources and informal interviews with four neighborhood organization responsible for food access

interventions. The discussions of analysis results help to show the potentials for integrating community-driven models into transformative planning policy and practice to address structural causes of diminished food access.

23

Stephen Riffle

Molecular & Developmental Biology, PhD

Advisor: Rashmi Hegde, PhD

Hypoxia and DNA Damage Repair in Multicellular Tumor Spheroids

As tumors outgrow local blood supply, oxygen gradients develop leading to regional hypoxia. Clinically relevant consequences of hypoxia include increased chemo- and radiation-resistance, increased metastatic potential, genomic instability and poor patient prognosis. Cells proliferating in hypoxic environments experience elevated levels of reactive oxygen species (ROS) and replication stress which necessitates activation of DNA repair proteins to facilitate survival and continued proliferation. Such proliferation has been correlated with tumor aggressiveness and lower disease free survival. Relatively little is known about activation of DNA damage repair (DDR) pathways under hypoxia outside the context of 2D monolayers which lack several aspects of the 3D tumor environment. Multicellular Tumor Spheroids (MCTS), however, recreate critical components of hypoxic tumors known to affect cellular responses to therapeutics and cell survival including proliferation, oxygen and nutrient gradients. The aim of this project is to establish an *in vitro* model system that mimics avascular regions of tumors and to use this system to compliment biochemical studies

linking hypoxia, ROS, DNA damage and the tumor cell response to both these stressors and targeted therapeutics.

24

Shima Dalirrad

Physics PhD

Advisor: Andrew Steckl, PhD

Cortisol Detection by Aptamer Based Strip Biosensor

Developing a robust, easy to use aptamer based colorimetric point of care diagnostic device to detect the stress and depression biomarker by using gold nanoparticles has been proposed. Cortisol is released by the adrenal cortex and plays an important role in body and brain function. Cortisol levels vary during the day and studies have shown that the cortisol level increase in response to both physical and psychological stresses, therefore cortisol is identified as a stress biomarker. The cortisol hormone plays an important role in physiological processes, and elevated levels lead to serious problems. Monitoring cortisol levels in patients suffering these problems could be helpful to assess their physiological state. Most of the cortisol methods of detection rely on antibody identification or complex laboratory techniques. Aptamers could be a great substitute for antibodies, due to several important advantages over antibodies. Experiments in solution could detect very low cortisol concentration in artificial sweat. This approach could serve as proof of principal work toward development of a robust paper based devices to detect the cortisol level in human sweat samples. Cortisol with various concentrations added to citrated rabbit blood. The red blood cells travel distance decreases linearly with increasing cortisol concentration due to

changes in blood viscosity. Another detection method was developed by using dry blood as an indicator in paper based devices to detect cortisol in artificial sweat. Due to low concentrations of cortisol in sweat and low sensitivity of dry blood approach, aptamers will be utilized in test strips due to their higher sensitivity and specificity.

25

Bryan Buechner

Business Administration, PhD

Advisor: Joshua J. Clarkson, PhD

Optimizing Self-Control as a Function of Political Ideology: The Importance of Vigilant Versus Adaptive Strategies

Though recent research demonstrates a self-control advantage of conservatives over liberals, two experiments detail how innate distinctions in self-control strategies lead conservatives to outperform liberals on tasks that demand vigilance but liberals to outperform conservatives on tasks that demand adaptation.

In an initial experiment, we presented 85 participants with an adaption task in the form of twenty-five trials of a card game in which the rules were ill-defined. The findings revealed that liberals exhibited greater self-control in the form of faster reaction times. In a subsequent experiment, 173 participants completed a classic number string task. The first twenty-five trials required vigilance whereas the second twenty-five trials required adaptation. Participants were presented with a rule to confirm in the first twenty-five trials and then that rule changed in the final 25 trials. The

findings revealed conservatives outperformed liberals on the vigilance trials, whereas liberals outperformed conservatives on the adaptation trials. Importantly, in both experiments, effects occurred controlling for relevant demographics and response accuracy.

These findings demonstrate that conservatives excel at tasks that require vigilance, whereas liberals excel at tasks that require adaptation. These findings not only offer novel insight into the effects of political ideology on self-control but they also emphasize the importance of different strategies when seeking to optimize self-control. Indeed, this latter conclusion is especially relevant as this work offers a novel perspective by which to interpret conflicting performance differences as a function of political ideology (e.g., intelligence).

26

Fatemesadat Mohammadi

Physics, PhD

Advisor: Hans Wagner, PhD

Exciton Emission from Bare and Hybrid Plasmonic GaN Nanorod

We study the exciton emission of hybrid gold nanoparticle/Alq₃ (aluminiumquinoline)/wurtzite GaN nanorods. GaN nanorods of ~1.5 μm length and 250 nm diameter were grown by plasma assisted MBE. Hybrid GaN nanorods were synthesized by organic molecular beam deposition. Temperature and power dependent time integrated (TI) and time resolved (TR) photoluminescence (PL) measurements were performed on bare and hybrid structures. Bare nanorods show donor (D_{0,X}) and acceptor bound

(A_{0,X}) exciton emission at 3.473 eV and at 3.463 eV, respectively. TR-PL trace modeling reveal lifetimes of 240 ps and 1.4 ns for the (D_{0,X}) and (A_{0,X}) transition. 10 nm gold coated GaN nanorods show a significant PL quenching and (D_{0,X}) lifetime shortening which is tentatively attributed to impact ionization of (D_{0,X}) due to hot electron injection from the gold nanoparticles. This is supported by electron energy loss spectroscopy that shows a redshift of a midgap state transition indicating a reduction of a preexisting band-bending at the nanorod surface due to positive charging of the gold nanoparticles. Inserting a nominally 5 nm thick Alq₃ spacer between the nanorod and the gold reduces the PL quenching and lifetime shortening. Plasmonic nanorods with a 30 nm thick Alq₃ spacer reveal lifetimes which are nearly identical to uncoated GaN nanorods.

27

Rajeswari Jayavaradhan

Pathobiology & Molecular Medicine, PhD

Advisor: Punam Malik, MD

KIT Blockade Is Sufficient for Donor Hematopoietic Stem Cell Engraftment in Fanconi Anemia Mice

Fanconi anemia (FA) is the most common cause of inherited bone marrow failure (BMF) and is also associated with a high incidence of cancer in these patients. Hematopoietic stem cell transplant (HSCT) is the only curative option for FA. However, due to the underlying DNA repair defect, FA patients poorly tolerate alkylating chemotherapy/total body irradiation (TBI) conditioning, which further augments their increased risk

Yuqian Zhang

Electrical Engineering, PhD

Advisor: Leyla Esfandiari, PhD

Sequence-Specific MicroRNA Detection by Induced Electroosmosis Flow inside a Borosilicate Capillary

Recently, there have been significant efforts in the identification and isolation of cancer-related biomarkers in body fluids such as circulating tumor cells, extracellular vesicles, cell-free DNA and microRNAs (miRNAs). Cancer detection based on circulating biomarkers is advantageous over the traditional tissue biopsy because it is minimally invasive and can serve as better representatives of the primary and metastatic sites and metastatic sites. To this day, a few hundred miRNAs have been identified in human cells and several have been shown to have either pro-oncogenic or tumor suppressing activities. MiRNAs are short, noncoding, ~22-nucleotide-long RNAs that regulate gene expression primarily at the post-transcriptional level. The primary function of miRNAs is to inhibit translation of target genes, but they can also process mRNAs for cellular decay and degradation. MiRNAs can be passively leaked from apoptotic cells or actively released by exosomes secreted from cells in to the blood stream. Traces of circulating miRNAs have been identified in blood serum, plasma, urine and sweat. Thus, they have a remarkable potential to be utilized as non-invasive diagnostic, prognostic and predictive cancer biomarkers. The overall goal of this project is to demonstrate the feasibility of a new nanopore sensing concept for sensitive and cost-effective detection of cancer-related miRNA biomarkers that does not rely on polymerase chain reaction (PCR) amplification and

of malignancies. Pre-transplant conditioning devoid of alkylating agents/TBI is a critical unmet need in FA patients. We found that FA hematopoietic stem/progenitor cells (HSPC) had several features suggestive of increased susceptibility to KIT blockade-mediated death: KIT surface expression, but not total expression, was lower in FA HSPC, while KIT-ligand expression was higher in FA stroma, suggesting increased KIT signaling in FA HSPC compared to normal HSPC; genes associated with apoptosis were significantly upregulated upon KIT-blockade in FA HSPC compared to controls. Indeed, FA HSPC demonstrated increased susceptibility to KIT-Ab-mediated killing both *in vitro* and *in vivo*. Definitive HSCT, using KIT-Ab conditioning resulted in normal donor HSC engraftment with multi-lineage reconstitution, which progressively increased to near-total normal chimerism over a 10 month period in *Fanca*^{-/-} mice. Overall, we show that KIT-blockade alone is an adequate, non-genotoxic, HSPC-targeted pre-transplant conditioning in *Fanca*^{-/-} mice. Its clinical translation can circumvent the extensive transplant-related morbidity/mortality and improve the short- and long-term HSCT outcomes in patients with FA.

does not require any special reagents other than a complementary sequence capture probe conjugated to polystyrene beads.

29

Noma Agbonifo

Occupational Safety and Ergonomics, PhD

Advisor: Kermit G. Davis, PhD

Inclined Surfaces: Impact on Postural Stability and Spine Loading

Workers perform manual materials handling (MMH) tasks on surfaces that are not perfectly flat. These may be sloped, slippery or uneven surfaces in construction, agriculture and maritime workplaces. Biomechanically, stable posture is maintained when the body's center of pressure (COP) remain within the base of support (BOS). Theoretically, this will be greatly distorted by potential increase in muscle coactivation and spine loads during MMH activities on these inclined surfaces. In 2013 alone, 170,450 cases were reported of work-related injuries to the back, spine and spinal cord. Currently, over \$90B is being spent annually on low back injuries/disorders. The objective of this study is to investigate the potential link between postural stability and spine loading from MMH on inclines and their interlinking mechanisms. To understand this, we are performing repeated-measures within subject experimental design by taking electromyography (EMG) of the ten major trunk muscles and eight postural stability muscles including COP and lumbar motion monitor (LMM) measurements while subjects lift a 20lbs box from shelf at knee

height from 3 different shelf locations (sagittal, 90o right and 90o left) while standing on three surface inclines (0o, 14o, and 26o). Data will be analyzed using repeated measures ANOVA, linear regression analysis and structural equation modeling of the biomechanical factors relating to spine loads. Our expected results will determine the impact of surface inclines, task asymmetry and lift type (1 hand vs. 2 hands) on 3D spine loads, trunk kinematics and kinetics, and postural sway including their potential relationship

30

Ivayla Gyurova

Pathobiology & Molecular Medicine, PhD

Advisor: Stephen Waggoner, PhD

The Pursuit of Better Vaccines: Uncovering the Function of Human Cytomegalovirus-Induced NK Cell Subsets

Cytomegalovirus infection (CMV) poses a considerable burden to public health due to significant morbidity and mortality in immunocompromised patients and babies born with the infection, thus highlighting the priority of developing a successful CMV vaccine. Whereas previous CMV vaccination strategies have aimed to induce T- and B-cell responses, we speculate that natural killer (NK) cells hold the key to protective immunity based on the evidence that patients lacking NK cells suffer recurrent, severe infections with multiple herpesviruses, including CMV. Notably, CMV infections in both mice and humans triggered accumulation of unique adaptive NK-cell subsets that putatively possess enhanced effector functions against CMV. This suggests that a pioneering approach to creating an efficacious

CMV vaccine would include stimulation of the accumulation and long-term maintenance of these CMV-reactive NK cells. It remains unknown, however, whether vaccines can be designed to stimulate the expansion of these NK-cell subsets. Here, using a unique set of samples collected during a CMV vaccine trial, we aim to determine whether vaccination promotes accumulation of these NK cells. Moreover, we examined the relationship between the activity of NK cells and stimulation of virus-specific T- and B-cell responses during immunization and in cell culture. Preliminary analysis revealed a supportive role for NK cells in stimulation of CMV-specific T-cells during *in vitro* culture with peptide which correlates to the presence of adaptive NK cells. Our studies represent a key step in understanding the potential role of subsets of human NK cells in primary CMV infection and vaccine-induced immune responses against CMV.

31

Caroline Bozzi

Architecture, MArch

Advisor: Mike Eriksen, PhD

Anthony Bridgewater

Community Planning, MCP

Advisor: Mike Eriksen, PhD

Innovation in Affordable Housing

The need for quality, affordable housing has never been greater. At its best, housing can help strengthen the social and physical fabric of

communities and neighborhoods. It is the hope of HUD and PD&R that by initiating and funding this competition, Innovation in Affordable Housing, a new generation will advance the design and production of livable and sustainable housing for low- and moderate-income people through research and innovation. The competition specifically asks teams to identify and develop innovative ideas and solutions for affordable family housing. Our approach to this competition provides innovative solutions while balancing affordability with resource efficiency, durability, and resiliency.

32

Ahmad Hanandeh

Mathematical Sciences, PhD

Advisor: Lei Kang, PhD

Nonstationary Nearest Neighbors Gaussian Process

Modeling is an essential part of research and development in almost every sphere of modern life. Computer models are frequently used to explore physical systems, but can be computationally expensive to evaluate (taking days, weeks or possibly months to run single simulation at one input value). In such settings, an emulator is used as a surrogate. Gaussian Process (GP) is a common and very useful way to develop emulators to describe the output of computer experiments and to describe computationally expensive simulations in uncertainty quantification. Recently, much attention has been paid to dealing with large datasets which can be found in various fields of the natural, social sciences and modern instruments. This resulted in an increasing need for methods to analyze large datasets. However, GP is nonparametric, meaning that the complexity of the model grows as

more data points are received. As a result, it faces several computational challenges for modeling large datasets because of the need of calculating the inverse and determinant of large, dense and unstructured matrix. Therefore we need alternative methods to analyze such large datasets. Various methods have been developed to deal with this problem, including Nearest Neighbors Gaussian Process (NNGP). However, NNGP doesn't perform very well if the field is nonstationary. The purpose of my research is to develop a methodology that deals with the nonstationary problem as well as reduces the computational complexity.

33

Jonathan Thompson

Physics, PhD

Advisor: Hans Wagner, PhD

Index Matching of TE and TM Modes in Organic Multilayer Waveguides

We investigate transverse electric (TE) and magnetic (TM) mode propagation in organic multilayers consisting of aluminum quinoline (Alq_3) and perylenetetracarboxylic dianhydride (PTCDA). We analyze two multilayer waveguides, Alq_3 -PTCDA- Alq_3 and PTCDA- Alq_3 -PTCDA, as well as an effective medium of alternating PTCDA- Alq_3 layers, engineered to give index matching according to our model. The waveguides were grown on a glass substrate via organic molecular beam deposition. Fabry-Perot oscillations observed from reflection measurements were used to confirm the individual layer thicknesses. We could observe refractive index matching between TE_0 and TE_1 , as well as TE_2 and TE_3 modes for the PTCDA- Alq_3 -

PTCDA waveguide due to the light propagation through the top and bottom PTCDA layers, respectively. In addition, we could match TE_1 and TM_1 , as well as TE_3 and TM_3 modes in the Alq_3 -PTCDA- Alq_3 multilayer due to the birefringence of the PTCDA layer. Furthermore, we can create mode matching for a range of wavelengths due to the similar effective refractive index dispersion of different waveguide modes. The ability to phase match different waveguide modes opens a wide range of potential applications including polarization-insensitive propagation and mode switching by adding a thin magnetic metal film within the waveguide and applying an external magnetic B-field.

34

Amanda Powers

Biological Sciences, PhD

Advisor: Joshua B. Gross, PhD

Cranial Asymmetry Manifests Later in the Life History of the Blind Mexican Cavefish, *Astyanax mexicanus*

The blind Mexican cavefish, *Astyanax mexicanus*, has undergone extensive morphological changes, such as eye loss and pigmentation regression, following colonization of numerous caves in northeastern Mexico. Extant surface-dwelling forms of this species provide powerful comparisons between ancestral and derived morphologies. Several populations of cavefish are completely eyeless and harbor dramatic changes in the shape and positioning of cranial bones. Cavefish also manifest lateral asymmetries in their skull, such as bony fragmentations or fusions that are randomly present on only one side of the face. Using a geometric

morphometrics approach to capture shape variation, we performed shape analyses of the chondrocranium and osteocranium across ontogeny. We performed these studies in surface-dwelling fish and two different cavefish populations. Chondrocranial shape was bilaterally symmetric and similar in juveniles (6-8 dpf) across all three populations. However, overall osteocranial shape segregated into significantly distinct groups in adult fish ($p=0.0082$). Cavefish demonstrated intra-individual shape asymmetry in lateral bones surrounding the collapsed eye orbit and the opercle bone posterior to the orbit ($p=0.0002$). Interestingly, we discovered that cavefish exhibit a dorso-cranial bend biased to the left, resulting in significant directional asymmetry of skull shape ($p=0.0409$). This observation may relate to observed asymmetries with the lateral line sensory system and putative “handedness” associated with swimming behavior. This work reveals dynamic changes to the craniofacial skeleton over the course of life history, which evolved in response to extreme environmental pressures of the cave.

35

Lori Foote

Educational Studies, PhD

Advisor: Sarah M. Stitzlein, PhD

Examining Math Supports Across Socioeconomic Contexts: A Comparative Mixed Methods Case Study

U.S. educational policy has determined goals for mathematic excellence and equity, yet data at state, national and international levels indicate that

much progress still needs to be made. Elementary math education provides foundational understandings necessary for related, more complex math coursework, yet data shows students can fall behind and little is known about how, or if, these students catch up. Math supports, such as differentiation and small group instruction, may be helpful for ensuring all students succeed. The aim of this proposed sequential mixed methods study is to determine the types of mathematics supports available in high-achieving schools serving grades three through six across various demographic contexts within the state of Ohio. In the first, quantitative phase of the research, school-level demographic data will be used to group schools into clusters according to the percentage of low socioeconomic status students they serve. School-cases within two clusters serving either high or low percentages of low socioeconomic status students, who have demonstrated success in math achievement compared to their cluster, will be examined in-depth in the second, qualitative phase of the study. Interviews with key personnel and math planning documents will be used to develop individual school-case descriptions related to the types of mathematic supports available to students who struggle. Cross-case analysis of individual schools, within and across clusters, will be used to identify mathematics supports enacted across demographic setting, informing refined theoretical propositions regarding access to supports. The results of the study will have policy implications for policymakers and administrators.

36

Rachel Gilbert

Biological Sciences, PhD

Advisor: George Uetz, PhD

The Influence of Pathogenic Infection on Host Microbiome

Research has shown that the microbiome can have significant impacts on host immunity and susceptibility to parasites and pathogens. Few studies have examined the lingering effects of pathogenic infection on the microbiome and especially the life history tradeoffs that can occur from persistent infections. Even less clear is how a host is able to balance the fitness tradeoffs required to both fight off infections and simultaneously perform costly behaviors such as mating and reproduction. In this study, we infected male *Schizocosa ocreata* wolf spiders as juveniles (penultimate) or as adults with the bacterial pathogen *Pseudomonas aeruginosa* in order to investigate whether there were significant changes in the composition or proportions of the microbiome associated with infection. Whole organism 16S rRNA sequencing revealed that males infected as juveniles had a significantly altered adult core microbiome compared to controls and to adult infected males, as well as a greater proportion of pathogenic bacteria. This fundamental shift in the structure and function of the adult microbiome in juvenile infected males is consistent with behavioral and physiological evidence showing that these males have a significantly lower body condition, lower quality secondary sexual signals and lower mating success. These males also had significantly higher immune function than control individuals, which is interesting given this new data which shows that juvenile infected males may have a higher proportion of pathogenic

bacteria present. This suggests that the immune response may be activated or upregulated as a way of coping with the abundance of novel and/or pathogenic bacteria, as seen in other invertebrate species.

37

Wenlong Zhang

Civil Engineering, PhD

Advisor: Ala Tabiei, PhD

Fatigue Life Prediction of Adhesive Joints in Automotive Industry

Composite and adhesive joints are used more and more in the automotive industry, not only because of the government policy but also their advantages in mechanical properties over traditional materials and joints. One hot pursued research area is the fatigue analysis of adhesive joints. In this presentation, a methodology to predict the fatigue life of adhesive joint is proposed and implemented into LS-DYNA as a user defined cohesive material. Fatigue crack growth rate is used to obtain the fatigue damage accumulation rate in cohesive zone model. Our method is verified by numerical simulations of two commonly used adhesive joints in automotive industry: single lap joint and stepped lap joint. The predicted S-N curve fits well with the experiment data.

38

Chun Liang

Communication Sciences and Disorders, PhD

Advisor: Fawen Zhang, PhD

The Acoustic Change Complex (ACC) Evoked by Frequency Changes in Cochlear Implant Users and Normal Hearing Listeners

Background: The ability to detect fine frequency changes plays a crucial role in speech understanding and music perception in cochlear implant (CI) users (Gifford et al., 2014; Won et al., 2014; Kenway et al., 2015). Acoustic change complex (ACC) is a cortical response that can be evoked by frequency change in an ongoing stimuli. However, it is unclear if ACC are related to behavioral frequency change detection. The aim of the current project is to determine if the ACC can serve as an objective tool to predict frequency discrimination capability measured behaviorally.

Method: Ten CI users and 12 normal hearing young (NH) listeners participated in this study. For the psychoacoustic test, stimuli were a series of 160 Hz base frequency tones containing different magnitudes of upward frequency changes at 0.5 sec after the tone onset. An adaptive, 2-alternative forced-choice procedure was employed to measure the minimum frequency change. For ACC recording, the stimuli are similar to those in the psychoacoustic test, but the base frequencies were 160 Hz and 1200 Hz with 3 types of frequency change (0%, 5% and 50%).

Results: The CI users exhibited much higher thresholds in frequency change detection compared to NH listeners. The components of ACC showed longer latencies and smaller amplitudes in CI group. The NI' latency

is significant correlate to behavioral frequency change detection threshold.

Conclusions: The ACC is a useful objective tool for assessing the capability in frequency change detection, which is critical for speech perception performance.

39

Abigail Richard

Mathematical Sciences, PhD

Advisor: David A. Herron, PhD

Gromov-Hausdorff and Pointed Gromov-Hausdorff Distance

Space is a common word that everyone knows. Each location on Earth takes up a certain amount of space, and we use distance to describe the closeness of these spaces. In mathematics, we often deal with what is known as metric spaces, and distance can also be used to describe the closeness of metric spaces. However, in order to describe the distance between metric spaces, we have to use a specialized form of distance. One such specialized form is called Gromov-Hausdorff distance. In addition to discussing metric spaces and Gromov-Hausdorff distance, we will also discuss pointed metric spaces and explain pointed Gromov-Hausdorff distance.

40

Enas Ghulam

Biostatistics (Environmental Health), PhD

Advisor: Marepalli B. Rao, PhD

Comparing the Effects of FDR and FWER, With and Without Filtering, for Gene Expression Data

DNA microarray, also referred to as a biochip, is mainly used to quantify gene expression across conditions. Microarray is capable of measuring and comparing tens of thousands of genes at the same time. It is predicted that the number of non-differentially expressed genes will be larger than the differentially expressed ones. This is expected to cause dimensionality issues. Multiple testing corrections method can result in reducing the ability to detect genes that are considered to be truly differentially expressed. One strategy to tackle the above-described problem is to filter out non-informative genes. It allows for reduction in the number of the null hypotheses. This will then be followed by performing the multiple testing corrections on genes that are considered to have a high probability of being truly differentially expressed. The objective of this study is to examine the effects of fold change filtering in combination with the Bonferroni Procedure for Family Wise Error Rate control and the Benjamini-Hochberg Procedure for False Discovery Rate control. This project will explore the effects of various thresholds of fold change. Furthermore, a new criteria to determine optimal threshold for gene filtering is also proposed. The criteria is based on the adaptation of the Receiver Operating Characteristic (ROC) analysis to the filtering environment. By performing analyses of simulated datasets, it was demonstrated that the ROC Curve using Local FDR thresholds criteria

increases the accuracy of identifying true differentially expressed genes compared to percentiles thresholds criteria of filtering microarray data using fold change.

41

Caroline Williams

Chemistry, PhD

Advisor: William B. Connick, PhD

Mechanistic Intermediates of a Vaporchromic Platinum(II) Salt

Vapochromic materials, which undergo a significant color change when exposed to organic vapor compounds, have potential to be made into environmental sensors. Solvates of platinum(II) terpyridine chloride perchlorate ($[\text{Pt}(\text{tpy})\text{Cl}]\text{ClO}_4$) behave differently from each other and the vapor exchange between solvates allows for the long range lattice structure to be preserved. Single crystal-to-crystal comparison after a vapor exchange has only been observed previously in two compounds. In this study, the intermediates of $[\text{Pt}(\text{tpy})\text{Cl}]\text{ClO}_4$ when exposed to different vapors (H_2O , THF, DMF) were observed via x-ray powder diffraction.

42

Jennie Cox

Industrial Hygiene (Environmental Health), PhD

Advisor: Tiina A. Reponen, PhD

Efficiency of a Portable Air Cleaner in Reducing Children's Exposure to Aerosol Particles

Indoor environment, a place where people spend more than 80% of their time, is affected both by indoor and outdoor particulate pollution sources. One important source for particulate pollution is the infiltration of outdoor particles into the indoor air environment. The overall goal of this study is to assess the efficiency of high efficiency particle air (HEPA) filtration in the home for reducing exposure to particles, with a special emphasis on traffic related particles. We also explore the effect of this intervention in reducing children's asthma. Subjects are randomized to either HEPA or dummy air purifier (air cleaner without the filter) groups for one month, followed by one month wash-out period, then will cross-over to the other treatment arm for an additional month. The measured pollutants are: particle mass <math><2.5 \mu\text{m}</math> in size (PM_{2.5}), elemental carbon contribution of PM_{2.5} (EC) and fungal spores. The fungal spore samples are analyzed for 36 fungal species using the mold-specific quantitative polymerase chain reaction assay. Preliminary results obtained in four homes show that the average (\pm standard deviation) indoor fungal spore concentration was 109 ± 124 and 3 ± 2 spores/m³ before and after the HEPA treatment, respectively. The respective indoor concentrations before and after the dummy treatment were 215 ± 178 and 143 ± 255 spores/m³. Furthermore, the average (\pm standard deviation) of indoor-outdoor ratios of fungal spores were respectively 0.226 ± 0.274 and

0.007 ± 0.006 before and after the HEPA treatment. The respective ratios before and after the dummy treatment were 0.139 ± 0.170 and 0.145 ± 0.141 . Pilot data show that the HEPA treatment reduces fungal spore, PM_{2.5} and EC concentrations.

43

Hannah Flood

Cancer and Cell Biology, PhD

Advisor: Vladimir Kalinichenko, MD, PhD

The Forkhead Box F1 Transcription Factor Acts as a Negative Regulator of Pro-Fibrotic Genes in Hepatic Fibrosis

Hepatic fibrosis is the end stage to many chronic liver injuries and is characterized by an extracellular matrix (ECM) and collagen deposition. During fibrosis, ECM and collagen build fibrotic lesions between portal veins, impairing liver function. These scars are secreted by hepatic stellate cells (HSC). After liver insult, quiescent HSCs are activated differentiate into myofibroblasts. The forkhead box F1 (Foxf1) transcription factor is expressed in quiescent and activated HSCs. Previous studies have shown that Foxf1 is required for HSC activation; however, the role of Foxf1 in the progression of fibrotic diseases remains unknown.

To inactivate Foxf1 in HSCs, we generated transgenic mice containing a tamoxifen-inducible aSMA-Cre-ER transgene and two Foxf1-floxed alleles (aSMACreER;Foxf1^{fl/fl}). To induce liver fibrosis, we utilized a carbon tetrachloride-induced chronic hepatic injury model. Mice were harvested after 5 weeks. Protein and RNA were isolated from the caudate

lobe of the liver, and the remainder of the liver was paraffin-embedded for immunohistochemical (IHC) analysis.

The aSMACreER;Foxf1fl/fl mice show more severe liver injury than Foxf1fl/fl mice, as demonstrated by H&E and trichrome staining. The loss of Foxf1 resulted in a significant increase in fibrosis as shown by IHC for aSMA and desmin, along with increased mRNA expression levels of TGF- β , collagen 1a1 and collagen 3a1. Finally, RNA-sequencing of isolated HSCs reveal that the loss of Foxf1 results in an increase of multiple pro-fibrotic genes. ChIP-Sequencing of MFLM-91u cells reveals that Foxf1 directly binds to the promoter region of these genes. These studies show that Foxf1 negatively regulates pro-fibrotic genes during hepatic fibrosis.

44

Eugenia Mazur

Romance Languages & Literatures, PhD

Advisor: Michael R. Gott, PhD

María Carmen Hernández

Romance Languages & Literatures, PhD

Advisor: Michael R. Gott, PhD

Liquid Identities: The Poetics of Water in Accented Cinema

“Accented cinema” is a term coined by Hamid Naficy which encompasses contemporary films that focus on migration, exile and diaspora from an intimate perspective. These films often involve stories of migrant and

displaced workers who live in multi-cultural, multi-lingual spaces. This research focuses on three accented films and analyzes how water, as the most basic element of human life, provides a representation of the social and physical interstice in which these individuals live, both as a real tangible medium and as a poetic representation of the instability of the characters’ lives, molding ever changing identities with significant consequences in modern societies.

45

Chaochang Li

Molecular & Developmental Biology, PhD

Advisor: Rulang Jiang, PhD

Pax9 and Wnt Signaling Converge on the Regulation of Palatogenesis

Cleft palate is a common birth defect caused by disruption of palatogenesis during embryonic development. Previous studies have shown that disruption of each of major signaling pathways, including Bmp, Fgf and Wnt signaling, causes cleft palate in humans and mice. Pax9 single-nucleotide polymorphisms have been associated with nonsyndromic cleft lip with or without cleft palate (NSCL/P) in humans. It is a transcription factor expressed in the developing palatal mesenchyme. Disruption of Pax9 functionality results in cleft palate in mice. Although Wnt signaling has been associated with NSCL/P, little is known about how Wnt signaling is integrated with Pax9 and other pathways in the control of palatogenesis. We found that genetic or pharmacological modulation of Wnt signaling

could rescue palate development in Pax9 mutant mice. On one hand, 70% of Pax9del/del embryos exhibited fused middle and posterior secondary palate (n=10) when the dams were injected at E12.5, E13.5 and E14.5 with Dkk inhibitor IIC3a. Dkk2 is expressed in the medial side of palatal shelves from E12.5 to E13.5. It is up-regulated in the middle and posterior region of palatal shelves of Pax9del/del embryos. On the other hand, genetic removal of Wise, a Wnt antagonist, rescued 70% of cleft palate in the Pax9del/del embryos (n=20). Cell density is restored in the middle region of palatal shelves of Pax9del/del ; Wise-/- embryos at E13.5, and palatal elevation is rescued at E14.5. Besides, Wnt target gene, Cyclin D1 is down-regulated in the palate shelves of Pax9del/del embryos. Our data suggest that Pax9 and Wnt signaling converge on the regulation of key regulatory pathways of palate development.

46

Safa Khodabakhsh

Materials Science, MS

Advisor: Vijay K. Vasudevan, PhD

The Effects of UNSM on AA7075

Effects of UNSM (a kind of surface treatment) on the corrosion behavior (SSRT, polarization, proof ring) of AA 7075 will be discussed.

47

Christine Uebel-Niemeier

Industrial Hygiene (Environmental Health), PhD

Advisor: Tiina A. Reponen, PhD

Effect of Early Exposure to Traffic-Related Air Pollution on the Bacterial and Fungal Respiratory Microbiome

Exposure to traffic-related air pollution (TRAP) has been associated with the exacerbation of existing asthma and the incident asthma of young and adolescent children. Particulate matter found in TRAP has the potential to cause damage, inflammation and oxidative stress in the respiratory tract. Damage to the respiratory epithelial tissue has been demonstrated to affect the adherence of bacteria to the lungs. Therefore, exposure to TRAP may affect the microflora that persists in the respiratory tract, playing a role in the development of asthma. This investigation hypothesizes that exposure to traffic-related air pollution early in life significantly alters the diversity of microorganisms in the lower respiratory tract in children and this effect persists to early adolescence. Forty children, ages 12-16, will be recruited from the Cincinnati Childhood Allergy and Air Pollution study, a birth cohort with well-characterized exposure and health history, and then divided into two groups, high and low exposure, based on *a priori* TRAP exposure data. Sputum samples will be collected and used to characterize the bacterial and fungal microbiome of the lower respiratory tract. Both Illumina MiSeq and qPCR will be utilized. Environmental samples from the homes of the children will also be collected for comparison.

48

Toritseju Omaghomi

Environmental Engineering, PhD

Advisor: Steven G. Buchberger, PhD

Residential Water Demand Calculator (WDC)

The design of indoor water distribution systems in buildings is a function of the fixture characteristics such as type, number, flow rate and the probability of use. These fixture characteristics are gotten from observation, fixture specification by the manufacturer and the analysis of water use data in residential buildings. Fixture characteristics are parameters needed to estimate the expected water demand and size the pipes downstream of any section within the building. The current method for estimating demand and pipe sizing prescribes a one-size-fits-all method; however, buildings such as residential building have exaggerated water demand estimates and are usually oversized due to an inappropriate method.

Our research shows that although the parameters needed to estimate water demand in a building remains the same, different methods are necessary for accurate demand estimates depending on the size of the building/number of fixtures. The challenge then is developing a tool for the smooth transition between methods of estimating demand for discrete water use from few fixtures and continuous water demand from many fixtures.

The WDC is a one-stop tool to estimate water demand necessary for pipe sizing from 4 different methodologies. The WDC was developed in Microsoft Excel and it needs only the number of fixtures as input from the

user. It uses the combination of total fixture count and fixture probability of use to choose the proper method. The up to date fixture probability values and smooth transitions between methods in the WDC emphasize a versatile tool to estimate water demand reflecting today's water use habits irrespective of the building size.

49

Allison Young

Geology, PhD

Advisor: Carlton E. Brett, PhD

A Comprehensive Look at the Late Ordovician (Katian) Upper Lexington Equivalents of Eastern Ohio: Differentiating the Utica – Pt. Pleasant System

The “Utica Formation” and “Point Pleasant” (mixed shale and thin limestones) of driller’s terminology is a major target for unconventional oil and gas development in eastern Ohio, and is the largest producing unit in the state of Ohio. Despite major production yields from this unit, the paleoenvironmental interpretations, stratigraphic nomenclature, and litho-, chemo- and sequence stratigraphic framework of this region remains poorly understood. Here, we present a detailed analysis of a single drillcore from Cadiz, Ohio, using an integrative chronostratigraphic approach to tie the sequences of this Point Pleasant basin section to those of the shallow-water Lexington Platform and to develop a paleoenvironmental interpretation of this distal section. We analyzed the 100-m-thick Cadiz core for major and trace-element concentrations (XRF), total organic carbon (TOC%)

and carbonate carbon isotopes at a high stratigraphic resolution (~50 cm intervals). Environmental fluctuations were interpreted on the basis of widely used geochemical proxies, developed from modern and ancient marine systems. These results, set within a framework of biostratigraphy and faunal epiboles, suggest that distal expressions of the Lexington Formation are recognizable despite the absence of major well-differentiated sequences. We infer that the “Utica Formation” of eastern Ohio is a more distal expression of the Bromley Member through Kope Formation of the well-differentiated Lexington Platform. The highest TOC% zone occurs below the “Utica Formation” in the so-called “Point Pleasant Formation,” the shalier regional expression of the middle/upper Lexington Formation approximately equivalent to the Brannon Member.

50

Shana White

Biostatistics (Environmental Health), PhD

Advisor: Mario Medvedovic, PhD

KEGGlincs Design & Application: An R Package for Exploring Relationships in Biological Pathways

The Library of Integrated Network-based Signals (LINCS) project is a data generation venture that is a quintessential example of current efforts concerning “big data” in the biomedical research environment. One element of this project is the production of gene expression profiles corresponding to individual gene knock-outs within specific cancer cell lines. The R package

“KEGGlincs” and the companion data package “KOData,” both recently published with the latest version of Bioconductor (3.4), were developed to promote synergy between existing pathway structures from the Kyoto Encyclopedia of Genes and Genomes (KEGG) and LINCS data in order to reveal mechanisms of biochemical signaling processes that display heterogeneity across different types of cells. KEGG pathways are manually-curated biological pathways represented as networks of nodes (genes) and directed edges whereby experimental evidence determines the nature and direction of an edge (relationship) between genes.

The LINCS data available from the KOData resource along with the functionality offered by KEGGlincs allow for the investigation of relationships between genes in a given pathway in a cell-type-specific manner via analysis of overlapping de-regulated genes corresponding to pairs of experimental knockouts. This approach to pathway analysis yields quantitative measures and a novel method for annotating relationships (edges) between genes programmatically created in R and automatically visualized in an interactive session via Cytoscape software.

51

Sushmitha Vallabh

Immunology, MS

Advisor: Artem Barski, PhD

Epigenetic Reprogramming at the IL4 Locus

Hypersensitivity reactions such as asthma are characterized by an increase in the levels of the IL-4 cytokine which is released by Th2 cells.

More number of positive histone marks in memory T cells compared to naïve T cells is thought to be one of the reasons of the rapid recall ability of these cells to release lineage specific cytokines immediately after antigen exposure. This suggests that histone modifications could make a gene more poised for transcription, allowing the cells to release cytokines rapidly. But it is still unknown if the deposition of negative histone marks could repress IL-4 expression in Th2 cells. Therefore we hypothesize that histone modifications can play a role in epigenetic programming at the IL4 locus of Th2 cells in asthma.

To demonstrate this, we build constructs carrying the catalytic domains of epigenetic modifying enzymes SUV39h1, G9a and LSD1. SUV39h1 and G9a can repress the transcription of genes by depositing the negative histone marks H3K9me1/2/3. LSD1 can repress transcription by removing positive histone marks- H3K4me1/2/3. We direct the enzymes to the IL4 locus of mouse Th2 cells using the DNA-binding domains, TALE domain. Our preliminary studies show that the epigenetic modifying enzymes (SUV39h1, G9a and LSD1) can indeed decrease the expression of IL-4 by histone modifications. We are now working on further establishing a causal relationship between histone modifications and gene expression, which can be important in the treatment of diseases and immune therapies.

52

Stephani Kim

Epidemiology (Environmental Health), PhD

Advisor: Aimin Chen, MD, PhD

Adverse Birth Outcomes Associated with Exposure to Informal E-Waste Recycling Metal Mixture

Electronic waste is the fastest growing waste stream in the world, expected to rise to 50 million tons per year by 2018. Although methods to properly recycle e-waste exist, many sites around the world use primitive methods leading to environmental contamination and affecting human health. Guiyu, a rural town in Shantou, China, once labeled the “e-waste capital of the world,” has been recycling e-waste since the mid-1990s. The Electronic waste Recycling and Community Health Study enrolled 899 pregnant women residing in Guiyu and a non-recycling control site 30 miles away, Haojiang, from 2011-12. The women completed a questionnaire and gave biological samples for Pb, Cd, Cr and Mn assays using AAS. Pb, Cd and Cr in maternal blood and Cd, Cr and Mn in maternal urine were significantly higher in Guiyu than Haojiang. The geometric mean (GM) of maternal blood Pb was 6.7µg/dL in Guiyu (range: 1.9-27.1), higher than 3.8µg/dL in Haojiang (range: 0.9-16.1). In cord blood, only Pb was significantly higher in Guiyu versus Haojiang, with a GM of 5.2µg/dL and 3.2µg/dL, respectively. Neonates in Guiyu had smaller covariates adjusted head circumference (mean: 34.3 vs. 35.3cm, adjusted β : -0.6 [95% CI -1.0, -0.3]) and Ponderal Index (mean: 23.5 vs. 25.5 kg/m³, β : -2.0 [-2.6, -1.4]), compared with neonates in Haojiang. In conclusion, primitive e-waste recycling is associated with high exposure to heavy metals and adverse birth outcomes.

53

Kaitlin Carroll

Immunology, PhD

Advisor: Jonathan Katz, PhD

Extending the Utility of Mitoxantrone by p53 Potentiation in Experimental Autoimmune Encephalomyelitis and Multiple Sclerosis

Multiple sclerosis (MS) is a chronic autoimmune disease of the central nervous system that results in motor and cognitive impairments due to immune-mediated neural demyelination. Though treatments with long-term, first-line therapeutics are effective in patients with the relapsing-remitting form of MS, highly active progressive forms of the disease are treated with more aggressive therapies, such as the topoisomerase II inhibitor mitoxantrone. Mitoxantrone treatment shows significant clinical benefits, but also confers the potential for adverse effects including cardiotoxicity and leukemia. Thus, it has a finite cumulative dose of approximately 3 years' treatment, limiting its utility in treating a chronic lifelong disease. Because mitoxantrone generates double-stranded breaks in the DNA of rapidly dividing cells, leading to the activation of master regulator p53, we hypothesize that the addition of the MDM2 antagonist nutlin-3 has the potential to increase mitoxantrone's efficacy in killing pathogenic lymphocytes. Here we demonstrate that a combination of nutlin-3 and mitoxantrone in the treatment of MS increases the treatment's efficacy in killing pathogenic lymphocytes, enabling the usage of a lower dose of mitoxantrone by pushing the targeted cells towards apoptosis. We show a similar reduction of CNS-infiltrating lymphocytes with high-

dose mitoxantrone (2.5 mg/kg) and low-dose mitoxantrone (0.5 mg/kg) combined with nutlin-3. Utilizing this new drug combination has the potential to extend the use of the drug for each patient, substantially increasing its utility without increasing the associated adverse effects.

54

Carla Luevano

School Psychology, PhD

Advisor: Renee Oliver Hawkins, PhD

Hallie Fetterman

School Psychology, PhD

Advisor: Renee Oliver Hawkins, PhD

The Use of a Brief Functional Analysis to Identify the Function of Disruptive Behavior for a Student with Down Syndrome in a Self-Contained Classroom

A brief functional analysis was conducted in a grade 4-6 special education classroom to determine the function of disruptive behaviors interfering with direct instruction. The participant in the functional analysis was a nine-year old female in the fourth grade with Down Syndrome. Disruptive behavior was recorded using a 10-second partial interval time sampling procedure during each five-minute condition within the brief functional analysis. Test conditions were embedded within the typical classroom schedule and included attention, tangible, escape and play. The highest percentage of

disruptive behavior occurred in the attention condition, during which the student was provided with adult attention for a specified amount of time following the occurrence of disruptive behavior. It was hypothesized that the participant's disruptive behavior was maintained by social positive reinforcement in the form of adult and peer attention. The results of this study were used to maximize the efficiency of intervention planning and implementation of behavioral supports within the classroom to address the attention-maintained disruptive behaviors of the target student.

55

Kelsi Wood

Health Education, PhD

Advisor: Keith A. King, PhD

Parenting Factors and Marijuana Use among Hispanic Adolescents

Objective: The purpose of the present study was to determine the influence authoritative parenting factors have on lifetime, past year and past month marijuana use among Hispanic adolescents. **Methods:** A secondary analysis of the 2013 National Survey on Drug Use and Health was performed. A nationally representative sample of 3,457 Hispanic adolescents who were 12–17 years old were included. We performed a series of logistic regression analyses to answer the study aims. **Results:** Results indicated 19.5% Hispanic participants reported lifetime marijuana use, 14.5% reported past year use and 7.5% reported past month use. Lifetime, past year and past month marijuana use differed based on authoritative parenting factors (e.g., helped with homework; told youth they did a good job). Hispanic adolescents at

increased risk of marijuana use were those with parents who never/seldom performed authoritative parenting behaviors (all $p < .03$) Conclusions: Recommendations for substance use prevention programming are included.

56

Zachary Long

Physics, PhD

Advisor: Michael L Sitko, PhD

The Shadow Knows: Using Shadows to Investigate the Structure of the Pretransitional Disk of HD 100453

We present GPI polarized intensity imagery of HD 100453 in Y-, J- and K1 bands which reveals an inner gap (1 - 18 AU), an outer disk (18 - 39 AU) with two prominent spiral arms and two azimuthally-localized dark features also present in SPHERE total intensity images (Wagner et al. 2015). The narrow, wedge-like shape of the dark features appears similar to predictions of shadows cast by an inner disk misinclined with respect to the outer disk. Using the Monte Carlo radiative transfer code HOCHUNK3D (Whitney et al. 2013), we construct a model of the disk which allows us to determine its physical properties in more detail. From the angular separation of the features we measure the difference in inclination between the disks (45°) and their major axes, $PA = 140^\circ$ east of north for the outer disk and 100° for the inner disk. We find an outer disk inclination of $25 \pm 10^\circ$ from face on in broad agreement with the Wagner et al. (2015) measurement of 34° . SPHERE data in J- and H-bands indicate a reddish disk which points to HD

57

Wesley Parker

Geology, MS

Advisor: Yurena Yanes, PhD

Mollusk Shells of *Patella crenata* (Gastropoda: Patellidae) from Tenerife, Canary Islands, as a Low-Latitude Paleoclimatic Proxy

The limpet genus, *Patella*, has been established as a credible repository of sub-monthly paleotemperature data at high and mid latitudes. However, these shells have not been extensively studied in low-latitude environments, where climatic variations are comparatively subdued and shell growth may be continuous throughout all seasons. The Canary Islands, located 95km from the Atlantic coast of Morocco at 27–29°N, provide an ideal location for studying these shells at subtropical latitudes considering that (1) *Patella* is plentiful in the modern rocky intertidal shore and (2) archeological shells are well-preserved and abundant in shell middens expanding back in time ~2,500 years. Moreover, oxygen isotope ratios (d18O) of local seawater do vary seasonally allowing us to constrain this parameter for estimating sea surface temperature (SST) from shell carbonate. We analyzed the d18O values of live-collected *Patella* shells using two different sampling approaches. First, live-collected limpets were sampled using a manual Dremel drill along the calcitic shell margin, which provided averaged d18O values at the time of specimen collection. Second, several modern limpets were cross-sectioned from anterior to posterior parallel to the maximum growth axis and microsampled sequentially at high resolution using a Merchantek micromill. Bulk shell margin d18O values correlated negatively with observed SST. These results suggest that the high-resolution

oxygen isotope time series of *Patella crenata* records seasonal variations in SST. Ongoing oxygen isotope analyses from high-resolution micromilled samples will allow us to reconstruct SST at sub-monthly scale during the late Holocene using archaeological *P. crenata* from the Canary Islands.

58

Bingbing Wu

Industrial Hygiene (Environmental Health), PhD

Advisor: Sergey Grinshpun, PhD

A Novel Respirator Seal Integrity Monitor for Controlling Inhalation Exposure of Firefighters

It is widely recognized that the integrity of a respirator seal may be compromised during actual use, especially for firefighters who engage in strenuous activity at work. No method is presently available to fully ensure that the facepiece seal is maintained during actual use. The aim of this study is to develop and validate a novel wearable continuous Respirator Seal Integrity Monitor (ReSIM) that can rapidly detect respirator leakage in real time and alert the wearer.

The ReSIM prototype was developed to detect and enumerate aerosol particles inside an operating respirator. Test aerosols spheres, NaCl particles and combustion particles were measured with an optical particle spectrometer as well as with scanning aerosol instruments capable to cover the particle size range of 10 nm to >10 µm. Based on preliminary testing, the aerosol particle sensor Sharp Shinyei PPD 60PV-T2 was selected and utilized in the ReSIM unit. Results show that the ReSIM prototype responds

quickly with sufficient sensitivity and accuracy. This prototype is being tested on a respirator-wearing manikin in an exposure chamber; the aerosol concentrations inside and outside the respirator are measured to determine the protection level. Preliminary data demonstrate that the ReSIM does not interfere with the respirator function and adequately detects various seal failures. The most significant feature of the ReSIM is real time continuously respirator performance monitoring. It is not only ideal for firefighters to alert them a sudden increase in their inhalation exposure, but can be modified and applied to any particulate filter respirator.

59

Chi Wei

Biostatistics, MPH

Advisor: Jun Ying, PhD

Big Data Analyses of Birth Defects

Birth defects (BDs) are conditions present at birth that are associated with structural changes in one or more parts of the body. Birth defects may affect physical development, mental development, appearance or organ function. In the United States, BDs occur in approximately 3 percent of all live births and account for approximately 20 percent of all infant deaths. Although the causes of most BDs are unknown, they are thought to be caused by a combination of genetic, behavioral and environmental factors. The goal of this research is to exam these patterns using multiple years (1995–2005) of national live birth data from CDC. The study population consists of approximately 70 million live births from 1990 to 2005. We hypothesize that

the incidence of BDs varies by geographic location and fluctuates seasonally, based on month of onset of the pregnancy or month of last menstrual period (LMP). Initial results indicate that incidence of BDs fluctuate by month of LMP and that the incidence of BDs decreased significantly over the study period. Furthermore, regional differences in the incidence of BDs were noted. The incidence of total BDs and many individual BDs were higher in April–July of LMP months than in other months. The differences are more likely related to specific environmental factors. Birth defects appear to vary both geospatially and temporally in the U.S., and further investigation and research on these patterns will help understand the causes and the risk factors of the birth defects.

60

Connor Sears

Biological Sciences, PhD

Advisor: Joshua B. Gross, PhD

Gene Expression Analysis Leading to Possible Roles of *Pmela* and *Tyrp1b* in Complex Pigmentation Development in the Blind Mexican Cavefish, *Astyanax mexicanus*

Upon colonizing the cave environment, the blind Mexican cavefish, *Astyanax mexicanus*, has evolved a variety of extreme phenotypes that contrast starkly with the extant surface morphotype. Regressive loss of the visual system and pigmentation have been extensively documented in this system, based on direct comparisons between derived cave morphologies and the ancestral, surface forms. Little is known, however, of the complex

gene network controlling melanophore patterning in this system. In this study, we focused on two genes, *pmela* and *tyrp1b*. These genes have been implicated in melanophore number in prior QTL analysis. Using analysis of cross-developmental *in situ* hybridization and gene knockdown by morpholino, we established clearer roles of *pmela* and *tyrp1b* in *Astyanax* pigmentation development. *In situ* hybridization analysis of *pmela* implies a delayed (heterochronic) shift in pigmentation development compared to surface fish. Analysis of gene expression patterns of *tyrp1b* indicates that cavefish have a higher number of expression locations compared to surface fish. *Pmela* knockdown by morpholino injection results in a “clustering” phenotype and a lesser ratio of light cells. This coincides with heterochronic delay. *Tyrp1b* knockdown results in a wider dispersal of melanophores and a larger number of “pale” melanophores on the yolk sac compared to *pmela* morphs. These quantitative and functional analyses of the developmental changes in pigment cell gene expression through *pmela* and *tyrp1b* allows for a better understanding of the mechanisms driving degenerative trait evolution in the extreme cave environment. This work was supported by a grant from the National Science Foundation (DEB-1457630) to JBG.

61

Maryanne Refaci

Chemistry, PhD

Advisor: Pearl Tsang, PhD

Purification of Methyl Mercaptan Oxidase

Methyl mercaptan oxidase (MMase) cleaves primary thiol bonds to allow its expressing organism to feed on sulfur deposits. *Thiobacillus thiooparus* is a Gram-negative bacterium primarily found in soil deposits in Eastern Europe and Asia. These autotrophic bacteria use organic and inorganic sulfur as a primary energy source, and require several weeks of growth time. Total cell lysate was purified to produce MMase with monitoring of enzyme activity using the following reaction: $\text{CH}_3\text{SH} + \text{O}_2 \rightarrow \text{CH}_2\text{O} + \text{H}_2\text{S} + \text{H}_2\text{O}_2$

We report the purification of 180 μg of MMase from *T. thiooparus* along with confirmation of its biological activity.

62

Mohammad Sadegh Riasei

Environmental Engineering, PhD

Advisor: Lilit Yeghiazarian, PhD

Can We Control Contaminant Transport in Hydrologic Networks? Application of Control Theory Concepts to Watershed Management

Although controlling the level of contamination everywhere in the surface water network may not be feasible, it is vital to maintain safe water quality levels in specific areas, e.g. recreational waters. The question then is, “What is the most efficient way to fully/partially control water quality in surface water networks?”

This can be posed as a control problem where the goal is to efficiently drive the system to a desired state by manipulating few input variables. Such problems reduce to (1) finding the best control locations in the network to influence the state of the system; and (2) choosing the time-variant inputs at the control locations to achieve the desired state of the system with minimum effort. We demonstrate that the optimal solution to control the level of contamination in the network can be found through application of control theory concepts to transport in surface water networks.

63

Mohammad Sarim

Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Neuromorphic Device-based Learning Solution for Biomimetic Robots

Biomimetic robots are gaining attention every day for various applications ranging from resource hunting to search and rescue operations during disasters. Biological species are known to intuitively learn from the environment, gather and process data, and make appropriate decisions. Such sophisticated computing capabilities in robots are difficult to achieve, especially if done in real-time with ultra-low energy consumption. Here, we present a novel neuromorphic device-based learning architecture for robots. Two terminal synaptic memory devices with resistive switching of oxide layer are modeled in a crossbar fashion to develop a neuromorphic platform that can impart unsupervised learning capabilities in a robot. This approach is validated by navigating a robot vehicle in an unknown environment with randomly placed obstacles. The simulation as well as experimental results corroborate the validity and potential of the proposed learning scheme for robots.

64

Gaurav Patil

Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Lillian Rigoli

Psychology, PhD

Advisor: Michael Richardson, PhD

Exoskeleton Support System for Sit-to-Stand (STS) Transition Based on Multimodal Action Intent Recognition

1.5 million senior citizens live under supervision and most require assistance with at least one or more activities of daily living (ADL), including transferring in and out of chairs, beds and toilets, which requires the ability to perform sit-to-stand (STS) transitions. This STS transition is a complex full-body activity that requires the synergistic coordination of the upper and lower limbs and trunk. The long-term goal of this research is to come up with a working prototype of an active exoskeleton which can be controlled based on behavioral models of a user's intent, given that differences in a user's intent modulate the dynamics of STS transitions. The research plan includes synchronized multimodal data-collection of STS transitions across various environmental situations and action intent contexts and development of intelligent control algorithms to actuate and operate the exoskeleton. This poster will present the initial control system model for the exoskeleton and preliminary pilot data.

65

Matthew Owen

Mechanical Engineering, MS

Advisor: Milind A. Jog, PhD

Influence of Wettability on Droplet Splash Simulations

Aerosolization is the process in which a liquid or solid is reduced to small enough particles such that they can be carried by the air. Notable examples that should not be inhaled are cutting fluids in machining and manufacturing processes, as well as other chemicals or substances such as pesticides, spray paint or contaminated blood. If inhaled, these can pose negative short term or long term health effects. One source of aerosols is the secondary droplets created from droplet splattering or splashing after impacting a dry or wetted surface. To minimize and better control this fully in future situations, an understanding of what factors and properties that enables or contributes to splatter or splash is important.

This investigation is intended to computationally determine the relationship between wettability and threshold for splattering or splashing. This is done by creating test cases of droplets of varying diameter, impact velocity, surface tension, density and kinematic viscosity to alter Reynolds, Weber and Ohnesorge numbers in OpenFOAM, an open-source CFD program. Furthermore, dynamic contact angles between the substrate and impinging droplet will be altered. Different structures which are predicted, such as fingering, fragmentation and secondary droplets will be the main focus. The predictions made by simulation cases will be compared to established empirical models for predicting splashing. From this the effects of wettability on splashing and splattering of droplets will be clarified.

66

Michelle Burbage

Health Education, PhD

Advisor: Rebecca A. Vidourek, PhD

Effective Strategies of Medication-Assisted Treatment for Heroin: A Review of the Literature

Heroin use among the American population is a major health concern. The purpose of the present study is to identify effective strategies in heroin use treatment programs targeting adolescents and adults. A total of 7 articles were found describing medication-assisted treatment for heroin that met inclusion criteria. For each intervention, a summary was developed and treatment components were identified. By doing this, treatment curriculum as well as effective strategies the programs utilized regarding heroin treatment could be more clearly discussed. Future programs recommendations are noted.

67

Hedieh Hashemi Hosseinabad

Communication Sciences and Disorders, PhD

Advisor: Suzanne E. Boyce, PhD

Underlying Mechanism for Occurrence of Nasal Rustle Following Surgery in Children with Cleft Palate

Children with cleft palate often show persisting difficulty in managing the interaction of airflow between the mouth and nasal cavities following palatal surgeries. One common consequence is a type of audible nasal airflow emission known as “nasal rustle.” The mechanism of sound generation is unknown, although nasal rustle is more likely to occur when the velopharyngeal port—that is, the opening between the nasal and oral cavities—is small. One hypothesis for the generation of nasal rustle is that, as the air moves through the opening, secretions on the nasal side of the opening start to produce an audible bubble noise. If so, when secretions are removed, the extra noise should disappear. Identifying the source of nasal rustle will help surgeons to make appropriate surgical decisions. To test this hypothesis, we compared percentage of noise occurrence, cepstral peak prominence (CPPs) and nasalance scores in six children with nasal rustle before and after the secretions were suctioned out of the nasal cavity by nasopharyngoscopy. The children were recorded using Nasometer II microphones during production of sentences with a high proportion of oral sounds pre and post suctioning. Results showed the percentage of noise occurrence in syllables pre/post suctioning was reduced significantly (Friedman’s Test, $p = 0.001$). However, the CPP and nasometry scores didn’t significantly change as an effect of suctioning. These findings suggest

that clinical efforts to reduce nasal rustle in children with cleft palate should focus on minimizing the effect of secretions.

68

Suzanne Summer

Epidemiology (Environmental Health), PhD

Advisor: Erin N. Haynes, DrPH

Thermic Effect of Food and Endocrine Responses Following Vertical Sleeve Gastrectomy in Adolescence

Background: Evidence shows that patients who have undergone Roux-en-Y gastric bypass (RYGB) have increased resting energy expenditure (REE) and thermic effect of food (TEF) compared to controls. Both contribute to negative energy balance and weight loss. A second bariatric procedure, vertical sleeve gastrectomy (VSG), is increasingly used and causes significant weight loss. This study investigated effects of VSG in adolescents on energy metabolism.

Methods: Ten females, 18-60 months post-VSG (performed during adolescence) and nine matched controls were recruited. REE and respiratory quotient (RQ) were measured by indirect calorimetry after an overnight fast. They then consumed a 450 kilocalorie meal and had TEF measured for up to 6 hours. Plasma glucose, insulin and C-peptide were assessed before meal ingestion, for every 15 minutes for the first 90 minutes and then every 30 minutes thereafter.

Results: The surgical and control groups had similar age (20.7 vs. 21.3 years) and BMI (33.0 vs. 33.1 kg/m²). The groups did not differ in baseline

REE, RQ, glucose or islet hormone values. During the postprandial period, the surgical group had lower glucose and higher RQ, insulin and C-peptide values compared to the control group (p<0.05). TEF did not differ between groups.

Conclusions: In contrast to published studies of RYGB, we did not observe an increase in REE or TEF following VSG. This suggests a possible difference in pre- and post-prandial energetics between the two surgeries. Our pilot study may have lacked statistical power to detect a difference between groups. Larger randomized trials are needed to determine whether RYGB and VSG, despite being similarly effective, achieve weight loss by different mechanisms.

69

Andrew Vonhandorf

Toxicology (Environmental Health), PhD

Advisor: Alvaro Puga, PhD

Assessing the Effects of Cr(VI) on Dynamic Nucleosomes and Its Potential for Dysregulating Transcription

Cr(VI) is well-established as a carcinogen with prevalent use in many industries; however, the mechanisms associated with DNA damage, disruption of normal transcriptomic profiles and carcinogenesis require further elucidation. We have shown using FAIRE-Seq that Cr(VI) elicits a spectrum of chromatin accessibility changes in regulatory elements, dependent on the dose and length of exposure in Hepa-1c1c7 cells, that correlates with changes in the transcriptome. Currently, we sought

to investigate these findings using ATAC-Seq to measure differential chromatin accessibility in Hepa-1c1c7 cells treated with Cr(VI) for three days. We found that all Cr concentrations demonstrated moderate overlap while exhibiting treatment-specific profiles. The 0.5 μ M Cr(VI) treatment in FAIRE and ATAC exhibited a large degree of similarity in enriched motifs, of which CTCF ranked consistently for all conditions. Interestingly, CTCF regulates transcription through the organization of nucleosomes and demarcation of topologically associated domains. Therefore, we chose to investigate the impact of a low dose Cr(VI) treatment on dynamic nucleosome positioning. Occupancy of nucleosomes in promoter regions exhibited differential enrichment for the CTCF/BORIS motifs, suggesting altered motif accessibility in regions crucial for transcription. Our findings identify changes in differentially accessible chromatin that are enriched for the CTCF motif, supporting the notion that exposure results in structural chromatin remodeling. It is possible that Cr(VI) may disrupt the normal patterns of CTCF binding, affecting the cell's capacity to maintain the stability of its transcriptome. Supported by NIEHS R01ES010807 and NIH 2T32ES007250-26.

70

Dylan Shields

Chemistry, PhD

Advisor: Anna D. Gudmundsdottir, PhD

Nitrogen Gas Release from Diazide Naphthoquinones: The Mechanistic Difference at Ambient vs Cryogenic Temperatures

Nitrene intermediates offer an attractive avenue for researchers pursuing

organic magnets. In addition, nitrenes can provide synthetic avenues for macroscopic surface modifications and polymer crosslinking reactions. Understanding the factors that control nitrene reactivity can lead to more efficient use of these versatile intermediates. Using DFT calculations, matrix isolation and laser flash photolysis studies, we have determined the reaction mechanism in both cryogenic matrices and in solution at ambient temperatures.

71

Davida Scoggins

Design, MDes

Advisor: Vicki Daiello, PhD

Boundaries of Empathy

This study develops methodologies for trust building in cross-cultural, trans-sectional relationships. While applicable to multiple domains, this approach focusses specifically on relationships between low-income, African-American, teen mothers and their social workers. This relationship is of particular interest because these mothers are statistically predisposed for negative birth outcomes (Graham et al, 2007) and interact with social workers in a range of non-traditional settings. The hope is for these developed paradigms to inform professional problem solvers (designers, directors) in how to best build trust with clients and users from complex backgrounds. The hope is for these paradigms to inform and equip designers, directors, medical personnel and the like in creating solutions for bridging the trust gap between them and their target markets or clients.

72

Alicia Goldschmidt

Biological Sciences, MS

Advisor: Ishi D. Buffam, PhD

Biochar Amendment of Green Roof Substrate: Effect on Hydrologic Performance and Runoff Water Quality

Green (vegetated) roofs provide benefits to urban areas through mitigating stormwater runoff; however the substrate material has the potential to act as a pollutant source, mostly due to organic matter leaching from the soils. Biochar, a type of activated carbon, has the potential to bind nutrients, making them plant available whilst improving water runoff quality. In addition, biochar is a water-retaining soil additive with the potential to further aid in stormwater retention. We examined the effect of biochar amendment to green roof substrate on runoff water quality and retention. To simulate green roof conditions, forty-five 1' x 2' green roof test plots were established in May 2016. Ten plots of four biochar treatments (0, 2.5, 5, 10% w/w) were established with five plots of each treatment planted with *Sedum* species (365 g/m²). Each plot was outfitted with a spigot and tubing to drain runoff into a plastic bucket. Runoff was collected monthly for water quality analysis and each bucket was weighed after runoff inducing events to determine the water retention of each treatment. Preliminary results have shown that biochar addition does not significantly affect water retention, however, biochar does improve water quality by buffering pH and lowering specific conductivity (salt concentrations) of runoff. Future analyses will additionally determine whether biochar significantly improves

nutrient retention, vegetative growth and productivity. This ongoing study will improve our understanding of the benefits associated with biochar amendment in green roof substrates and will provide pertinent information regarding the ability of biochar to optimize green roof performance.

73

Nataraja Sarma Vaitinadin

Epidemiology (Environmental Health), PhD

Advisor: Ranjan Deka, PhD

Combining the Health Belief Model with Artificial Neural Networks to Predict Childhood Obesity Prevention Behaviors

The poster aims to present a novel approach at predictive modeling in disease prevention behaviors by combining health behavioral theories with artificial intelligence.

74

Bina Ajay

Business Administration, PhD

Advisor: Joanna Campbell, PhD

Fusing RBV and Strategic Leadership: Perception Driven CEO Opportunistic Behavior

The resource based view (RBV) and strategic leadership are two popular streams of research within the strategic management literature, given their implications for firm performance. While RBV focuses on resources at the firm level, strategic leadership examines “resources” (characteristics) at the level of individuals and teams and how they impact strategic choices. This proposal connects the two streams by examining how perception of resources can influence CEO opportunistic behavior (which is salient in the context of strategic decisions) and therefore can impact firm survival and effect all stakeholders. I expect that a negative perception of resources will increase opportunistic behavior.

75

Daniel Peat

Business Administration, PhD

Advisor: Joanna Campbell, PhD

Strategic Human Capital Emphasis: Effects on Firm Performance

Firms often state that their most important asset is their people; however, this concept has not been studied extensively in extant empirical research, especially from a strategic lens. In this proposed study, I plan to show that firms that emphasize strategic human capital as a strategic resource increase their performance as they are better able to respond to industry level stimuli. Additionally, I will explore industry dynamism and complexity as antecedents to this relationship as well as two firm level moderators: firm growth and diversification.

76

Lauren Fattlar

Communication, MA

Advisor: Nancy A. Jennings, PhD

Melissa Carroll

Communication, MA

Advisor: Nancy A. Jennings, PhD

Abbey Klever

Communication, MA

Advisor: Nancy A. Jennings, PhD

The Analysis of Words Used by Commercial Weight Management Programs

Commercial Weight Management Programs (CWMP) have become a popular way for people to diet. These plans provide preplanned meals for their consumers to enjoy at the same time they are losing weight. These plans, though, may not actually be a healthy way to for people to diet. This study uses a content analysis to examine what words are used on four popular CWMP commercials that promote these programs. This study indicates a shift in language from a health focus to a results focus. It finds that CWMPs are promoting the skinnier image by focusing on the results, that is, the pounds being lost. With the shame of being overweight, people are turning to CWMPs for a quick fix. Instead of being concerned with

health, consumers are attracted to society's ideology of being skinny and therefore are looking for positive outcomes.

77

Nicole Phillips

Communication Sciences and Disorders, MA

Advisor: Nancy Creaghead, PhD

Alexis Wolf

Communication Sciences and Disorders, MA

Advisor: Karla N. Washington, PhD

Social Communication Profiles in School-Aged Girls with High Functioning ASD: Preliminary Information from the CCC-2

Little is known regarding the social communication profile of girls with HF-ASD. We report performance on the Children's Communication Checklist, Second Edition from a group of school-aged girls. Results were variable. Most, but not all girls, were identified with a profile of ASD. Implications for assessment are discussed.

78

Markaisa Black

Molecular & Developmental Biology, PhD

Advisor: Tatiana Kalin, MD, PhD

Foxf1-Deficient Myofibroblasts Promote Pulmonary Fibrosis by Regulating Cadherin Switching

Idiopathic pulmonary fibrosis (IPF) is characterized by the scarring of the airway due to accumulation of collagen-secreting myofibroblasts. Effective therapeutics are limited by an incomplete understanding of the molecular mechanisms that regulate myofibroblast functions. Forkhead Box F1 (Foxf1) transcription factor is essential for lung development and repair. Although Foxf1 is expressed in normal lung fibroblasts, its role in diseases induced by pathogenic myofibroblasts, such as IPF, is unknown. We determined that Foxf1 is lost in the fibroblasts of human IPF samples. Conditional deletion of Foxf1 in alpha smooth muscle actin (aSMA)-expressing myofibroblasts exacerbated mouse lung fibrosis and increased lung collagen content. Increased lung myofibroblast migration/invasion contributed to the expansion of fibrosis in Foxf1-deficient mice. The increased migratory and invasive phenotype was associated with the loss of N-cadherin (Cdh2) and upregulation of Cadherin-11 (Cdh11) expression. Cadherins are homophilic cell-adhesion molecules known to induce pathogenic functions. Foxf1 directly bound to Cdh2 and Cdh11 promoters. Foxf1 transcriptionally activated Cdh2 promoter. Rescue experiments showed that overexpression of Cdh2 or knockdown of Cdh11 reduced fibroblast invasion in Foxf1-deficient human lung fibroblasts. Protein and mRNA analysis revealed that Cdh2 is decreased, while Cdh11 is increased

in human IPF samples. Together this study defines Foxf1 as an anti-fibrotic factor that regulates myofibroblast migration/invasion via transcriptional control of Cdh2/11 and Cdh11 promoters. Targeting Foxf1 and downstream factors that regulate fibroblast migration/invasion could lead to therapeutic approaches in IPF.

79

Xiaobang Liu

Electrical Engineering, PhD

Advisor: Ranganadha Vemuri, PhD

Combined Inference and Satisfiability-Based Methods for Complete Signal Restoration in Post-Silicon Validation

Forward inference and backward justification (FB) methods are commonly used for signal restoration in post-silicon validation and debug. We show that the FB method can miss a large number of restorable signal values. We propose a novel hybrid method combining FB and satisfiability (SAT) checking for efficient and accurate restoration of all signal values that can possibly be restored. Experimental results show that the proposed method can increase the signal restoration ratio by a factor of 18x. For large circuits where this method takes a long time, we introduce a new method based on time frames along with a signal prioritization heuristic to improve efficiency while compromising the restoration ratio. Experimental analysis shows up to 5x improvement in restoration ratio for large benchmarks.

Benjamin Merritt

Biological Sciences, PhD

Advisor: Theresa Culley, PhD

Can We Be Defined by Our Niche? Using Ecological Niche Modeling to Differentiate Taxa of the Wild Hyacinth (*Camassia* spp.) in the Eastern United States

Species are deeply rooted within their environments such that it is possible to use biotic and abiotic variables to describe habitat suitability, and potentially even differentiate species based on unique habitat types. The plant genus *Camassia* is a taxonomically complex group that provides an excellent opportunity to test the use of ecological niche modeling in differentiating closely related species. This genus consists of a number of taxa found across North America that inhabit diverse environments, ranging from open prairies to wet fields to shaded forests.

In this study a GIS-based approach was utilized to compare the environmental niche distributions of three different taxa within the *Camassia* genus: *C. angusta*, *C. scilloides* and a putative new taxon found in the southern glades of the eastern United States. We developed (1) ensembles of small models to characterize the distribution of each species qualitatively, (2) utilized a niche identity test to statistically test for differences in ecological niche distributions between each taxon, and (3) developed a principle components analysis to parse out each species according to the unique attributes of each biotic and abiotic layer used in the analysis.

Here we present preliminary results from these approaches that suggest that each of these taxa are different according to ecological niche

modeling. These results are the first of a larger project that includes genetic and morphological analyses to better characterize species in the complex *Camassia* genus through integrative taxonomy.

Jenny Burton

Communication Sciences and Disorders, PhD

Advisor: Karla N. Washington, PhD

Brittany Swint

Communication Sciences and Disorders, MA

Advisor: Nancy Creaghead, PhD

Exploring Core Symptomatology in School-Aged Girls with High-Functioning ASD: Findings from the SCQ and ADOS-2

Little is known regarding core symptoms of ASD in high-functioning girls. We report performance on the SCQ and ADOS-2 from a group of school-aged girls. Results were variable. Most, but not all, girls were consistently identified with a profile of ASD or autism. Implications for girls with HF-ASD are discussed.

82

Sarah Davidson

Biostatistics (Environmental Health), PhD

Advisor: Marepalli B. Rao, PhD

Safe Drug Dose in Oncology and 3+3 Design

In oncology, new cancer treatment drugs are developed and tested for their safety and efficacy. In Phase I clinical trials, safe dosage of the experimental drug is determined. Suppose $D_1 < D_2 < \dots < D_k$ are k different doses to be experimented. Let p_i = toxicity probability of dose D_i , i.e. p_i is the probability that the drug at dose D_i becomes toxic when given to a cancer patient. The probabilities enjoy the property $p_1 \leq p_2 \leq \dots \leq p_k$. These probabilities are unknown. The goal is to select maximal dose D_i such that $p_i \leq \frac{1}{3}$, called the maximal tolerable dose (MTD). A 3+3 design is typically implemented to generate data and determine MTD. The goal of this research is to evaluate statistically how good the design is.

83

Upasana Banerjee

Chemistry, PhD

Advisor: Anna D. Gudmundsdottir, PhD

Elucidating How Crystal Lattices Control the Reactivity of Alkylnitrenes

Solid state photoreactions have potential synthetic applications, as they are much more selective than their counterparts in solutions. However, for further applications, it is better to understand how the crystal lattice controls the solid state reactivity and to elucidate solid state reaction mechanism and correlate the solid state kinetics with the crystal lattice.

We report the first detection of a tertiary triplet alkylnitrene 2 in solution, solid state and in cryogenic matrices. Triplet alkylnitrene 2 is stable at cryogenic temperatures and thus can be identified using ESR, UV-Vis, and IR spectroscopy. The D (1.58 cm⁻¹) value obtained from ESR spectroscopy indicates that the unpaired electron are delocalized on the nitrogen atom in 2 and as expected for triplet alkylnitrenes.

Irradiation of tertiary azide 1 in solution resulted in different products. We used laser flash photolysis of 1 in solution and in nanocrystals of 1 to elucidate the reaction mechanism in solution and the solid state. With the aid of the X-ray crystal structure of 1 and the solid state kinetics, it is possible to explain how the crystal lattice controls the solid state selectivity.

Upasana Banerjee,† Sujan K. Sarkar,† Jeanette A. Krause,† Manabu Abe,‡ and Anna D. Gudmundsdottir*,†

†Department of Chemistry, University of Cincinnati, Cincinnati, Ohio 45221-0172, United States

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84

Onyinye Osisioma

Chemistry, PhD

Advisor: Anna D. Gudmundsdottir, PhD

Exploring the Mechanism of Insertion of Ortho-Substituted Arylic-Azides into Adjacent Vinylic Bonds

Heating and irradiation of aromatic azides with two ortho-substituents yields C-C and C-H insertion products, which are valuable in organic synthesis. In comparison, irradiation of simple aryl azides leads to the formation of a benzazirine intermediate through a singlet nitrene followed by rearrangement to the keteneimine. (1) Yoon et al. has shown that visible light sensitization using inorganic photo-catalysts can also lead to C-H insertion and the synthesis of indoles from ortho-substituted arylic azides. (2) This has further expanded the possibility of using arylic azides in synthetic applications, especially since visible light can be used to activate the arylic azides.

Although triplet sensitization has been proposed as the pathway leading to synthesis of indoles with visible light, the mechanism has not been investigated. We used product studies, density functional theory (DFT) calculations, and laser flash photolysis to elucidate the mechanism of the photo-reactivity of 1-Azido-2-[(1E)-2-phenylethenyl]benzene (2). We demonstrated that triplet sensitization of azide 2 is possible by characterizing the triplet intermediates involved in the photochemistry of 2.

85

Nathan McGee

Counseling, Mental Health, MA

Advisor: Michael Brubaker, PhD

Predictors of Alcohol Use Behaviors among NCAA Student-Athletes

The purpose of this study was to examine the predictive relationship between trait emotional intelligence (TEI) and substance use behaviors (i.e., alcohol and marijuana), and athletic coping resources amongst a National Collegiate Athletic Association (NCAA) student-athlete sample. Eighty-seven student-athletes (18 males and 69 females) responded to an online questionnaire gauging EI (SEIS-19), alcohol use behaviors (AUDIT), marijuana use behaviors (MSI-X), and personal coping resources (ACSI-28). Upon conducting a bias-corrected bootstrap analysis, interrelationships revealed that: (a) TEI scores associated weakly and negatively with the alcohol use behaviors scores, (b) marijuana use behaviors scores did not associate with TEI scores, and (c) TEI scores associated moderately and positively to the athletic coping resources scores. Multiple linear regression analysis indicated that TEI and marijuana use are predictors of alcohol use behaviors among NCAA student-athletes. Findings illustrate the relevance of the associations and predictors related to TEI, substance use behaviors, and athletic coping resources to manage sport-related stress.

Kristen Welker

Health Education, PhD

Advisor: Laura Nabors, PhD

Exercise and Eating Goals and Perceived Barriers to Achievement: A Review of a Goal-Setting Activity with Low-Income, Urban Youth

Youth participants of a modified version of the Children's Healthy Eating and Exercise Program (CHEE), an evidence-based healthy eating and exercise program, completed goal-setting activities as part of a two-week program held at the Boys and Girls Club of Cincinnati. The goal-setting sessions were facilitated by high school student volunteers participating in a summer service-learning program. In addition to lessons on nutrition and time for physical activity, high school volunteers worked with youth participants to develop at least one exercise goal and one eating goal each day. Progress toward these goals was tracked daily. The youth varied in the sophistication of their goals, as some provided basic goals (e.g., "Eat better.") and others ventured in to higher levels of specificity with their daily goals (e.g., "Eat 4 servings of vegetables.") While developing their eating and exercise goals, the youth participants were asked to consider potential roadblocks to successfully reaching their goals. These youth were primarily residing in a low-income, urban neighborhood in the Cincinnati area, and faced unique barriers to reaching their goals. This presentation will highlight the eating and exercise goals developed by the youth, and describe the many challenging roadblocks reported. The importance of combating roadblocks to exercise and healthy eating in this population will

be discussed, and potential solutions to these roadblocks will be included.

Arunkumar Muthusamy

Biological Sciences, PhD

Advisor: Elke Buschbeck, PhD

S-Cell Responses to Visual and Mechanical Water Waves in the Leech *Hirudo verbana*

Sensitivity to water waves in aquatic predators greatly facilitates prey location. The behavioral response to visual and mechanical information from water waves is well-documented in the leech *Hirudo verbana*. In response to low-amplitude water waves, they orient themselves and initiate swimming or crawling toward the source of the waves. Here, we begin to quantitatively characterize the neuronal response patterns of the leech to water waves in terms of visual and mechanoreceptive sensitivity. We recorded activity of the S-cell, an interneuron that forms a syncytium connecting all midbody ganglia. The S-cell is excited by mechanical and visual stimuli and could be critical to coordinating responses across the whole body.

Although leeches are behaviorally capable of discerning the direction of water waves, we found that the magnitude of the S-cell response to mechanically-cued water waves (in darkness) does not depend on the direction of waves relative to the leech's orientation. Mechanical waves presented toward the head, toward the tail, and laterally all evoked the same number of action potentials. Remarkably, regardless of wave direction, most action potentials propagated retrogradely (tail-to-head) along the nerve

cord, but when waves approached a leech head-first, an initial burst of action potentials propagated anterogradely. We are currently exploring the cause of the predominance of retrograde spike propagation in the S-cell system. Initial results indicate that retrograde propagation persists in the absence of the tail brain and even in the absence of most posterior ganglia.

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Christopher Sheehan

Geology, PhD

Advisor: Dylan Ward, PhD

Retreating Cuestas of the Desert Southwest: Linkages between Climate Change and Landscape Evolution Revealed Using Cosmogenic ^{36}Cl

Cuesta retreat is a principal mode of exhumation on the Colorado Plateau. Quantitative estimates of cuesta evolution are difficult to evaluate over millennial timescales, and so rates of geomorphic change have mostly been constrained over millions of years. Several international studies have resolved this problem with data from slope facets called talus flatirons. However, this method has not been applied systematically on the Colorado Plateau. This study quantifies rates of geomorphic change along a single cuesta using ^{36}Cl surface exposure dating. We present 52 ages from colluvial boulders on talus flatiron surfaces and channel interflaves, in-situ bedrock, and alluvium from a stream terrace. Results suggest a colluvial apron was deposited below the cuesta beginning as early as Marine Isotope Stage 3 (~57,000-29,000 years BP), and the latest phase of deposition occurred

near the Last Glacial Maximum (~24,000-18,000 years BP). A switch from apron deposition to incision initiated talus flatiron formation sometime between 20,700 and 10,200 years BP, broadly coincident with the transition from glacial to interglacial conditions. Our results have two important implications. First, distinct, geomorphic phases are correlated with late Quaternary global climate. Field observations suggest the changeover from deposition to erosion of the apron was accommodated by decreased sedimentation and local base level lowering due to a regional transition from cold/wet to warm/dry conditions. Second, we derive a conceptual model describing how cuesta relief is initially generated and later maintained. Small bedrock escarpments are created beside stream channels and subsequently propagate along the cuesta base, increasing local relief. action potentials propagated retrogradely (tail-to-head) along the nerve

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Kathryn Falcon-Davidson

Communication Sciences and Disorders, PhD

Advisor: Wendy Leborgne, PhD

Attitudes, Care Practices and Training of the Singing Voice Specialist for Pediatric and Adolescent Performers

A unique cohort of professional voice users includes the youth performer. There are some similarities to adult voice users; however, professionals agree that children and teenagers are not small adults, so the approach should be adjusted. It is not well-documented as to the preparation of habilitation and rehabilitation for this specific cohort among vocal professionals.

The moniker of singing voice specialist (SVS) has been assigned to voice professionals who specialize in the performing voice. To date, there is no certification process or uniformed training procedure for the SVS. An online survey taken by speech language pathologist and voice educators was conducted to gain insight into training history, care practices, and attitudes regarding the SVS specific for the youth population.

Thirty-three speech language pathologist (SLP) and 39 voice instructors responded. Of the SLP respondents, half had treated youth performing voice patients. Few had training on the performing youth voice. Care practices were adjusted for the needs of the youth population. Half of the respondents considered themselves SVS and felt the need for a uniformed certification. Of the voice educators, all had worked with youth population. A majority had taught clients with a history of a voice disorder, with reports of modifying typical instruction. A third of the respondents had training specific to youth voice, but few had training with voice disorders. A majority did not consider themselves SVS; however, there was confusion regarding the term.

However, this method has not been applied systematically on the Colorado Plateau. This study quantifies rates of geomorphic change along a single cuesta using ^{36}Cl surface exposure dating. We present 52 ages from colluvial boulders on talus flatiron surfaces and channel interfluvies, in-situ bedrock, and alluvium from a stream terrace. Results suggest a colluvial apron was deposited below the cuesta beginning as early as Marine Isotope Stage 3 (~57,000-29,000 years BP), and the latest phase of deposition occurred

90

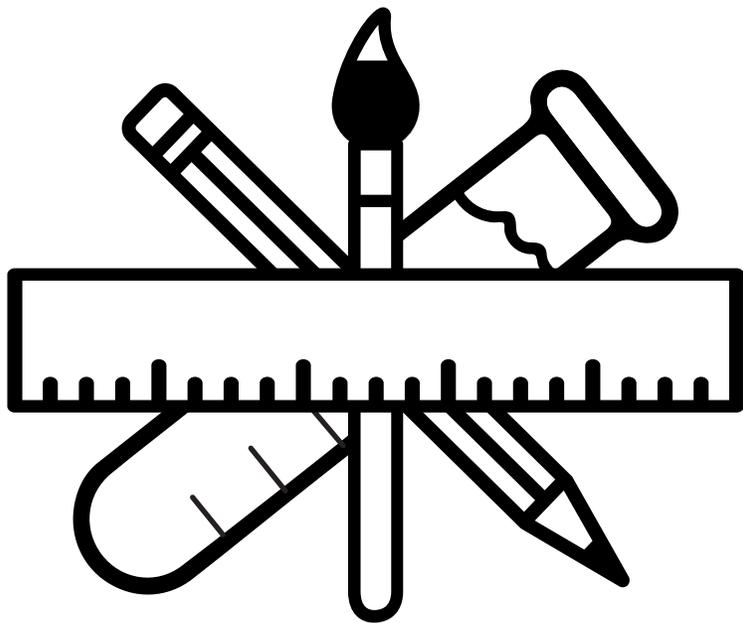
Karthik Vadambacheri Manian

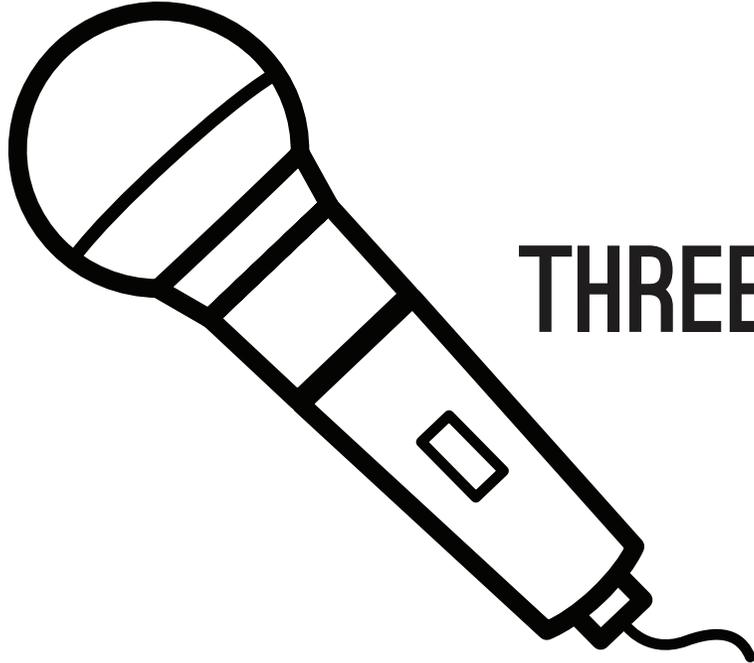
Computer Science & Engineering, PhD

Advisor: Yiming Hu, PhD

Improving Energy Efficiency of Spinlocks Using DVFS

Energy efficiency has become one of the important considerations while designing software for future multi-core processors. Lock contention observed in parallel programs has detrimental effect on its energy efficiency. This research explores the efficacy of applying dynamic voltage and frequency scaling (DVFS) technique on spinlocks in order to save power in spinlock contended applications. Though many researchers have worked on saving power in spinlocks, the efficacy of using DVFS technique to achieve power savings has not been analyzed thoroughly. Hence this poster proposes to save power by employing DVFS to reduce the frequency of the processor core on which a thread spins to acquire the spinlock. The efficacy of this technique is analyzed thoroughly on simulated large scale multi-core processors. Results show that for 100 cores, power savings of up to 22% is obtained using this technique.





THREE MINUTE THESIS

THREE MINUTE THESIS (3MT) SCHEDULE OF COMPETITORS

Noon

3MT Welcome and Introduction:
Dr. Yonatan Eyal, Director of
Graduate Studies, Graduate School

Noon-12:15 p.m.

Nethal Elmeligy
Nathan McGee
Ivayla Gyurova

12:15-12:30 p.m.

Najlaa Kareem
Stephen Riffle
Shraddha Barawkar
Jamie Fritz

12:30-12:45 p.m.

Nataraja Sarma Vaitinadin
Jeremy Cox
Sarah Schwab
M. Sadegh Riasi

12:45-1 p.m.

Pankaj Dwivedi
Katherine Paul
Sanjana Sekar

1-1:15 p.m.

Angelica Hardee
Gaurav Patil
Georganne Kincer
Sounak Gupta

1:15-1:30 p.m.

Crystal Whetstone
Vineeta Singh
Deeptha Girish

1:30-1:45 p.m.

Prajokta Ray
Hannah Flood
Rhemecka Graham

1:45-2:00 p.m.

Abigail Richard
Brianna Escoe
Robert Johnson

Schedule subject to change.

01



Nehal Elmeligy

Women's, Gender, and Sexuality Studies, MA
Advisor: Ashley Currier, PhD

Against Conventional Odds: Egyptian Women Fight For Their Independence

My thesis examines what has finally pushed Egyptian women to challenge long-practiced social conventions and religious teachings, and how they did it. It is my argument that some of the Egyptian youth, including women, started a liberal social phenomenon that departs from the old traditions. Many Egyptian women, who are now in their late thirties or younger, have been defying patriarchal social norms and traditional religious practices for years, in both the private and public spheres in the hopes of gaining social independence and self-autonomy. This act of defiance, however, became more widespread after the revolution in 2011.

02



Nathan McGee

Mental Health Counseling, MA
Advisor: Michael Brubaker, PhD

Student-Athletes' Personal Coping Resources, Trait Emotional Intelligence and Substance Use Behaviors: Mediating Effects

A gap exists regarding the relationships between trait emotional intelligence (TEI), substance abuse and coping resources amongst NCAA student-athletes. Moreover, no published research has investigated athletes' personal coping resources as a partial mediator between TEI and substance use behaviors. Thus, the purpose of this study is to determine the nature of the associations between student-athlete TEI, personal coping resources and substance use behaviors.



03

Ivayla Gyurova

Pathobiology and Molecular Medicine, PhD

Advisor: Stephen Waggoner, PhD

The Pursuit of Better Vaccines: Uncovering the Functional Capacity of Human Cytomegalovirus-Induced Subsets of NK Cells

Cytomegalovirus (CMV) infections in both mice and humans triggered accumulation of unique adaptive natural killer (NK)-cell subsets that putatively possess enhanced effector functions against CMV. This suggests that a pioneering approach to creating an efficacious CMV vaccine would include stimulation of the accumulation and long-term maintenance of these CMV-reactive NK cells. It remains unknown, however, whether vaccines can be designed to stimulate the expansion of these NK-cell subsets. Here, using a unique set of samples collected during a CMV vaccine trial, we aim to determine whether vaccination promotes accumulation of these NK cells.



04

Najlaa Kareem

Architecture, PhD

Advisor: Adrian Parr, PhD

Difference and Repetition in Redevelopment Projects for the Kadhimiya Historical Site, Baghdad, Iraq: Towards a Deleuzian Approach in Urban Design

The purpose of this research is to explore how the possibility of using history as a dynamic, intensive force in an urban design thinking process can escape the historicism and representational image functionary towards a re-engineered creative historical/architectural dialogue. By comparing two existing urban project strategies for the redevelopment of the Kadhimiya historical site, this research will examine the difference between mimicking historical styles in a decontextualized manner and repeating them with difference using the theory of “Difference and Repetition” outlined by the French philosopher Gilles Deleuze.

05



Stephen Riffle

Molecular and Developmental Biology, PhD
 Advisor: Rashmi Hegde, PhD

Model Tumors in the Lab to Study Mechanisms of Tumor Cell Survival

The aim of my thesis was to study how tumor cells protect their DNA when under a common environmental stress—severely low oxygen—present in most tumors. Cells that protect their DNA under these conditions are often resistant to chemo- and radiation therapy and have the potential to repopulate a tumor after therapy is completed. By modeling these cells in the lab and learning how they survive, we can identify critical survival pathways to target that could significantly increase the chances of patient survival. In my thesis work, I established this model using Ewing Sarcoma cells (A673) and then used it to show activation of a specific survival pathway (ATM mediated DNA damage repair) that, when targeted with a specific therapeutic (KU55933), resulted in decreased protection of the DNA, decreased growth and increased tumor cell death. The results from my work can be used to increase our understanding of these resistant cells and to further help guide the development of new therapeutic strategies.

06



Shraddha Barawkar

Mechanical Engineering, MS
 Advisor: Manish Kumar, PhD

Air Transport of Rescue Pod Using Collaborating UAVs during Emergency Evacuations/Disaster Management

The main objective of this research is to develop a deployable, safe and reliable collaborating multi-UAV system that can provide autonomous airlift during disasters for rescue evacuations. Multi-UAV lift provides benefits such as low-cost functionality, quicker response and more stability as opposed to a conventional single high payload aerial vehicle. A novel force feedback controller (FFC), based on leader-follower approach, is proposed in this research for multi-UAV collaboration. The FFC overcomes the limitation of traditional position based leader-follower controller, which is difficult to implement practically due to high inherent errors in position data obtained using GPS.



07

Jamie Fritz

Health Services Management, MPH
Advisor: Jun Ying, PhD

IORT Quality Study at The Christ Hospital

In collaboration with Dr. McCluskey, a radiation oncologist at The Christ Hospital, I am performing a biostatistical analysis of de-identified charts in a retrospective study. We are determining the quality of the intraoperative radiation therapy procedure at The Christ Hospital and the adherence to ASTRO guidelines.



09

Jeremy Cox

Computer Science & Engineering, PhD
Advisor: Alexey Porollo, PhD

KLUE: Revolutionizing Genome Research

KLUE is a database system designed to enable K-mer analysis of the metagenome.

08



Nataraja Sarma Vaitinadin

Epidemiology (Environmental Health), PhD
Advisor: Ranjan Deka, PhD

Predicting Disease Prevention Behaviors Using Artificial Intelligence

The presentation demonstrates a novel approach at combining artificial intelligence with behavioral theories to predict childhood obesity prevention behaviors.



Sarah Schwab

Physical Therapy, DPT

Advisor: Jennifer Angeli, DPT, PhD

Meaningful End of Treatment Scenarios in Neurodevelopmental Pediatric Physical Therapy

Goal setting is a critical element in the promotion of patient and family-centered care. Unfortunately, the goal setting process often emphasizes the identification of goal focal areas without regard to the dimension of change (e.g., faster, with fewer errors, with increased independence) within the goal area that is most meaningful to the patient and family. Qualitative analysis of neurodevelopmental pediatric physical therapy goals revealed decreased level of assistance to be the most frequently reported dimension of change across all diagnoses, goal domains, genders, ages and goal setters under investigation. These findings suggest with impressive generality that independence in task performance is a highly prioritized area of change for therapy participants with neurodevelopmental disability. This study is of particular clinical utility for therapists in their daily therapeutic approach and, on a larger scale, for consideration in new therapeutic program development.



M. Sadegh Riasi

Environmental Engineering, PhD

Advisor: Lilit Yeghiazarian, PhD

Pore Topology Method: A New Methodology for Micro-Scale Modeling of Flow in Porous Media

Porous materials are ubiquitous in nature and widely employed in many products and devices. Examples range from soil, oil/gas reservoirs, coals and living tissues to filters, membranes, fuel cells and absorbent materials. Characterizing porous materials is the first and the most critical step in designing and understanding porous systems. In an effort to replace expensive experimental set-ups in characterization process, several micro-scale modeling approaches have been developed in the last few decades, but none of them have been able to provide a general, computationally fast and straightforward technique.

Pore topology method (PTM) is a fast and algorithmically simple method that reduces the complexity of the 3-D void space geometry of the porous medium to its topologically consistent medial surface and uses it as a solution domain for single- and multi-phase flow simulations. Our validation studies show that while being algorithmically simple, fast and applicable to all types of porous media, PTM's accuracy is comparable to sophisticated and computationally demanding approaches.



12

Pankaj Dwivedi

Cancer and Cell Biology, PhD
Advisor: Kenneth Greis, PhD

Phosphoproteomic Analysis of Granulocyte-Colony Stimulating Factor Receptor Signaling

Neutrophils are a type of blood cells that play a very important role in defense against bacterial and viral infections. A receptor protein responsible for neutrophil production is called granulocyte-colony stimulating factor receptor (G-CSFR). Abnormal G-CSFR has been detected in leukemia patients. To understand how abnormal protein causes leukemia, we utilized a mass spectrometry based approach and found out that the abnormal receptor displays a different activation pattern compared to the normal receptor.



13

Katherine Paul

Germanic Languages & Literature, PhD
Advisor: Tanja Nusser, Dr Habil

The Faust Myth and Robert Wilson

The Faust myth has a long literary and cultural history which has influenced much of European culture since its very first published edition. Robert Wilson, postmodern and avant-garde producer of theatre, has recently staged Goethe's masterpiece version of "Faust" and adds himself as the most contemporary version of the work. My thesis will discuss both the legend within its historical context and issues within the contemporary theatre scene in Berlin.



14

Sanjana Sekar

Electrical Engineering, MS
Advisor: Ranga Vemuri, PhD

Hardware Security Using Logic Obfuscation

Describing the current issue of security in hardware and proposing a good locking mechanism for hardware design to prevent design information leakage.



Angelica Hardee

Health Promotion & Education, PhD

Advisor: Ashley Merianos, PhD

Malaria Control Methods and Healthcare Access among Pregnant Women in the Democratic Republic of the Congo

Malaria is a major public health problem and life-threatening disease. In the Democratic Republic of the Congo (DRC), roughly 400 children die every day and almost half of these deaths are attributable to malaria. The purpose of this study is to examine whether malarial control methods (i.e., insecticide bed net use and taking SP/fansidar or chloroquine for malaria) differed based on perceived problems preventing pregnant women from seeking medical advice or treatment (big problem, not a big problem), receipt of prenatal care (no, yes) and source of prenatal care (e.g., doctor) and sociodemographic characteristics. A secondary data analysis of pregnant women ($n = 2,404$) who completed the “Demographic and Health Survey” in the DRC (DHS-DRC7) was conducted. Results indicated that use of a mosquito bed net, took SP/fansidar and took chloroquine for malaria significantly differed among pregnant women based on educational attainment, ethnicity and wealth index. Pregnant women who slept under a bed net were more likely to receive prenatal care ($p = .002$), including 1.95 times more likely ($p = .002$) to receive care from a doctor, than pregnant women who did not sleep under a mosquito net. Pregnant women who took SP/fansidar for malaria during pregnancy were more likely to perceive that distance to a health facility ($p < .001$) and not wanting to go alone ($p = .009$)

were not big problems for getting medical help for themselves. Awareness of malarial control methods is critical in shaping the necessary interventions and policies toward the control of such diseases and addressing this global health disparity. The study found several healthcare utilization factors related to malarial control methods among pregnant women in the DRC.



Gaurav Patil

Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Exoskeleton Support System for Sit-to-Stand (STS) Transition Based on Multimodal Action Intent Recognition

1.5 million senior citizens live under supervision and most require assistance with at least one or more activities of daily living (ADL), including transferring in and out of chairs, beds and toilets, which requires the ability to perform sit-to-stand (STS) transitions. This STS transition is a complex full-body activity that requires the synergistic coordination of the upper and lower limbs and trunk. The long-term goal of this research is to come up with a working prototype of an active exoskeleton that can be controlled based on behavioral models of a user’s intent, given that differences in an user’s intent modulate the dynamics of STS transitions.

The research plan includes synchronized multimodal data-collection of STS transitions across various environmental situations and action intent contexts and development of intelligent control algorithms to actuate and operate the exoskeleton. This talk will present our vision for the final device and the current status of our research.



Georganne Kincer

Nursing Research, PhD

Advisor: Susan Reutman, PhD, RN

Reaction of Vital Signs When Firefighters Are Exposed to Heat and Exertion

Firefighters are dying. Heart problems are the number one cause of death for firefighters while on duty. This proposed study will look at firefighters' vital signs while they perform routine annual live-burn training.

17



Sounak Gupta

Computer Science & Engineering, PhD

Advisor: Philip Wilsey, PhD

Pending Event Set Design in Parallel Discrete Event Simulation

The rapid and widespread use of multi-core and many-core processors in a cluster increases the challenges for distributed simulation as it is now necessary to adapt the algorithms for efficient operation on both shared memory and distributed memory hardware. The challenge to develop solutions without significant contention for shared data structures grows with the increase in number of on-chip cores. Pending event set is such an example where multiple execution threads attempt to schedule the next event for execution from shared event pools. The fine-grained computational nature of parallel simulation quickly escalates this problem to non-trivial contention. This project proposes a research plan to study design alternatives for the data structures and algorithms for pending event set management. A key aspect that amplifies contention for the shared data structures containing the pending event set is lock contention, sorting and execution scheduling. This project will focus on four main concepts to improve performance of time warp synchronized parallel simulation on (a) multi-core processors and (b) clusters of multi-core processors. In particular, the thesis will study: (1) the use of a novel data structure called the ladder queue for scheduling the set of smallest time-stamped events from the collection of logical processes assigned to a multi-processor node; (2) a novel approach to remove sorting from the

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schedule queue that is enabled by the partitioning structure of the ladder queue; (3) the application of lock-free methods to access the schedule queue that is likely to be highly efficient due to the unsorted partitions in the ladder queue; and (4) the scheduling of groups of events from each access to the pending event set. Each of these methods addresses one or more of the aforementioned contributors of contention to the shared data structures that compose the pending event set.

19



Crystal Whetstone

Political Science, PhD

Advisor: Rina Williams, PhD

Advancing Women's Political Participation in Wartime Environments through Political Motherhood: A Comparative Study of Women's Maternal Peace Activism in Argentina and Sri Lanka

Armed conflicts can have contradictory effects on women. While devastating, wars can also open spaces for transformations in gender dynamics. Most analyses that examine changes sparked by war focus on women's involvement in fighting, women's entrance into the workforce and women's peace activism. Instead, I explore how opportunities to advance women's rights in warzones are tied to the political organizing of activists

mobilized by their identities as mothers, through a concept called political motherhood. During the Argentinian Dirty War (1976-1983) and Sri Lankan Civil War (1983-2009), activists with the Madres de the Plaza de Mayo and the Mothers' Front, respectively, organized for peace and protested the state's human rights abuses. While the Madres de the Plaza de Mayo's use of political motherhood proved successful in increasing women's long-term political participation, it failed in the case of the Mothers' Front. Through a comparative case study of these two groups, this dissertation investigates the conditions under which political motherhood can successfully increase women's long-term involvement in the political sphere, which I define as a maternal groups' ability to last beyond a 10-year period and increase impact in areas such as women in government and women in civil society.

20



Vineeta Singh

Electrical Engineering, MS

Advisor: Anca Ralescu, PhD

Medical Image Segmentation

Newer technologies have capabilities to generate terabytes of medical images. Understanding and analyzing this data has become challenging. My thesis aims to automate the understanding of medical images.



21

Deeptha Girish

Electrical Engineering, PhD
Advisor: Anca Ralescu, PhD

Determination of the Optimal Number of Clusters in K-means Algorithm

A major drawback of the popular and effective clustering algorithm, the k-means algorithm, is that the optimal number of clusters present in the dataset has to be given as an input by the user. In my thesis, we have proposed an algorithm to overcome this major drawback and have given a method to find the optimal number of clusters in any dataset.



22

Prajokta Ray

Electrical Engineering, PhD
Advisor: Andrew Steckl, PhD

Rapid POC Stress Biomarker Detection in Body Fluids

Physical and psychological stress in day to day life causes release of certain molecular markers—also known as biomarkers—into the blood stream, which gets transported to body fluids such as sweat, urine and saliva. Cortisol, serotonin, dopamine, adrenaline and norepinephrine are few such markers. Point of care rapid quantitative detection of stress biomarkers through lateral flow assay and rapid spectroscopy for multiple biomarker detection from single sample is the project goal.

23



Hannah Flood

Cancer and Cell Biology, PhD

Advisor: Vladimir Kalinichenko, MD, PhD

Foxf1 in Hepatic Fibrosis

The forkhead box F1 transcription factor acts as a negative regulator of pro-fibrotic genes in hepatic fibrosis.

24



Rhemecka Graham

Educational Studies, MA

Advisor: Lisa Vaughn, PhD

Redevelopment, Asset Mapping and Parker Elementary

I am conducting an action research master’s project at John P. Parker Elementary (Parker), a K-6 grade school in Madisonville, Ohio. Parker’s resource coordinator, Pamela Knox, is interested in locating where potential partners in the community are. I will use participatory asset mapping to detect stakeholders in Madisonville. Participatory asset mapping is a co-researching process where assets, such as grocery stores, business and parks, or concentrated health issues of a neighborhood are displayed on various

mapping tools (i.e., my Google maps, printable city maps). Mrs. Knox has provided me with a list of businesses, churches and associations that have not been contacted by Parker yet. While there are many types of assets, this project defines assets as support from stakeholders. This will be tracked by placing color coded pins on a map of Madisonville that represent: 1) current supporters of Parker, 2) interested supporters and 3) stakeholders not yet reached (non-supporters).

25



Abigail Richard

Mathematical Sciences, PhD

Advisor: David Herron, PhD

Pointed Gromov-Hausdorff Convergence

I am studying pointed Gromov-Hausdorff convergence of spaces.



26

Brianna Escoe

Business Administration (Marketing), PhD
Advisor: Frank Kardes, PhD

The Importance of Surprise in Consumer Regret and Omission Neglect

Much research has looked at the effects of omission neglect on consumer choice. When consumers make decisions without knowledge of missing information there are many potential negative outcomes. One of these outcomes—consumer regret—needs to be explored further. Three studies and content analysis of consumer reviews show the mediating role of surprise on the effect of omission neglect on consumer regret. We also investigate how consumer expectations and emotions change after one piece of missing information has been disclosed. Once consumers are aware of one piece of missing information, they assume there will be more. This changes consumers' emotional reactions to subsequent discoveries of missing information. This research builds upon the current omission neglect literature by offering a deeper understanding of the negative consequences associated with missing information, as well as shedding light on how consumers react to missing information outside of a lab setting.



27

Robert Johnson

Community Planning, MCP
Advisor: David Edelman, PhD

A Kiln to Solve All

I served in Peace Corps Morocco (January 2014–May 2016) in tandem with the School of Planning's master's international program. Observing all of my town's (Tameslouht) environmental problem (pottery kilns fueled by burning tires, open landfills and olive oil by-product waste), I began researching ways to at least design a kiln that can be better for the community and just as efficient. My solution was to capture the methane gas from burning/composting the solid waste. Upon my arrival to finish my final year of classes/thesis, I assembled a team of mechanical and environmental engineering students to help me design the kiln prototype; these students are using this project as their own capstones as well. Along the design process, we have found a way to also use the olive oil waste in the decomposer.

I am still in contact with my friends and potters in Morocco, who are helping me in the design process as well. When I graduate, I plan to visit Morocco to start laying the groundwork for moving forward. This kiln could help the area not only environmentally, but also as a case study and educational tool for other artisan communities that use the same traditional kiln methods. The kiln itself is one phase in a multi-phase process that includes bringing in a waste management company, relocating the largest landfill, recycling/separation facility, the kiln itself and training programs to make it sustainable environmentally, socially and economically.

CONTACTS

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