The University of Iowa
College of Engineering

RESEARCH OPEN HOUSE

April 6 - 7, 2017

Engineering the Future…

…the Future of Engineering

THE UNIVERSITY
OF IOWA
College of Engineering

THE 15TH ANNUAL
COLLEGE OF ENGINEERING RESEARCH OPEN HOUSE

THURSDAY, APRIL 6TH
UNIVERSITY CAPITOL CENTER, 2ND FLOOR HALLWAY
9:00 A.M. - 4:00 P.M.

The Research Open House will showcase, celebrate, and promote the research activities and accomplishments of the College of Engineering's faculty, staff, and students.

The event will also provide opportunities for graduate and undergraduate recruitment, development of new industrial contacts, and better informing the University and the local community about the research mission and capabilities of the College.

THE 14TH ANNUAL
STUDENT LUNCHEON & RECOGNITION CEREMONY

FRIDAY, APRIL 7TH
HOTEL VETRO, DOWNTOWN IOWA CITY
11:30 A.M. - 1:30 P.M.

Honoring those students who participate in research, the Student Luncheon & Recognition Ceremony is open to all undergraduate and graduate students.

Recognition will be accorded to students who have published, presented, and received awards during the past year (March, 2016 - February, 2017). As well, winners of the "Best Poster" and "Popular Choice" Awards from the poster competition held during the Research Open House will be recognized.

COLLEGE OF ENGINEERING RESEARCH OPEN HOUSE
THURSDAY, APRIL 6, 2017
SCHEDULE OF EVENTS

9:00 am - 4:00 pm   **<u>Student Research Poster Session</u>**   **2nd Floor Hallway, UCC**
Biomedical Engineering
Chemical & Biochemical Engineering
Civil & Environmental Engineering
Electrical & Computer Engineering
Mechanical & Industrial Engineering
Center for Bioinformatics & Computational Biology
Center for Computer-Aided Design
Center for Global & Regional Environmental Research
Iowa Institute for Biomedical Imaging
IIHR - Hydraulics & Engineering
Special Programs & Studies

9:30 am - 10:15 am   **<u>New Engineering Annex Tour</u>** (Registration Required)

10:30 am - 11:15 am   **<u>New Engineering Annex Tour</u>** (Registration Required)

11:30 am - 12:30 pm   **<u>"Going to Graduate School" Workshop</u>**   **2390 UCC**
Presented By: Allan Guymon, DEO Chemical & Biochemical Engineering
This seminar is targeted to undergraduate student who are considering graduate school.

- The application process for graduate school
- Information about how to get financial support through fellowships & stipends
- Information on BS/MS program
- Future job opportunities

There will be a significant amount of times devoted to questions. Undergraduate students from all disciplines are invited to attend, Refreshments provided.

1:00 pm - 2:00 pm   **<u>"Citation Management – EndNote" Workshop</u>**   **2520B UCC**
Presented By: Qianjin (Marina) Zhang, Engineering & Informatics Librarian

1:30 pm - 2:15 pm   **<u>New Engineering Annex Tour</u>** (Registration Required)

2:30 pm - 3:15 pm   **<u>New Engineering Annex Tour</u>** (Registration Required)

5:00 pm - 6:00 pm   **<u>Scholz Symposium: "Engineering in Ergonomics"</u>**   **W10 PBB**
Speaker: Dr. Lauren Gant, HNI Industries

Co-sponsored by the UI Tau Beta Pi chapter, Tau
Beta Pi alumni, and the College of Engineering

STUDENT LUNCHEON & RECOGNITION CEREMONY
FRIDAY, APRIL 7, 2017
HOTEL VETRO, DOWNTOWN IOWA CITY
SCHEDULE OF EVENTS

11:30 am   **Check-in & Registration**

For graduate and undergraduate students. If you presented a poster during the Research Open House, please make sure you receive a ticket for the prizes!

11:30 am - 12:30 pm   **Lunch**

12:30 pm - 1:30 pm   **Recognition Ceremony**

We will recognize students in advanced engineering degree programs. Please join Milan Sonka, Associate Dean for Graduate Programs and Research at the front of the room to have a photo taken in each of the groupings listed below.

- PhD Graduates
- Master of Science Graduates
- Recognition of Milestones
  - Published
  - Presented
  - Awards for Research

Other Student Awards

Departments, centers, and programs will have the opportunity to recognize outstanding students and researchers by presenting annual awards.

Best Poster Awards & Popular Choice Awards

Winners from the Research Open House poster competition will be announced and recognized by Milan Sonka, Associate Dean for Graduate Programs and Research.

Drawing for Prizes

All students who presented posters at the Research Open House will be eligible to participate in a drawing for prizes. Tickets will be handed out at the door.

TABLE OF CONTENTS

POSTER ABSTRACTS

BIOMEDICAL ENGINEERING

"Abnormal Airway Growth in Cystic Fibrosis Piglets"
Ryan J. Adam, Mahmoud Abou-Alaiwa, Daniel P. Cook, Drake C. Bouzek, Eric A. Hoffman, David K. Meyerholz, and David A. Stoltz

We used chest CT imaging to assess lung and airway growth in our porcine model of cystic fibrosis (CF) lung disease. We found that neonatal CF pigs have proximal airway size reduction, despite normal lung volumes. CF pig lungs thus exhibit dysanaptic airway growth, or a mismatch in size between the lungs and airways.

"Nanoparticles and Drug Release Using Ultrasonic Waves: Novel Approach to Drug Delivery"
Madeline Beauchene, Sean Sweeney, Colton Miller, and Joe Assouline

The use of nanoparticles and their controlled release of the drugs will allow for more effective treatment of cancer. Through targeted use of the particles, they will get to the desired location, or the cancer cells, and then through the use of the ultrasound, the particles release the drugs within the cancerous cells.

Preliminary results from experiment conducted in our laboratory show that we found ways to limit the release of fluorescein from the particles. In vivo, this would be ineffective and the cytotoxic drugs could cause cell death of noncancerous cells and risk making the method no better than what is now used. Thus our goal now is to find a method for capping the particles, or closing the pores, with the cancer drug already loaded inside them. In addition, one of the major aim in this study is to be able to uncap the particles using ultrasound. If this were possible, we could load the particles with a drug, cap them so that it could not naturally escape, target to the cancerous cells and then using ultrasound uncap the particles to deliver the drug and cause the cancer cells to die, while saving as many healthy cells as possible. Experimentally, loaded particles show increased diffusion seen with ultrasound, but some passive diffusion is detectable. The proposed experiments will determine the practical parameters to use in future animal study. Ultimately, this work in conjunction with other discoveries in our laboratories, may be uncovering a whole new way to accurately deliver drugs into cancerous growths.

"Human Engineered Skin as an *In Vitro* Model of Wound Healing"
J. Timmins, **H. Conlan**, S. Chinnathambi, A. Klingelhutz, E.A. Sander

Better in vitro models of wound healing are required in order to devise better therapies for improving the rate of re-epithelialization and reducing scarring. Here we describe the development of such a model that uses human engineered skin. A portion of the skin is biopsied and filled with a fibrin gel. The remodeling process is then quantified.

"Advanced Physics-Based Models of Cancer Therapeutics"
Rae Ann Corrigan and Michael J. Schnieders

This project focuses on understanding how chemotherapy drugs interact with cancer-causing proteins. PolType is a program that determines the chemical features of small biomolecules, however, it lacks the ability to analyze large biomolecules, such as drugs. Two programs, Fragmenter and Stitch, were designed to help overcome PolType's size constraint when evaluating large molecules. Fragmenter splits the drug of interest into small fragments to be parameterized by PolType, and Stitch puts these fragments back together to reform the full molecule. Working together, these two programs output a chemically complete model for the drug as a whole. Such drug models can then be used to help predict drug-protein interactions.

"Perturbation of Fibrin Gels Seeded with Fibroblast Cell Aggregates Using a Linearly Actuated Acupuncture Needle"
Mariam El-Hattab and Edward Sander

The purpose of this study is to investigate the mechanical and biochemical responses of dermal fibroblast cells in a simple wound model by disrupting the fibrous environment with which they reside. This is performed with the use of a linearly actuated acupuncture needle and observed with time-lapse imaging. It has been seen in the literature and through experimentation that external forces on fibroblast cells can actually drive their preferential migration through a 3D matrix (in this case, a simple fibrin gel). This can have important implications in wound healing and the mechanical environment of aged and diseased skin.

"Convolutional Neural Networks for Pulmonary Fissure Detection and Segmentation in Computed Tomography Datasets"
Sarah E. Gerard and Joseph M. Reinhardt

Accurate delineation of pulmonary fissures in computed tomography (CT) datasets is important for studying pulmonary disease and lung function at the lobar level. Designing robust algorithms for this task is challenging due to weak and incomplete fissures, diseased lung tissue, and large variation of fissure shape and location between subjects. In this study, we explore the use of a ConvolutionalNeural Network (CNN) architecture for detection and segmentation of fissure surfaces in CT images. Compared to traditional approaches that utilize handcrafted filters for fissure enhancement, often leading to high false positive rates, CNN's are more powerful because they can automatically learn both low and high level filters that are optimal for distinguishing fissures from non fissures.

"A Functional Model of Cell Migration on a Dynamic Neo-Hookean Substrate"
Spencer Halberg and Edward Sander

Fibroblast motility plays an imperative role in the development and maintenance of the extracellular matrix (ECM). Previous literature has shown that fibroblasts consistently respond to stiffness gradients in the ECM that affect cellular migration and more specifically, direction. We have created a model of cell migration in which the cell dynamically interacts with the ECM (represented with 3D finite elements model) and causes it to deformation. This interaction may result in a local stiffening effect of the ECM that could influence cell migration characteristics, particularly when multiple cells are considered.

"Comparison of Image Registration Direction on Pulmonary 4DCT Datasets"
Anna Y. Keil, Sarah E. Gerard, Wei Shao, Taylor J. Patton, John E. Bayouth, Gary E. Christensen, and Joseph M. Reinhardt

Image registration is used to find the anatomical correspondence between pulmonary images of lungs at different levels of inspiration and expiration, and the resulting transformation can be used to estimate biomechanical measurements of the lung. Traditionally, registration is performed by deforming a larger lung volume to a smaller lung volume. 4-Dimensional computed tomography (4DCT) datasets from lung cancer patients were used to compare this traditional orientation to its reverse to understand the resulting effects on image registration accuracy and computational time. These same effects were also tested via the process of step-wise image registrations over the 4DCT datasets.

"Response of Epithelial Thyroid Cells to Vibrational Stimuli"
A. Mendenhall, A. Wagner, S. Chinnathambi, E. Sander, and I. Titze

Hypothyroidism is the most common endocrine disease. Previous work has shown that vibration of thyrocytes at levels consistent with human vocalization can stimulate thyrocyte metabolism in a manner comparable to stimulation from thyroid stimulating hormone. Here we report on our continued examination of thyrocyte responses to differing

vibrational amplitudes, exposure times, and duty cycles in monolayer culture, and in type I collagen and basement membrane-based gels. These results may lead to mechanobiology-based therapies improving thyroid function.

"A Combined Approach of Traction Force Microscopy (TFM) and Magnetic Tweezers (MT) to Study the Structure of Keratin Intermediate Filament-Desmosome-Hemidesmosome Network in Human Epidermal Keratinocytes"
Waddah Moghram and John C. Selby

Epidermal keratinocytes, the outermost layer of the human skin, is our barrier and protection from the outside world. To date, the mechanisms by which these cells fail to maintain their integrity remain uncertain. In other words, the keratinocyte's ability to sense and respond to mechanical signals within its environment - not just biochemical ones - is poorly understood. As such, the primary goal of our research is to design, construct, and conduct mechanical micro-testing using traction force microscopy (TFM) and electromagnetic micro-needle manipulation - or magnetic tweezers (MT) - to apply a precisely and accurately controlled external force to the outermost layer of in-vitro keratinocytes that are covalently attached to magnetic beads. The transmission of the cell traction force distribution is visualized using fluorescence microscopy. Knowing both ends, we can study the structure and structural failures of the keratin intermediate filament-desmosome-hemidesmosome (K-D-H) network. More specifically we can tease out the various subcomponents of the K-D-H network under various scenarios.

"Nanoscale Surface Modification Through 'Click Chemistry' and its Effect on Biofilm Formation"
Logan W. Muckenhirn, David F. Donovan, Marry E. Biggin, and Dr. Scott K. Shaw

In a recent survey conducted by the Center for Disease Control and Prevention, approximately one in 25 U.S. patients has at least one infection contracted during the course of their hospital care, demonstrating the need for improved infection control in U.S. healthcare facilities. Biofilms contribute to more than 80% of all healthcare-associated infections (HAI's). Our research focuses on the nanoscale modifications of the surfaces where biofilm formation takes place and aims to decrease or eliminate bacterial attachment to these surfaces. Last year, we were able to develop a system with quartz crystals with a Texin polymer coating. Surface modifications included, hydrophobicity, surface charge, and surface morphology which was examined through vibrational spectroscopy, quartz crystal microbalance, contact angle measurements, and ellipsometry. I am currently conducting experiments that involve 'click' chemistry; which is a series of biocompatible reactions intended to join substrates of choice with specific biomolecules. In our experiments, we use a hex-5-yne-1-thiol and an azido sugar (mannose, lactose, and α-Gal) for our reactants. The goal of our project is to substitute the molecule heparin for the sugar, successfully incorporating the drug with the polymer coating.

"Accelerating Computational Protein Design via Advanced Thermodynamic Paths"
Jacob M. Litman, **Claire O'Connell**, Stephen D. LuCore, Young Joo Sun, Ernesto Fuentes, and Michael J. Schnieders

Free energy simulations are an emerging approach to computational protein design, and are largely based on fixed partial charge force fields, which suffer from accuracy limitations. Dual force field methods show improvement to the accuracy of small-scale simulations by correcting thermodynamics to those of a more advanced force field in a fraction of the time. Our 'dual environment switching' approach attempts to perform these corrections on larger, biologically relevant systems. We converge a 648-atom system, 15 times larger than those previously studied, in simulations less than 10 nanoseconds, and show an approximation that should extend the method to larger systems.

"Developing Machine Learning Tools for Cancer Prediction from Genomic Data"
Michael C. Rendleman, Thomas L. Casavant, Reinhard Beichel, Bart Brown, Terry A. Braun, and John Buatti

Tumor characterization is an integral part of personalized oncological medicine. Machine learning has been successfully applied to this topic in the context of medical imaging and radiomics, yielding results showing significant association with gene expression in lung cancer patients. The aim of this poster is to describe a strategy for applying machine learning algorithms and techniques to perform tumor characterization using a combination of a patient's clinical, imaging, and genome sequence variant analysis information. This approach utilizes existing longitudinal patient data to build prognostic classifiers, providing a novel path for clinical decision support and ultimately more informed, precise oncological treatment in the age of personalized/precision genomic medicine.

"Optimizing the Photopolymerization Parameters of High-Resolution, 3D Biodegradable Tissue Scaffolds"

Jessica R. Thompson, Kristan S. Worthington, Brian J. Green, Spencer J. Bunn, Luke A. Wiley, Emily E. Kaalberg, Chunhua Jiao, Stephen R. Russell, Ian Han, Katherine N. Gibson-Corley, Elliott H. Sohn, and Budd A. Tucker

Poly(caprolactone) (PCL) is a promising candidate for tissue scaffolds due to its biodegradable, biocompatible, and easily chemically modified nature. In this study, two-photon polymerization of acrylated PCL was used to create microstructured tissue scaffolds. PCL functionality, molecular weight and concentration, as well as photoinitiator concentration, scanning speed, laser power, slicing distance and hatching distance were varied in order to optimize prepolymer formulation and printing parameters. These optimized parameters were then used to create 1x3x0.1mm tissue scaffolds that were implanted into porcine retinas. After 1 month in vivo, there were no signs of inflammation or fibrosis.

CHEMICAL & BIOCHEMICAL ENGINEERING

"Production of Theobromine from Coffee Waste"
Khalid Algharrawi, Mani Subramanian, and Ryan Summers

This work reports the use of metabolically engineered *E. coli* to convert caffeine from coffee waste to theobromine. First, coffee waste was collected from Iowa city Starbucks, dried, and the amount of caffeine was analyzed. 25 mg/mL metabolically engineered *E. coli* (strain pBD2dDB) was required to achieve 100% conversion of 1 mM caffeine to theobromine. Cell growth, reaction, and separation were scaled up to produce and purify 178 highly pure theobromine with 88% yield.

"Effect of Heat Shock on Growth Rate of *Pseudomonas Aeruginosa* Biofilms"
Haydar Aljaafari, Erica Ricker, and Eric Nuxoll

Many medical implanted devices obtain biofilm infection and cause health issues. Because the bacterial biofilm infections on medical implants cannot be killed with antibiotics, the current standard of care is explantation of implant and surrounding tissue. Biofilms can be reduced by thermal shock, but it remained unclear whether surviving bacteria would repopulate the biofilm. This study indicates that below a critical population density of 1000 (CFU/cm^2) the biofilm is non-viable, while large population densities will slowly repopulate to their pre-heat-shock levels.

"Improved Electrodialysis by Using Complex 3-D Electrode Architecture"
S. Alsaedi and S. Mubeen

Surging population and climate change will push society, ever more urgently, to harvest lower quality or impaired water supplies for drinking water. However, the widespread adoption of desalination technologies is currently limited due to its energy intensive nature and/or limited membrane lifetime and performance, especially during high operation rates. This work focuses on developing a novel, cost-effective, electrodialysis unit. Specifically, we have replaced planar electrodes in traditional electrodialysis units with complex 3-D electrodes. The 3-D electrode bed configuration provided large surface area per unit volume, thereby allowing high currents to be drawn at current densities short of the diffusion-limited regime.

"Carbon Capture and Sequestration Technology for the State of Iowa"
Alexander Bartley, Jason Plickebaum, and Sarah Keith

Feasibility study of current and future technology for carbon capture and sequestration for use in the state of Iowa. Carbon capture and sequestration technologies for the state of Iowa. Conclusions on outlook, technology options, approach, economics, technology readiness level will be drawn from extensive literature review.

"Analysis of the Protein Effects on Nanoparticle-Cell Association"
Alexandra Bess and Jennifer Fiegel

When inhaling an aerosol drug, the drug particles travel through the throat and lungs on their way into the body. Using epithelial cells from the alveoli of human lungs and polystyrene particles to simulate drug particles, cells were exposed to these simulated drug particles in a controlled environment, using saline, and a more natural environment, using a dilute lung fluid called broncheolalveolar lavage fluid (BALF). Analysis of the effect lung proteins will have on the interactions between lung tissue cells and a simulation drug particle describes how that drug particle may interact within the body, and what interactions in particular can be attributed to the proteins alone.

"Integrated Lab-On-A-Chip Life Support Device for Human Space Missions"
Alec Countryman and Syed Mubeen

The overall objective of this research project is to design and construct an innovative miniaturized lab-on-a-chip device that can produce breathing quality oxygen, as well as, methane which could, perhaps, be used for propellant. The project starts with the design, using COMSOL Multi-physics, of a to-scale Reactor for CO_2 to H_2O conversion. It is imperative for the entire device to be 'small' in both volume and weight as expense escalates with both dimensions. The transition from modeling to fabrication will commence thereafter thanks to our laboratory's successful approach to fabricate miniaturized energy conversion devices and sensors using state-of-the-art characterization and foundry techniques. Each component will first be used in macro-scale for demonstration as a proof of concept. Following the proof-of-concept, a prototype will be constructed assuring the weight, volume, and personal safety aspects are accounted for.

"Determination of Sugar Composition and Distribution in *Pseudomonas sp.* ADP by Fluorescent Lectin Binding Analysis"
Michael A. Delcau, Andrea Diaz, and Tonya L. Peeples

Pseudomonas sp. ADP (PADP), a strain of bacteria capable of degrading the persistent herbicide atrazine, has been genetically characterized as a catabolic microbe for its relevance in the field of bioremediation. However, despite extensive studies on the planktonic form, relatively little is known about the biofilms formed by this bacterial strain. Fluorescent lectin binding analysis was employed with rhodamine-conjugated lectins to identify and quantify the specific sugars involved in the formation of PADP biofilms. The highest ratio of rhodamine-bound lectin to a non-specific DAPI cell counterstain was *Concanavalin* A, indicating an affinity for mannose present in *Pseudomonas sp.* ADP biofilms.

"Using Ultrasound to Enhance Tumor Cell Killing by Anti-PD1 and Doxorubicin-loaded Particles"
Anh-Vu Do, Dongrim Seol, Phillip Tobias, Ino Song, James A. Martin and Aliasger K. Salem

Metastatic melanoma is currently an incurable disease for which alternative treatments to chemotherapy alone are sought. The use of ultrasound (US) with microbubbles is a promising regimen for tumor treatment. In this study, the addition of US provided a means for controlled drug delivery through inertial cavitation. The aim was to obtain a synergistic or additive effect with respect to tumor killing by combining US with chemotherapy and checkpoint blockades. In vitro experiments combining US with blank PLGA particles showed higher cytotoxicity towards B16.F10 melanoma cells compared to either treatment alone. Furthermore, in vitro experiments demonstrated an ability to control the release kinetics of doxorubicin (dox) from dox-loaded PLGA particles through the application of US. Utilizing a melanoma murine model, the application of US to dox-loaded particles and/or anti-programmed cell death protein 1 (anti-PD1) yielded higher tumor regressions and survival rates compared to any treatment alone.

"Ethanol: Fuel of the Future"
Chad Ford, Brian Cherrier, and Tejasvi Sharma

Can Ethanol be fuel for the future for the State of Iowa? Outlook, technology options, scalability and economics.

"Shining a Light on the Irradiance and Wavelength Properties of Light Emitting Diodes in Dental Applications"
Katherine Giles, Sara Kaalberg, Nicole Kloepfer, and Julie L.P. Jessop

Light curing units (LCU) are used in order to photopolymerize resin based composites applied during dental restorations. Characterizing the light emitting diodes (LED) used in the LCU will provide crucial information on the uniformity and power provided to the restoration during curing. In this study, two-dimensional spatial mapping was performed on the irradiance and wavelength emitted by a given LCU.This method and the data obtained from the

study will be used in future research to spatially map the cure of a dental resin system illuminated by the LCU and determine the best practices for curing these systems.

"The Effect of Solution Properties on Protein Corona Formation and Nano-Bio Interactions"
Brittany E. Givens, Elizabeth Wilson, Nina D. Diklich, Vicki H. Grassian, and Jennifer Fiegel

The human body is comprised of many organs and fluids which are specialized by their location. When nanoparticles are present in the environment, they can be taken into the body via inhalation, ingestion, or dermal absorption. As a result, nanoparticles can reach many different organs of the body, and their effects in these regions may differ. This study investigated the effects of pH and ion types on nanoparticle-protein interactions with silicon dioxide nanoparticles and bovine serum albumin protein. The aggregation and zeta potential of nanoparticles in the presence and absence of protein were measured, the adsorption of protein to the nanoparticle surface was compared in different solutions, and the energy barrier for particle attraction was modeled using the Derjaguin-Landau-Verwey-Overbeek (DLVO) theory. Results from these studies suggest that the affinity for neighboring particles to aggregate is related to the quantity of protein adsorbed to the nanoparticle surface. This knowledge can be used to improve predictions of nanoparticle behavior in biological system.

"Improving 3D Photocured Systems"
Brian Green, Ted Paulsen, Robert McLeod, and Allan Guymon

Since its inception 30 years ago, stereolithography (SL) has become a valuable technology for rapid prototyping, customization, and manufacturing of intricate structures unavailable through other techniques. SL is an additive manufacturing process that commonly utilizes UV-initiated photopolymerization to selectively cure resins into layers of solid materials, subsequently building an object layer by layer and capable of printing objects with resolution down to the scale of 10 to 100 micrometers. However, widespread adaptation of SL technologies faces many obstacles, particularly slow print speeds, unsuitable thermomechanical properties, and low resolution. In this research, we aim to gain a fundamental understanding of the relationship between material properties and processing conditions by analyzing the kinetics and properties of a model acrylate formulation.

"Nano/Microstructured Materials Obtained Using Photopolymerization-Induced Phase Separation (PhIPS)"
Erion Hasa, Julie Jessop, Allan Guymon, and Jeffrey Stansbury

Controlled phase separation in polymer networks can generate materials with enhanced physical and mechanical characteristics, including increases in material toughness, reduction of polymerization-induced shrinkage stress, and enhanced abrasion resistance compared to equivalent homogeneous counterparts or each component in the polymer networks. Materials doped with inorganic fillers have similar benefits but are not ideal because of high component costs, deleterious changes in mechanical properties, and challenging down-stream processing conditions. Conventional polymerization induced phase separation (PIPS) generally involves unreactive species, such as linear prepolymers or liquid crystals, diluted in a monomer solution.

"Cationic Photopolymerization of Epoxides and Oxetanes: Effect of Secondary Functional Groups on Kinetics and Viscosity"
Sara Kaalberg and Dr. Julie L. P. Jessop

Cationic photopolymerization systems are able to overcome many difficulties present in free-radical systems, such as shrinkage and oxygen inhibition, but react more slowly and typically reach lower conversions. In this project, we study the effect of monomer formulation and secondary functional group on the cationic photopolymerization kinetics during and after illumination. A commonly used epoxide monomer was mixed with varying ratios of four oxetane monomers. Monomer conversion was measured using Raman spectroscopy. Increasing oxetane concentrations improved epoxide conversion and led to faster reaction rates, with large differences between oxetanes due to the secondary functional group present on the oxetane monomer.

"Copper Oxide Nanoparticle Toxicity in Acute Lung Cell Exposure"
Benjamin King, Joseph O'Brien, Andrea Adamcakova-Dodd, Peter Thorne, David Roman, and Jennifer Fiegel

Lung infections can be exacerbated by inhalation of a variety of pollutants, including cigarette smoke and urban particulate matter. We hypothesize that metal oxides, present on both cigarette smoke and urban particulate matter, upregulate specific cell receptors and lead to enhanced bacterial adhesion. We have exposed A549 alveolar epithelial cells to various concentrations of copper oxide nanoparticles, then evaluated the cells for toxicity and for receptor activity. Lung cells exposed to copper oxide nanoparticles exhibited concentration-dependent loss of viability, with complete toxicity at high concentrations. At low concentrations, copper oxide nanoparticle exposure led to a 2-fold increase in receptor expression.

"A Recipe for Success: Correlating Monomer Chemistry to Dose Rate Effects in Electron Beam Polymerization"
Nicole Kloepfer and Dr. Julie Jessop

Electron beam (EB) polymerization offers many advantages over traditional thermal and photopolymerization. However, industrial scale-up of EB processes is difficult because even if the total dose delivered on the pilot and production line is the same, changing the rate the dose is delivered can change polymer properties. Unfortunately, the magnitude of these changes, termed dose rate effects (DREs), is unpredictable. To better understand DREs, conversion and glass transition temperature (Tg) were measured using Raman Spectroscopy and Dynamic Mechanical Analysis. Analysis of conversion and Tg has led to the discovery of a correlation between DREs and monomer chemistry.

"Evaluating the Absorption Spectra of Cationic Photoinitiators"
Eric Knapp, Sara Kaalberg, and Dr. Julie Jessop

In cationic photopolymerization reactions, specialized molecules called photoinitiators (PI) are used to absorb light energy and initiate the polymerization. In this research, UV/Visible absorption spectroscopy was used to measure how much light different PIs absorbed and at what wavelength. The absorption spectrum of each PI was then compared to the light output of a mercury arc lamp. The amount of relative overlap of the absorption spectrum of the PI and the emission spectrum of the lamp was then calculated. The amount of overlap can be used to predict which PI would be most effective when used with that lamp.

"Hydrogen as Fuel for the Future"
Vincent LaPelusa, Daniel Lippert, and **Jonathan Koonce**

Hydrogen has been proposed as a clean fuel source for the future. Through water splitting for hydrogen production this fuel can act as an energy storage medium for intermittent power sources such as wind and solar, and it can also act as a high energy-density fuel for transportation purposes. This research will explore the outlook, technology options, scalability, and economics of hydrogen as a fuel for the future.

"Low Iridium Content Transparent Electrocatalyst for Oxygen Evolution Reaction"
Jonathan Koonce

Water splitting for hydrogen production requires catalysts that are active for both the hydrogen evolution reaction (HER) and the oxygen evolution reaction (OER). OER kinetics typically limit the efficiency of electrolysis, so improved OER catalysts are needed. This research has found an effective iridium doped nickel-iron based catalyst that is effective even at extremely low loadings. This low loading also allows the films to be transparent, which has positive implications for solar energy conversion systems.

"Curing Dose Rate Effects: Predicting Polymer Properties in Electron Beam Polymerization"
Renae Kurpius, Nicole Kloepfer and Julie L.P. Jessop

Dose rate effects (DREs) are important for electron beam (EB) polymerization and the scale-up from pilot line to production scale. DREs only occur in certain chemistries. This research is focused on determining the correlation between monomer chemistry and DREs experienced during EB polymerization. To analyze the DREs, conversion and glass transition temperature were measured using Raman Spectroscopy and dynamic mechanical analysis, respectively. Analysis of glass transition temperature and conversion led to a predictive model that can determine the DREs experienced by changing dose and belt speed.

"Engineered Zwitterion"
Braden Leigh, Elise Cheng, Na Shen, Corinne Andresen, Marlan Hansen, and C. Allan Guymon

All biomedical devices accumulate fibrous tissue on their surfaces several weeks after implantation, a process called the foreign body response (FBR). This fibrosis is particularly problematic for neural prosthetics, such as the cochlear implant. The first step in the FBR is nonspecific adsorption of proteins to device surfaces. To reduce this nonspecific protein adsorption glass substrates were coated with zwitterionic polymers, materials known to minimize the FBR, and were shown to reduce nonspecific protein adsorption. Further, zwitterionic patterns were fabricated shown to significantly reduce adhesion of multiple cell types in functionalized areas. These results provide insight for advancing cochlear implants.

"Preliminary Analysis of the Diurnal Variation of Aerosol Optical Depth during the KORUS-AQ Campaign"
Elizabeth Lennartson and Jun Wang

Aerosols play a large role in air quality, climate, and human health. Data from surface monitors, aircrafts, satellites, and chemistry transport models are becoming integral components of atmospheric research. We investigate the diurnal variation of aerosol optical depth (AOD) during the KORUS-AQ field campaign using data from AERONET surface monitors and WRF-Chem model output. Preliminary analysis shows that the climatological diurnal variations are distinct within different land classifications and that the diurnal variations during the KORUS-AQ campaign departed from these patterns. Additionally, the WRF-Chem model tended to have a high bias in predicting AOD values throughout the campaign.

"Opportunities and Barriers of Electric Vehicles in Iowa"
Devyn Lewis, Noah Gavin, and Jingwen Chen

Objective: This study was conducted to examine the current state of electric vehicles specifically as they relate to the state of Iowa. In particular, research was conducted on the future outlook, technological options, economic potential, accessibility, and potential site selections that pertain to electric vehicle technology.

"Improving the Estimates of Particulate Matter Impact on Human Health through Remote Sensing"
Wan Nurlaila Yusra Mat Desa and Gregory Carmichael

Exposure to particulate matter has severely affect human health as approximately 6 million people die from air pollution each year. This leads to the increasing need for accurate documentation of particulate matter in the atmosphere at ambient conditions, in order to provide more accurate prediction that can help to mitigate the adverse impact on human health. This study examines how well aerosol behavior can be predicted using atmospheric remote sensing, in relative to ground station observation in Eastern Asia.

"UI Nuclear Power Plant Installation"
Wan Mat Desa, Austin McKee, Thomas Bradshaw

This project analyzed the installation feasibility of a nuclear pilot plant, which involves a fission reactor capable of producing 1 MW of power for the UI energy use. The overview of this project includes literature review of existing technology options, suitable approach of installation and site selection, as well as analytical analysis on the project economics.

"Team Solar"
Taylor Mattingly, Thomas Chase and Abdulelah Abuhaimed

Installation of solar enabled technologies around campus to meet 25%, 50%, 75% and 100% UI campus electricity demand. Outlook, technology options, approach, site selection, economic.

"Electrochemical Reduction of CO_2 into Usable Chemicals and Fuels"
Austin McKee, Syed Mubeen, et al.

CO_2 in the atmosphere is a major cause of global climate change. Therefore it is necessary to find a method of reducing the amount of CO_2 released into the atmosphere when producing fuels. This method attempts to change the CO_2 into something useful through electrochemical and high pressure means. Preliminary results show an electrochemical reaction in the high pressure CO_2 environment showing potential for this experiment.

"Improved Toughness in Photopolymerized Films via RAFT Modification"
Jacob R. McLaughlin, Eastyn Fitzgibbon, Jon P. Scholte, and C. Allan Guymon

We demonstrate the effects of controlling the photopolymerization of polyurethane/acrylate films using a reversible-addition fragmentation chain-transfer (RAFT) agent. These films exhibit greatly enhanced mechanical properties when polymer propagation is controlled using commercially available RAFT agents as a method of controlling chain growth. Photopolymer chain propagation rates were slowed by use of a RAFT chain transfer agent at varying concentrations. The controlled network growth is thought to allow more homogeneous networks to form. Homogeneous networks are tougher, due to fewer defects. RAFT modified materials with amounts as small as 2% RAFT agent are up to three times tougher than controls.

"The Effect of Cyanuric Acid on the Expression of Atrazine-Degrading Genes in *Pseudomonas sp. ADP*"
Emily Pattee, Michael Delcau, Andrea Diaz, Sarah Keith, and Dr. Tonya Peeples

Atrazine is an herbicide used to control broad-leaved and grassy weeds. The EPA limits the concentration of atrazine in drinking water to 3ppb due to its classification as an endocrine disrupter compound. Pseudomonas sp. ADP (PADP) cells are used to degrade atrazine via six enzymatic steps. To determine if PADP would grow on cyanuric acid (CA), the third metabolite of degradation, spread plates and a growth curve containing CA were prepared with the strain. Subsequently, the differential gene expression of CA compared to atrazine was evaluated using RT-qPCR, which exhibited decreased expression for 67% of the degradation genes.

"Development and Application of Electrospun Nanofiber Mats as Passive Sampler Media for Hydrophilic and Hydrophobic Organic Compounds"
Jiajie Qian, Brandon Jennings, Andres Martinez, and David M. Cwiertny

We fabricated electrospun polymer nanofibers (ENMs) to be used as sorbent materials for passive sampling devices to measure organic pollutants in the environment. Characterization revealed that electrospinning provides a highly reproducible and well-controlled approach for the ENM fabrication. Uptake experiments in aqueous phase indicated that equilibrium between the chemicals and ENMs was achieved in < 1 day, with equilibrium partitioning coefficients yielding ~ 4 log units depending on the chemicals and the ENMs tested. Isotherm sorption experiments showed

linearity between ENMs and the chemicals. Measurements of chemicals in sediment pore water from spiked soil yielded reproducibility and good extraction.

"Acid Stable Bismuth Vanadate for Photo Electrochemical Chlorine Production"
Alan Rassoolkhani, Wei Cheng, Joun Lee, Kevin Nguyen, Graham Young , and Austin Mckee
Water scarcity issues has forced nations to find new approaches to meet growing water demands. Most often, this involves harvesting lower quality or impaired water supplies as a source for drinking water. There is growing reliance of wastewater recycling, in which high pressure membrane processes such as Reverse Osmosis are used to restore municipal and industrial wastewater to a quality suitable for beneficial reuse (including drinking). Here, we report a photoelectrochemical process that's built on established chloralkali process to explore alternative systems through which important fundamental questions on water desalination using sunlight can be addressed.

"Combined Treatment of Heat and Antibiotic to Mitigate *Pseudomonas aeruginosa* Biofilm Implant Infections"
Erica Ricker and Eric Nuxoll

Medical implant infections result in tens of thousands of additional surgeries each year, and cost billions of dollars. Bacteria colonize the surface of medical implants, forming a biofilm that cannot be treated by antibiotics alone. Localized heating to the surface can mitigate the biofilm infection and improve the efficacy of the antibiotics. Temperatures of $37°C$ to $80°C$ were investigated for exposures between 1 and 30 minutes in conjunction with exposure to different concentrations of ciprofloxacin, tobramycin, or erythromycin. The combination of antibiotic administration and heating the biofilm should substantially reduce costs, personal and financial, of medical implant infections.

"Recovery Storage Unit for The Seamans Center"
Michael Seibt, Alec Countryman, and Maliah Kome

The Seamans Center for the Engineering Arts and Sciences currently has no form of mass storage device for energy supply intermittencies. We have been tasked to come up with a 100 kWh energy storage system or battery. There are no confinements in term of cost, however, the proposed action is as follows: Explore current technologies for mass energy storage, devise a plan for the integration with existing electricity sources and envisage a method of implementation.

"UI Wind Power Installation"
Zubair Shamsul Akmal, Carson Hemphill, and Ziyang Mao

This project will analyze options for wind turbines installation around campus to meet the UI energy demand at 25%, 50%, 75% and 100%. The project will provide energy outlook for UI including the overviews of potential site selection, technology options, approaches and the project economics.

"Modeling the Climatic Effects of Black Carbon and Arctic Snow and Ice"
Negin Sobhani, Gregory Carmichael, and Sarika Kulkarni

Arctic temperature has increased more than the global mean surface air temperature over the past century, due to the various positive feedbacks and amplification mechanisms such as black carbon (BC) deposition and albedo reduction. Long-range transport of atmospheric particles from midÂ-latitude sources to the Arctic is the main contributor to the Arctic aerosol loadings and deposition. Light absorbing particles (LAPs) such as BC and dust are considered of high climatic importance and are primary absorbers of sunlight in the atmosphere. Furthermore, wet and dry deposition of light absorbing particles on snow and ice cause reduction of snow and ice albedo. We study the potential effect of LAPs from different emission source regions and sectors on snow albedo in the Arctic. In this study, a modeling framework including Weather Research and Forecasting Model (WRF) and the University of Iowa Sulfur

Transport and dEpostion Model (STEM) is used to predict the transport of LAPs from different geographical sources and sectors (i.e. transportation, residential, industrial, biomass burning, and power) to the Arctic. To evaluate the simulated albedo change, we compared the simulated BC concentration in the snow with observed values from previous studies including Doherty et al. 2010.

"Economics-Informed Discovery of Solar Energy Conversion Systems"
Adam Weis, Alan Rassoolkhani, Wei Cheng, and Syed Mubeen

Current methods of solar energy conversion are not yet sufficiently economical to allow solar to be a competitive global energy source. This project investigates various solar energy conversion systems to identify which have the best economic potential, and how best to implement these systems. A techno-economic analysis was conducted of available chemicals produced via solar energy conversion to identify the best candidates. Copper metal was shown to be one of the products with the best potential. Investigation into producing copper via solar energy conversion and photo-electrodeposition in a continuous-flow reactor is now being conducted to optimize its economics and feasibility.

"Outreach and Environmental Education About Air Pollution"
Charles Stanier, **Kyle Wersinger**, Nathan Bryngelson, and Can Dong

CLE4R is a collaborative effort between the University of Iowa, the City of Dubuque, and Dubuque-area partners to improve air quality in Dubuque and the surrounding Upper Mississippi River Valley communities. The CLEAR in CLE4R stands for CLEan Air in the River Valley. An important component of CLE4R is environmental education, which has been conducted through a website, Facebook presence, Twitter feed, and presentations throughout eastern Iowa. Presentations have used handheld air quality sensors as a training aid. Successes and challenges of this approach will be presented.

"Porous Aluminum Oxide: Templates for High Throughput Production of Ordered Metallic and Semiconducting Nanowires"
Graham Young, Kevin Nguyen, Wei Cheng, Alan Rassolkhani, Dakota Evan, Johnathan Koonce, and Syed Mubeen

One-dimensional (1-D) nanostructures exhibit unique optoelectronic, catalytic, and interfacial properties that are of both fundamental and technological importance. The past decade has seen revolutionary advances in our ability to design, tailor and control these properties for technological implications. However for wide scale industrial adoption, the scale-up science associated with device, system and process level are still poorly understood. The objective of this project was to demonstrate a manufacturably scalable and sustainable method for nanowire production with controlled orientation and device architecture.

Conventionally, the procedures to fabricate 1-D nanostructures in desired device configuration requires expensive electron beam lithography or spatially limited photolithographic techniques. Herein we overcome this challenge by using inexpensive ordered alumina oxide membranes, which acts as a growth template and a structure directing agent for nanowire growth. Aluminum was chosen as a base for nanowire templates because of its low cost, and material availability.

A modified anodization procedure was used for generation of high density hexagonally ordered homogeneous nanopore arrays with tunable pore diameters, interpore distance and pore lengths. Pore diameters were controllably tuned from 30 to 80nm. Pore diameter ranges are dependent on pore density, which is determined by anodization conditions. Pore diameter growth rate was calculated to be 5.4nm per minute and pore length growth was optimized and found to be 1 ¼m per 12 minutes. Collectively, enabling us to create high-density nanostructures with aspect ratios (L/D) ranging from 33 to 12.5. Pore densities were calculated to be 14.6 billion pores per cm^2, with interpore distances of 96nm. Scanning electron microscope (SEM) techniques were used to characterize pore diameter, pore density and interpore distance. Methods of electrodeposition of silver and other semiconducting materials with desired functionalities are currently being investigated

CIVIL & ENVIRONMENTAL ENGINEERING

"The Impact of Freshwater Mussels on Anaerobic Ammonium Oxidizers and Other Nitrogen-Cycle Bacteria in Upper Mississippi River Sediment"
Ellen Black, Michael Chimenti, and Craig Just

Targeted quantitative polymerase chain reaction and non-targeted amplicon sequencing of 16S rRNA within sediment layers identified the anaerobic ammonium oxidation (anammox) niche and characterized microbial community changes attributable to freshwater mussels. Anammox bacteria were normally distributed (Shapiro-Wilk normality test, W-statistic=0.954, p=0.773) between 1-15 cm depth and were increased by a factor of 2.2 (p<0.001) at 3 cm below the water-sediment interface when mussels were present. 16S rRNA amplicon sequencing showed that mussel presence reduced observed species richness (p=0.005), Chao1 diversity (p=0.005), and Shannon diversity (p<0.001), with more pronounced decreases at 5 cm depth. A non-metric, multidimensional scaling model showed that intersample microbial species diversity varied as a function of mussel presence, but not sediment depth. Microorganisms capable of complete ammonium oxidation (Genus Crenothrix), aerobic ammonium oxidation (Family Nitrosomonadaceae), and aerobic nitrite oxidation (Genus Nitrospira) were increased with mussels, while nitrite-dependent anaerobic methane oxidizers and aerobic ammonium oxidizers (Genus Candidatus Nitrosophaera) were greater without mussel presence. These findings further our understanding of how mussels impact microorganism niches and influence biogeochemical nitrogen-cycling in freshwaters.

"Polychlorinated Biphenyl Biodegraders in an Altavista Lagoon"
Jessica Ewald, Yi Liang, Andres Martinez, Jerald Schnoor, and Timothy Mattes

Aquatic environments with levels of polychlorinated biphenyls (PCBs) greater than 50 ppm are a global concern. Biodegradation of PCBs offers a pathway for the transformation of these persistent organic pollutants to less toxic compounds in soil and sediment. To enhance understanding of microbial community structure and function associated with the PCB biodegradation process, sediment samples were collected from a PCB-contaminated lagoon in Altavista Virginia. Evidence substantiates the possibility of naturally occurring anaerobic and aerobic PCB biodegradation. Additional study is being performed to better understand and identify the microorganisms reductively dechlorinating the highly chlorinated PCB congeners present in the Altavista Lagoon.

"Calibration and Evaluation of PUF-PAS Sampling Rates across the Global Atmospheric Passive Sampling (GAPS) Network"
Nicholas J. Herkert, Scott N. Spak, Austen Smith, Jasmin K. Schuster, Tom Harner, Andres Martinez, and Keri C. Hornbuckle

Passive air samplers equipped with polyurethane foam (PUF-PAS) are frequently used to measure persistent organic pollutants (POPs) in ambient air. Here we present a method to determine sampling rates (Rs) for chemical compounds captured by a PUF-PAS sampler deployed anywhere in the world. The model was calibrated from samples collected around the world by the Global Atmospheric Passive Sampling (GAPS) network. Once calibrated, the model provided acceptable agreement with measured Rs (mean percent bias near zero, 6%). The model provides reliable PUF-PAS Rs for challenging sites, such as sites with low average wind speeds, very cold temperatures, or remote locations.

"Is Paint a Significant Source of PCBs to Indoor Air?"
Jacob Jahnke

Polychlorinated biphenyls (PCBs) are human carcinogens that are found in pigments used in paints applied to interior walls and surfaces. This study aims to figure out if PCBs that volatilize from these painted surfaces can explain the

concentrations of PCBs frequently measured in indoor air. We have developed a method to detect and quantify all 209 PCB congeners in pigments. We present preliminary results of the method and outline the direction of future research for quantifying this potential source of toxic air pollutants.

"Treating Ammonia in Small Town Iowa Wastewater Systems: A Case Study on a Submerged Attached Growth Reactor "
Rebecca Mattson, Dr. Craig Just, Matthew Wildman, and H.R. Green

Wastewater ammonia reduction protects aquatic organisms in Iowa's waterways. Due to economies of scale, many ammonia treatment processes utilized in urban areas are not affordable for small communities. Acknowledging these costs, the Iowa DNR approved the submerged attached growth reactor (SAGR) in December 2011 to retrofit lagoon systems. The first SAGR system in Iowa has been monitored since implementation, producing a comprehensive data set. This data confirms the effectiveness of the SAGR system to maintain ammonia discharges below the NPDES permitted levels. Denitrification and the distribution of ammonia-oxidizing and nitrate-reducing bacteria within the bioreactors is the focus of ongoing research.

"Flood Emergency Decision Support System and Loss Estimation on the Web Using HAZUS"
Enes Yildirim, M. Yusuf Sermet, and Ibrahim Demir

This study aims at providing a web-based interactive flood hazard and damage estimation platform utilizing HAZUS and Census datasets. The system provides real-time cross-sectional analysis capabilities to estimate economic and social impacts of flooding, and support emergency management during disasters.

ELECTRICAL & COMPUTER ENGINEERING

"The Effect of PV System Size and Installation Parameters on the Performance of Bifacial Arrays"
Amir Asgharzadeh, Tomas Lubenow, Joseph Sink, Bill Marion, Chris Deline, Clifford Hansen, Joshua Stein, and Fatima Toor

In this work, we present the combined effect of installation parameters (tilt angle, height above ground, and albedo) on the bifacial gain and energy yield of three photovoltaic (PV) system configurations: a single module, a row of five modules, and five rows of five modules. We found that for multi-row PV systems installed at a ground albedo of 21% (i) on equinox, energy production can be 450 W.h lower for cloudy day relative to clear day and (ii) on a clear day close to equinox the energy yield can be up to 6% lower relative to single module PV systems.

"Convex Recovery of Continuous Domain Piecewise Constant Images from Non-Uniform Fourier Samples"
Greg Ongie, **Sampurna Biswas**, and Mathews Jacob

Our work gives theoretical justification for a structured low-rank matrix completion approach useful for signal recovery problems in MRI, super-resolution microscopy, array processing. This approach is an extension of recent off-the-grid compressed sensing and super-resolution techniques to the setting of multi-dimensional images. This formulation has been observed to outperform standard discrete domain compressed sensing techniques, such as wavelet sparsity and total variation, for various MRI reconstruction tasks. We address the current gap between theory and empirical success of the method. We characterize the sufficient sampling rate needed for exact recovery according to the model and prove that the recovery is robust to noise and model-mismatch.

"Phaseless Super-Resolution in the Continuous Domain"
Myung Cho, Christos Thrampoulidis, Weiyu Xu, and Babak Hassibi

Phaseless super-resolution refers to the problem of super-resolving a signal from only its low-frequency Fourier magnitude measurements. In this paper, we consider the phaseless super-resolution problem of recovering a sum of sparse Dirac delta functions which can be located anywhere in the continuous time-domain. For such signals in the continuous domain, we propose a novel Semidefinite Programming (SDP) based signal recovery method to achieve the phaseless super-resolution.

"Improved Efficiency of Silicon Solar Cells Utilizing Sputtered Silicon Nitride Films"
Lauren Davidson, Wenqi Duan, and Fatima Toor

Planar silicon solar cells have an average surface reflectivity of 35%; however, this value can be reduced to as low as 2% using anti-reflective coatings and surface texturing. One such coating is silicon nitride (SiNx). The film reduces the surface reflectivity, increasing the number of photons absorbed, and passivates the surface, leading to an increase in current density and voltage. By adjusting the SiNx deposition parameters, the refractive indices and thicknesses of the films are optimized for lowest solar-spectrum-weighted reflectivity values. We report on the significant improvement of solar cell efficiencies utilizing the optimized single- and double-layer SiNx AR coatings.

"A Novel Approach to the Development of a Highly Sensitive Silicon Nanowire Biosensor"
Wenqi Duan, Rasheid Smith, Fatima Toor, and Aliasger Salem

Current cancer detection methods are insufficient for early detection; at present, cancer detection is performed using a combination of physical examination and CT scans or MRIs. Early detection both lowers the cost of treatment and increases survival rates. Nanowires (NWs) are effective sensing structures due to their large surface area to volume

ratio. However, contacting the NW arrays is challenging. Our Si NW optoelectronic sensor cartridge is made by a bundle of vertically oriented NWs, allowing us to electrically contact millions of NWs per cm^2 simultaneously, compared to 10's of NWs in other state-of-the-art NW biosensors.

"System Development for Roadway Safety Study"
Matthew Finley, Cara Hamann, Corinne Peek-Asa, Michelle Reyes, and Anton Kruger

In an effort to study and reduce the number of accidents between traditional automobiles and heavy farm equipment on roadways it was necessary to design a system to collect data regarding vehicle interactions. The system was designed using the integration of a GPS unit, video camera, and computing module. The system was also subject to physical constraints resulting from the mounting requirements of different types of farm equipment.

"Copper Catalyzed Etched Nanoporous Black Silicon for Efficient Solar Cells"
K A S M Ehteshamul Haque, Wenqi Duan and Fatima Toor

In this work, we report on a copper catalyzed etching process of silicon (Si) to obtain extremely low reflectivity nanoporous 'black silicon' (bSi) surface. We explored both one-step and two-step etching process, and found that one-step etching results in a more uniformly etched surface reproducibly. Adding ascorbic acid in the one-step process recipe resulted in inverted pyramid shaped pores that enhanced light trapping and lowered the bSi surface reflectivity. It was observed that the optimum concentration of hydrogen peroxide in the etching solution depends on sample size. The lowest spectrum-weighted-average-reflectivity (Ravg) obtained from the optimized one-step etching process was 3.36%.

"Spectrally-Selective Solar Window Coatings to Improve Energy Efficiency"
Xin Jin and Fatima Toor

In the US, nearly 1.48 quadrillion bTUs of cooling energy consumption is attributed to the window-related solar heating in buildings, an amount that costs about $53 billion in electricity annually. In this poster, we present the design and nanofabrication of spectrally-selective solar window coatings that can reduce a portion of that energy loss by reflecting heat-generating infrared (IR) radiation while not diminishing the transmission of visible light.

"Fast Demand Response with Datacenter Loads"
Josiah McClurg

Given datacenter energy constraints due to cost and environmental impact, the dimension of power is becoming increasingly important to Big Data applications. Beyond merely increasing datacenter efficiency, power-aware computing applications can actively contribute to a sustainable power grid by participating in demand response programs. This work investigates the energy impact and the power-shaping potential of certain Big Data query optimizations.

"Robustness of the Adaptive Bellman-Ford Algorithm"
Yuanqiu Mo, Jake Beal, and Soura Dasgupta

Self-stabilizing (asymptotically stable) distance estimation algorithms are an important building block of many distributed systems featuring in Spatial or Aggregate computing, but the dynamics of their convergence to correct distance estimates has not previously been formally analyzed. As a step to understanding how they behave in interconnections involving other building blocks, it is important to develop a Lyapunov framework to demonstrate their robust stability. This paper addresses this shortcoming by providing the first Lyapunov-based analysis of an adaptive Bellman-Ford algorithm, by formulating a simple Lyapunov function. This analysis proves global uniform asymptotic stability of such algorithms, a property which the classical Bellman-Ford algorithm lacks, thus demonstrating a

measure of robustness to structural perturbations, empirically observed by us in a previous work. We also show that the algorithm is robust to bounded perturbations and mobility of the nodes.

"An Iterative Method for Airway Segmentation Using Multiscale Leakage Detection"
Syed Ahmed Nadeem, Dakai Jin, Eric A. Hoffman, and Punam K. Saha

There is a growing use of quantitative computed tomography to assess the lung both in terms of parenchymal as well as bronchial tree characteristics. To our knowledge, there are no fully automated airway tree segmentation methods. We present a novel iterative algorithm resulting in a fully automated method for CT-based airway tree segmentation. It has been applied on CT scans of normal non-smoking subjects at total lung ad functional residual capacity, and the results were compared to expert user edited segmentations. The method successfully detected all branches up to two generations beyond segmental bronchi with no leakages.

"Clustering of Data in the Presence of Missing Entries"
Sunrita Poddar and Mathews Jacob

The amount of data being generated and stored globally is growing inconceivably every year. Thus algorithm development for analyzing and finding patterns within large datasets is a very active area of research. However, many of these algorithms do not take into account the fact that real-world datasets contain a lot of missing entries. This could happen due to a number of reasons such as sensor malfunction, time and resource limitations on the data collection etc. We propose and theoretically analyze an algorithm to cluster and find patterns in datasets in the presence of missing entries. Using simulated data, we show the stability of our clustering algorithm with change in the fraction of missing entries. The utility of the proposed algorithm is also demonstrated on real datasets.

"A Flexible Electronic Flash for Ophthalmology Research"
Michael Salino-Hugg and Anton Kruger

Ophthalmology studies focused on vascular diseases were optokinetic responses are affected can be detected through the use of computer-aided eye tracking. The ease and accuracy of this eye tracking, can be greatly increased if the captured images have specific lighting conditions which may vary based on the study.This research describes a design and operation of a highly flexible electronic flash system capable of emitting short and intense flashes of white and IR light, operating at various timings and intensities, and able to communicate with a master along side other units on the same bus.

"E-Beam Lithography: Nanohole Patterning and InAs Nanowire-Based Device Fabrication"
Joseph Sink, Kailing Zhang, John Prineas, and Fatima Toor

Selective area epitaxial (SAE) growth of InAs nanowires (NW) allows for high yield, metal catalyst free, vertically aligned NWs. To achieve SAE, we have designed and optimized 50 nm hole patterns on silicon (Si) [111] substrates covered with a SiNx layer utilizing a Raith Voyager electron beam lithography system. After NW growth utilizing the patterned substrates, the NW arrays are harvested on to substrates and turned into horizontal NW MOScap (metal oxide semiconductor capacitor) structures to determine the background carrier density (N0) from Capacitance-Voltage (CV) measurements of the NWs. We report on our analytical model and measurements of the CV behavior of the NWs.

"Cardiac Catheter Control Using Actuator Wire"
Adam Snyder

The main goal of this research is to design a snake-like robot arm to provide control of a cardiac catheter as it moves through the body. The arm is comprised of two joints that can independently move in any direction giving the user the ability to easily navigate complicated paths. The arm is controlled by Flexinol actuator wire which contracts when

heated. This allows us to control the arm electrically by sending current through it and we can control the level of current using a micro-controller to generate a pulse width modulation signal.

"Human Femur Active Shape Model From Hip MRI"
Xiaoliu Zhang, Cheng Chen, and Punam Saha

This project is aimed at finding corresponding regions in different femur bones, given the ground truth provided by experts. A mean shape is achieved based on active shape model first. Then target shape is constructed from the mean shape. A spring force model is applied to optimize the landmarks in target shape. Finally find the transform from reference shape to target shape.

MECHANICAL & INDUSTRIAL ENGINEERING

"Computational Fluid Dynamics Study of the Dead Water Problem"
Mehdi Esmaeilpour, J. Ezequiel Martin, and Pablo M. Carrica

The dead water problem, in which under certain conditions a vessel advancing in a stratified fluid experiences a considerable increase in resistance respect to the equivalent case without stratification, was studied using computational fluid dynamics (CFD). The advance of a vessel in presence of a density interface (pycnocline) results in the generation of an internal wave that in the most adverse conditions can increase the total resistance coefficient by almost an order of magnitude. This paper analyses the effects of stratification on total and friction resistance, the near field wake, internal and free surface waves, and resistance dynamics. Some of these effects are reported for the first time, as limitations of previous efforts using potential flow are overcome by the use of a viscous, free surface CFD solver. A range of densimetric Froude numbers from subcritical to supercritical are evaluated changing both the ship speed and pycnocline depth, using as platform the Research Vessel Athena. It was found that the presence of the internal wave causes a favorable pressure gradient, acceleration of the flow in the downstream of the hull, resulting in thinning of the boundary layer and increases of the friction resistance coefficient of up to 30%. The total resistance presents an unstable region that results in a hysteretic behavior, though the characteristic time to establish the speed-resistance curve, dominated by the formation of the internal waves, is very long and unlikely to cause problems in modern ship speed controllers.

"Modeling of Wheel and Rail Profile Wear on Small Radius Curved Track in Vehicle Dynamics Simulation"
Chris Feldmeier, Huaxia Li, Yosuke Yamazaki, Takanori Kato, Takahiro Fujimoto, Osamu Kondo, and Hiroyuki Sugiyama

In this study, a wheel and rail profile wear simulation capability for multibody railroad vehicle dynamics simulation is developed based on multi-Hertzian contact approach to account for the conformal contact exhibited in the wear process. Small radius curved tracks result in severe wear around the rail gauge corner and wheel flange due to large slips in the contact patch, thereby resulting in increased material loss. An accurate prediction of the profile wear evolution is, therefore, crucial to better understand the effect on curving performance of rail vehicles. The numerical procedure developed in this investigation is validated against test results.

"Additive Manufacturing of Support-Free Ceramic Components"
Li He and Xuan Song

One of the main challenges in ceramic fabrication using stereolithography (SLA) is that support structures are required to build overhanging features. Fracture tips that result from removing support structures will induce stress concentration and consequently increase the risk of cracking. In this research, we developed a new stereolithography-based additive manufacturing process which exploits yield stress of highly loaded ceramic slurry to support overhanging features without building any extra structure. A design of the process was presented and preliminary results were demonstrated, which indicate that use of highly loaded ceramic slurry to support overhanging features is feasible.

"Modeling and Performance Evaluation of Wind Turbines"
Yusen He, Andrew Kusiak, and Tinghui Ouyang

Deteriorating performance of wind turbines results in power losses. A two-phase approach for performance evaluation of wind turbines is presented at past and future time intervals. Historical wind turbine data is utilized to determine the past performance, while performance at future time horizons calls for power prediction. In phase I of

the proposed approach, wind power is predicted by an ensemble of learning machines based on the parameters such as wind speed, wind temperature, and the rotor speed. In phase II, the predicted power is used to construct Copula models. It has been demonstrated that the parameters of the Copula models make usable metrics for expressing performance of wind turbines. The Frank Copula model performs best among the five parametric models tested.

"Experimental Study of Single-Pass Laser Machining of CFRP"
Tim Heiderscheit, Qinghua Wang, Ninggang Shen, and Hongtao Ding

Carbon fiber reinforced plastics (CFRPs) have gained widespread popularity as a lightweight, high-strength alternative to traditional metals such as steel and aluminum. However, significant drawbacks exist concerning current manufacturing processes. These processes produce unacceptable delamination, poor tolerancing, and rapidly accelerated tool wear. Laser machining can solve these issues, but introduces new issues of thermal damage. In this study, the effect of laser parameters on machining quality and performance are investigated using a pulsed Nd:YAG laser. This research has primary applications in the automotive and aerospace industries, where CFRP components are particularly desirable for weight savings and fuel efficiency.

"Identification of Object Features - Edges, Landmarks and Textures - That Visually Guide an Assembly Process In Real and Virtual Environments"
Salvador Rojas-Murillo and Priyadarshini Pennathur

There is not a definitive theory that can explain how humans infer the visual information from three-dimensional visual scenes. This lack of knowledge is also true for Virtual Environments (VE), which are artificially created 3D spaces where the user interacts with different objects.

To this day, it is not clear if we observe at the same features for real and virtual environments, or how individual differences affect the way we interpret visual scenes for both environments. In order to generate an understanding about which image features - edges, landmarks, and textures - attract an observer's over attention during an assembly process for real and virtual environments. We developed a pilot-study using an assembly task for virtual and real environments, and used an eye-tracking device to capture behavioral observation differences between participants. Our findings show that participants observe at the same areas of interest for an assembly task regardless of the assembly environment.

"Simulations of Microstructure Evolution during Friction Stir Blind Riveting using a Cellular Automaton Method"
Avik Samanta, Ninggang Shen, Hongtao Ding, Weiming Wang, and Jingjing Li

Friction stir blind riveting (FSBR) is a novel and highly efficient joining technique for lightweight metal materials, such as aluminum alloys. The FSBR process induced large gradients of plastic deformation near the rivet hole surface and resulted in a distinctive gradient microstructure in this domain. In this study, micro-structural analysis is conducted to analyze the final microstructure after the FSBR process. Dynamic recrystallization (DRX) is determined as the dominant microstructure evolution mechanism due to the significant heat generation during the process. To better understand the FSBR process, a two-dimensional Cellular Automaton (CA) model is developed to simulate the microstructure evolution near the rivet hole surface by considering the FSBR process loading condition. To model the significant microstructure change near the rivet hole surface, spatial distributed temporal thermal and mechanical loading conditions are applied to simulate the effect of the large gradient plastic deformation near the hole surface. The distribution grain topography and recrystallization fraction are obtained through the simulations, which agree well

with the experimental data. This study presents a reliable numerical approach to model and simulate microstructure evolution governed by DRX under the large plastic deformation gradient in FSBR.

"Deep Spectral Descriptors: Learning the Point-Wise Correspondence Metric via Siamese Deep Neural Networks"
Zhiyu Sun and Stephen Baek

A robust and informative local shape descriptor plays an important role in mesh registration. In this paper, we investigate a way to improve the spectral descriptors by embedding them into a different metric space where the Euclidean distance between the elements directly indicates the geometric dissimilarity. We design and train a Siamese deep neural network to find such an embedding, where the embedded descriptors are promoted to rearrange based on the geometric similarity. We found that the performance of the new spectral descriptors was better than the conventional spectral descriptors for the registration tasks significantly.

"Nanosecond Laser Shock Processing of Steel for Superhydrophobic, High Absorption and Mechanically Enhanced Surface"
Qinghua Wang, Avik Samanta, Ninggang Shen, Wenqi Duan, Famita Toor, and Hongtao Ding

In this research work, multifunctional surface was prepared on AISI 4340 steel by laser shock processing. The multifunctional surface exhibit combined effects of superhydrophobicity, dramatically improved light absorption and enhanced mechanical strength. The superhydrophobic effect is demonstrated by the significant increase of the water contact angle (WCA) on the laser treated surface induced by laser shock processing and silanization. Optical and nanoindentation tests demonstrate the enhanced light absorption and mechanical strength of the laser treated surface. This work extends the application of laser shock processing and demonstrates its effectiveness in preparation of multifunctional engineering surface.

"Gasification and Combustion of Miscanthus"
Nathaniel Weger

Gasification is the process of heating biomass to extreme temperatures, which produces combustible gases and solid carbon. The gases can be burned to generate clean energy, and the carbon can be mixed with soil to improve nutrient absorption. Miscanthus is a fast-growing prairie grass, which is shown to produce high amounts of combustible gases and high-porosity carbon, both of which improve the cost-effectiveness of gasification.

CENTER FOR BIOINFORMATICS & COMPUTATIONAL BIOLOGY

"A Pipeline for RNAseq-Based Differential Expression Analysis of Neuroendocrine Tumors"
Bartley Brown, Thomas L. Casavant, James Howe, and Terry A. Braun

We have built a pipeline for analysis of differential expression in Neuroendocrine tumors using community-developed tools Tophat2 and Cufflinks. Samples are from small bowel and pancreas and include tumor, normal, liver metastasis and lymph node metastasis. Future plans are the adoption of other alignment and expression analysis such as Hisat2, edgeR and Ballgown. We also plan to expand the pipeline to accommodate the study of novel transcripts, fusion genes, GSEA, genotyping and the combining Whole-Exome with RNAseq data.

"Viral Pangenomics with Orthologous Groups"
Brendan Hodis and David Kristensen

The genetic diversity of viruses is unparalleled among known organisms. As genetic information continues to be recorded at an increasing rate, the task of describing it has grown with increasing complexity. Our group maintains the database of prokaryotic virus orthologous groups (pVOGs), a descriptive tool constructed to keep pace with the rapid expansion of genomic datasets. Here we use the most recent set of pVOGs to describe and visualize the pangenomic contents of the T4-like virus and Lambda-like virus genera.

"Asymptotically Optimal and Intrinsic Scaling Constant-pH Simulations with Physically Rigorous Sampling and a Polarizable Multipolar Potential"
Stephen LuCore, J.M. Litman, C. Brenner, and Michael Schnieders

Classical mechanics simulation of molecular models at constant pH is a cutting-edge technique for prediction of acid dissociation constant, a property critical to pharmaceutical design. Application of this technology is limited, however, as currently available algorithms do not support polarizable potential functions and because they force a choice between linear scaling and optimal property estimates. This work presents a novel and thermodynamically rigorous framework for protein and small-molecule pKa calculation that obviates all prior limitations by simultaneously achieving asymptotic optimality and intrinsic scaling, all in the context of polarizable atomic multipoles.

"The International Clubfoot Registry Database"
Bartley J. Brown, **Jacob Nishimura**, and Thomas L. Casavant

For the past eight years the Center for Bioinformatics and Computational Biology has hosted and maintained a series of websites, databases and other interfaces and tools for the Ponseti International Association (PIA), CURE International, and MiracleFeet Clubfoot treatment programs, among others. These tools are used by doctors and clinicians, mostly from developing countries, to collect clubfoot patient data and photos. In areas where internet access is limited, the data is collected via an offline application and later synchronized with the online databases. The needs of the organizations that use the system are often divergent and sometimes incompatible, which means that certain elements of the code-base cannot be uniform across the websites. We have most recently deployed a new unified system that eliminates the overhead of having multiple sites to maintain while also accommodating the diverse needs of our users. The new online system is implemented using the Spring Framework, and the offline tool in JavaFX.

"Genomic Analysis for Identifying Mutations in Neuroendocrine Tumors"
Jonathon Tessmann, Terry Braun, and Bartley Brown

Neuroendocrine tumors are a type of slow growing cancer that is difficult to diagnose and treat. Our research aims to construct a software pipeline capable of analyzing the exomes, genomes and transcriptomes of these tumors and the genetic background of their patients. Raw sequencing data is aligned, genotyped, filtered, and processed using existing and novel bioinformatics software. This analysis identifies harmful and possibly never before observed variants. These driver variants and the genes in which they reside can then be further studied to better understand the pathophysiology of the disease, progression, metastases, prognosis, and may eventually lead to better therapies.

"Evaluating Genetic Variants of Unknown Significance Using Protein Thermodynamic Simulations in the Context of Non-Syndromic Hearing Loss"
Mallory Tollefson, Kevin Booth, Hela Azaiez, Michael Schnieders, and Richard Smith

Accurate classification of missense variants as pathogenic or benign is crucial in translational genetic research. Many widely used prediction algorithms yield ambiguous or contradictory results. Computational molecular biophysics can provide a complementary approach by incorporating three-dimensional protein structural data and *ab initio* thermodynamic principles. In this work, we apply Free Energy Perturbation to calculate the folding free energy of variants in genes associated with non-syndromic hearing loss. We hypothesized that a significant free energy change correlates with pathogenicity. This hypothesis is being tested using positive and negative control variants with a known pathogenicity. We expect computational protein thermodynamics to prove advantageous in analysis of genetic data associated with human disease.

"AudioGene: Predicting Hearing Loss Genotypes from Phenotypes to Guide Genetic Screening"
Daniel Walls, Emily Glanz, Richard J. H. Smith, Terry A. Braun, and Thomas L. Casavant

Nearly 35 million Americans are affected by measurable hearing impairment due to environmental and/or genetic factors. Predicting a patient's disease-causing genetic mutation is critical to determining whether or not their hearing loss is genetic. AudioGene is a machine learning-based software tool developed to prioritize genes (genotype) for screening based on the pattern of hearing loss (phenotype). AudioGene is trained on a set of both dominant and recessive diseased patient audiograms whose mutation/gene and hearing loss patterns are known. Because the available data from some genes/patterns is much greater than for others, the resulting imbalance presents a great challenge for machine classification. Attempts to reduce the effect of this imbalance are discussed in this poster. AudioGene ranks genes for screening in patients with a suspected dominant or recessive genetic cause, or both, if the genetic inheritance is unknown. Finally, as the volume of electronic health record (EHR) data continues to grow exponentially, approaches for efficient and effective "warehousing" of this data have become increasingly important. We describe an approach to building and maintaining such a warehouse in the context of our ongoing AudioGene research.

CENTER FOR COMPUTER-AIDED DESIGN

"Analysis and Comparison of the Plie to Functional Dance Movement"
Lauren Schutz

Dance as a professional occupation is based on the physical body, and the ability to maintain a performance career is directly dependent on the ability to maintain adequate physical health; in other words, to remain injury free. Despite career dependence on health, this population is unlikely to seek medical care. This could be based on a fear of losing training time, potential job loss, or a poor health insurance policy, especially considering most professional dancers work freelance moving from job to job with periods of unemployment

In this study participants, college students currently pursuing a BA, BFA, or MFA in Dance at the University of Iowa, preformed common training and functional dance movements. The participants wore an XSens suit, which integrates data from accelerometers, 3D gyroscopes, and magnetometers to generate accurate positioning data of the body in space. The skeletal alignment and weight distribution of participants during the tasks was analyzed using Visual3D software. Discrepancies in the data between the tasks were identified. Analyzing such discrepancies can help identify risk factors for potential injury or suggest further or modified training exercises for dancers.

CENTER FOR GLOBAL & REGIONAL ENVIRONMENTAL RESEARCH

"Understanding Methane and VOC Emissions from Natural Gas Operation"
Maryam Abdi-Oskouei and Gregory Carmichael

Natural gas (NG) has been promoted as a bridge fuel that can smooth the transition from fossil fuels to zero carbon energy sources by having lower carbon dioxide emission and lower global warming impacts in comparison to other fossil fuels. However, the uncertainty around the estimations of methane emissions from NG systems can lead to underestimation of climate and environmental impacts of using NG as a replacement for coal. In this work, the performance of the EPA National Emission Inventory (NEI-2011) in predicting the methane and VOC emission from NG operation is evaluated using WRF-Chem model.

"Physical and Model-Based Characterization of Ultrafine Particle Size Distributions, Nucleation, and Particle Growth in the Central US"
Can Dong, Robert Bullard, Ashish Singh, and Charles Stanier

New particle formation (NPF) is a frequent phenomenon that has been observed frequently throughout the world. Long-term (about 10 months) continuous measurements of particle number size distributions were measured at a rural Midwestern location of Bondville, IL. Observation data show that NPF occurred during all months of the field campaign, with different frequency and intensities. These measurements are combined with the NPF-explicit WRF-Chem model to investigate features of the NPF events in the Central US. Both observed and simulated particle size distributions, particle growth rates during the NPF events in different seasons are analyzed.

"Experimental Characterization of Secondary Aerosol from D5 Cyclic Siloxane Oxidation"
Nathan Janechek, Nathan Bryngelson, Rachel Marek, Traci Lersch, Kristin Bunker, Gary Casuccio, William Brune, Keri Hornbuckle, and Charles Stanier

Cyclic volatile methyl siloxanes (cVMS) are widely used in personal care products such as antiperspirants, lotions, and hair conditioners. In the atmosphere, cVMS undergo oxidation reactions forming silicon nanoparticles (aerosols) which may play an important role in evaluating the human health exposure and environmental fate of cVMS. In this study, we generate and characterize the photochemically produced aerosols from oxidation of pure cVMS and personal care products. The generated particles were characterized by measuring particle size, concentration and volatility, imaging by electron microscopy, determining elemental composition by X-ray spectroscopy, and calculating aerosol yield sensitivity.

IIHR - HYDROSCIENCE & ENGINEERING

"Rolling Wings At High Angles of Attack"
Randall Berdon and James Buchholz

Leading-edge vortices strongly influence the aerodynamic loads on a rolling wing. Under certain circumstances, a rolling wing has been shown to maintain an attached leading-edge vortex under a particular set of fixed parameters. One parameter which appears to have an impact on the separation of the leading-edge vortex is the effective angle of attack the wing experiences during the roll motion. A qualitative analysis has been performed on the effects of exposing a rolling to high effective angles of attack in the presence of a free-stream.

"Air-Water Exchange of PCBs in Southern Lake Michigan: Chicago a Source of Airborne PCBs"
Aaron C. Boesen, Andres Martinez, and Keri Hornbuckle

This study hypothesized that Chicago remains an ongoing source of airborne polychlorinated biphenyls (PCBs) to Lake Michigan due to emissions of PCBs from both legacy and modern sources. To address this, we measured PCB congeners in air and water samples collected simultaneously. Furthermore, air-water exchange, emissions, and air dispersion modeling were coupled to estimate the magnitude of the effect of Chicago's PCB inventory on Lake Michigan.

"Modeling and Measurements to Estimate Nitrate Removal from a Large Constructed Wetland"
Chad Drake, Antonio Arenas Amado, and Larry Weber

Wetlands are an important agricultural conservation practice needed for achieving water quality goals in the Mississippi-Atchafalaya River Basin. However, their nutrient removal efficiency is highly variable and difficult to predict. In this study, a combination of real time, continuous monitoring data and numerical modeling was used to quantify nitrogen removal from one of the largest constructed wetlands in Iowa over a three year period. In general, the hydrologic and water quality model well-simulated wetland flow and nitrogen dynamics, providing the ability to estimate the number of wetlands of comparable size and performance that would be required to achieve the 45% nitrogen load reduction goal in Iowa.

"Multiscale Imaging-Based Clusters in Current Smokers of the COPD (SPIROMICS)"
Babak Haghighi and Ching-Long Lin

Previous studies showed a notable heterogeneity in clinical presentation of patients with COPD disease. Imaging-based cluster analysis can be used to characterize this heterogeneity. We acquired CT images of 284 current smoker and 130 healthy patients from SPIROMICS. A K-means cluster analysis gave clinically meaningful clusters. Cluster 1 represented relatively younger African-American with higher BMI (obese) while Cluster 4 showed white race and living common law with high Bode index. Cluster 2 and 3 represented relatively young with low Bode index. The multiscale imaging-based clusters exhibit significant associations with existing clinical phenotypes used for diagnosis of COPD.

"Soil Moisture Dynamics Assessment in Different Scales"
Navid Jadidoleslam, Ricardo Mantilla Gutierrez, and Witold Krajewski

The proper assessment of soil water content (i.e. soil moisture) is fundamental in different research fields as well as flood forecasting. In this study, we have investigated soil moisture dynamics in different depths. Using satellite (SMAP) and 38 in-situ gages located in different depths, we have proposed a model for soil moisture dry-out rate for each depth. The modeled curves show a good agreement with the measured values. We have found that soil

moisture in deeper layers tend to decrease slower than shallower layers; a characteristic that we can call it 'soil moisture memory.'

"Classification of Streamflow and Flood Conditions at Un-Gauged Sites for the State of Iowa"
Gabriel Perez, Ricardo Mantilla, and Witold Krajewski

We present a procedure to derive annual and monthly flow duration curves (FDC) and levels of flood alerts at rural/ unregulated un-gauged sites. Two features make the proposed methodology attractive, first, it is simpler to use and implement than the U.S. Geological Service methodology because it only requires estimates of mean annual flow and mean, and second, it provides reliable FDC estimates at monthly scales, which are unavailable from any other methodologies. The authors use the methodology to create maps of flow frequency and flood alerts of streamflow predictions from a distributed hydrologic model implemented for the State of Iowa.

"Knowledge Discovery, Integration, and Communication for Extreme Weather and Flood Resilience Using Artificial Intelligence: FLOOD AI ALPHA"
Yusuf Sermet and Ibrahim Demir

This abstracts presents our project on developing a resilience framework for flooding to improve societal preparedness with objectives; (a)develop a generalized ontology for extreme events with primary focus on flooding; (b)develop a knowledge engine with voice recognition, artificial intelligence, natural language processing, and inference engine (c)develop a data acquisition and processing framework from existing environmental observations, forecast models, and social networks. (d)develop a communication framework to support user interaction and delivery of information to users. The interaction and delivery channels will include voice and text input via web-based system (e.g. IFIS), agent-based bots (e.g. Microsoft Skype, Facebook Messenger), smartphone and augmented reality applications (e.g. smart assistant), and automated web workflows (e.g. IFTTT, CloudWork) to open the knowledge discovery for flooding to thousands of community extensible web workflows.

"Towards the High-fidelity Multidisciplinary Design Optimization of a 3D Composite Material Hydrofoil"
Silvia Volpi, Matteo Diez, and Frederick Stern

The development of a multidisciplinary design optimization (MDO) architecture for high-fidelity fluid-structure interaction (FSI) problems is presented with application to a 3D hydrofoil in metal and carbon-fiber reinforced plastic materials. The computational cost of the MDO is reduced by performing a design space dimensionality reduction beforehand and integrating into the architecture a variable level of coupling between disciplines, a surrogate model, and an adaptive sampling technique. The optimization is performed using heuristic global derivative-free algorithms. Results include preliminary analytical test problem optimization, validation of the hydrofoil FSI against experimental data, design space assessment and dimensionality reduction for the hydrofoil model.

Iowa Institute for Biomedical Imaging

"Novel Structured Low Rank Algorithm for Accelerated Parameter Mapping"
Arvind Balachandrasekaran and Mathews Jacob

Quantitative parameter maps offer valuable information about various tissue attributes, which are early markers for many neurological disorders. These maps are usually obtained from the acquired series of images. However, the acquisition time associated with the images with high spatial and temporal resolution is very long. In order to speed up the acquisition process only a few samples are acquired from the scanner. In this work, we we introduce a novel algorithm, which exploits the exponential behavior of the signal at every pixel and spatial smoothness of the parameters to reconstruct the images from only a few acquired samples. Our preliminary results clearly demonstrate the potential of the proposed algorithm.

"Machine Learning in a Graph-Based Framework for Subcortical Segmentation"
Zhihui Guo, Satyananda Kashyap, Milan Sonka, and Ipek Oguz

Automated segmentation of subcortical structures from human brain magnetic resonance images is of great importance in quantitative neuro-imaging studies. However, poor boundary contrast and variable shape of these structures make the automated segmentation a tough task. We propose a 3D graph-based machine learning method, called LOGISMOS-RF, to segment the caudate and the putamen from brain MRI scans in a robust and accurate way. Evaluation was performed on a dataset of T1-weighted MRIs of 62 subjects. Two comparison measurements indicate the results of our method are statistically significantly more accurate than the other two methods (FSL, FreeSurfer).

"Development of A Lung Cancer Pig Model: Non-Invasive Characterization with Computed Tomography"
Emily Hammond, Dawn E. Quelle, Mahmoud H. Abou Alaiwa, Kelly Stark, Melissa Saylor, Shayna Hogue, Frank Rohret, John D. Newell Jr., Ryan M. Sheehy, Ume Salma S., David K. Meyerholz, Benjamin Darbro, Christopher S. Rogers, and Jessica C. Sieren

Lung cancer is the leading cause of cancer-related deaths in the United States with a 5-year survival rate of 18%. Genetically-modified pigs were created aimed at the development of a lung cancer model to advance imaging biomarker development, optimization of image acquisition technology, and radiation treatment therapies. We used longitudinal, in-vivo characterization with computed tomography, structured reports, image registration, and lung feature extraction to evaluate disease development and assess viability of the model. Together, these methods provide comprehensive assessment of lung structure and change over time in this pig model.

"Varifold-Based Registration of Lung Vessel and Surface"
Yue Pan, Wei Shao, Gary E. Christensen, Oguz C. Durumeric, Sarah E. Gerard, Joseph M. Reinhardt, and Geoffery D Hugo

This poster compares and contrasts current- and varifold-based diffeomorphic image registration approaches for registering tree-like structures of the lung. In these approaches, curve-like structures in the lung, for example, the skeletons of vessels and airways segmentation are represented by currents or varifolds in the dual space of a Reproducing Kernel Hilbert Space (RKHS). We examine the image registration sensitivity and accuracy of varifold-based registration as a function of the number of momentum used to represent tree like-structures in the lung as the centerline of the pulmonary vessel and airway trees and the kernel width for the shape structures and deformation field. We also propose a multi-resolution framework, i.e we start from large shape and deformation kernel size at the coarsest level and reduce them appropriately at each levels in order to better align the global and local structure at the same time. Finally, we registered 2D fundus images of human eye and 3D Real Human Lung using multi-

resolution variold-based registration. The registrations presented in this poster were generated using the Deformetrica software package (Durrleman et al. 2014).

"Estimation of Pulmonary Function by Total Variation of Regional Lung Volume"
Wei Shao, Gary E. Christensen, Sarah E. Gerard, Taylor J. Patton, Yue Pan, Joseph M. Reinhardt, and John E. Bayouth

One side effect of radiation therapy for lung cancer treatment is toxicity to normal lung tissue. Minimizing radiation exposure of high functioning lung tissue can improve lung cancer treatment. Unfortunately, CT lung scan shows the location of tumor while giving no information about where high functioning tissues are. This project aims for a better treatment plan to spare healthy lung tissue by using image registration to detect high functioning regions in the lung. We are now using lung volume change between end expiration and end inspiration for treatment, which assumes that the whole lung motion is consistent along breathing. We observe that some regions of the lung are contracting during inhalation and some are expanding during exhalation. Therefore, we propose a new method which estimates the total variation of lung volume during one respiratory cycle using 4D CT, where regional lung volume change between two adjacent phases is estimated by a pairwise 3D SSTVD image registration algorithm.

"Spectral-Domain Optical Coherence Tomography Optic-Nerve-Head and Macular En-Face Image Registration in Cases of Papilledema"
Qingyang Su, Jui-Mai Wang, Mohammad Saleh Miri, Victor A. Robles, and Mona K. Garvin

We proposed an automated method to register OCT projection images from the optic nerve-head and macular scans. The algorithm first searched for corners using the features from the accelerated segment test (FAST) in both images and then compute the histograms of oriented gradient (HOG) for each selected corner. Next, it decided potential mapping landmarks by identifying the best matches of the features. By filtering and adjusting these landmarks, we were able to compute a transformation matrix which can be applied to form a panorama image. This helps physicians to study the overlap area of optic nerve-head and macular in cases of papilledema.

"Reduction and Selection of Uncorrelated Features for Lung Cancer Computer Aided Diagnosis"
Johanna Uthoff, Samantha K.N. Dilger, and Jessica C. Sieren

The presence of highly correlated features, common in image-based feature extraction, can reduce the stability of classification model selection and interpretability. We investigated 304 computed tomography imaging features extracted from 50 high-resolution scans with lung nodules (18-malignant, 32-benign). Using average silhouette width as an optimization function and the k-medoids method, the features were clustered into 24 groups based on their dissimilarity matrix. Eight feature qualification measures were trained on a weighting scheme to determine optimal measures for feature selection. The resulting five-feature artificial neural network using leave-one-out classification achieved an area under the receiver operator curve of 0.9479.

"An Innovative Four-Neighbour Stepping Interpolation"
Hui Xie, Mathews Jacob, and Hans Johnson

Blurring edges are a disadvantage of Bilinear, Cubic and Windowed Sinc interpolation. New Edge-Directed interpolation uses covariance matrix erasing blurring edges at a high computation cost. This paper proposes an innovative Four-Neighbour Stepping Interpolation computational approach to achieve the goal of remaining edges with similar bilinear computation cost. The core idea behind the FNSI is to stride a small step at each time and to use 2nd derivative to exclude possible un-related neighbors.

SPECIAL PROGRAMS & STUDIES

"T4: Table Top Tension Tester"
Brett Austin, Srivats Sarathy and M.L. (Suresh) Raghavan (Creative Kick-Start Program)

Our idea is to build and open-source uniaxial extension tester utilizing 3D-printing, micro-controllers, stepper-motors and load sensors. Many of the cardiovascular diseases that we suffer from are the result of soft tissue material failure. Understanding the material properties of biological soft tissues helps in diagnosing the underlying cause of failure and can lead to the development of artificial bio-prosthetic devices that better mimic biological tissues.

We plan on developing a device that can perform uniaxial extension for various biological soft tissues and offer flexibility to the end-user. The use of an Arduino micro-controller with stepper motors and load sensors will help us execute and analyze material properties of soft tissues.

"The Bandit: A DIY Quadcopter"
Sy Butler, Liam Hagan, Daniel Kelly, and Gary Christensen (Creative Kick-Start Program)

The Bandit is a DIY quadcopter drone made for aerial photography. Using parts sourced from online and a made-from-scratch frame, we have created a completely custom drone. Modifying the flight controller's software lends us even more freedom. Releasing our methods and modified code online allows others to follow in our footsteps and create their own quadcopter.

"Novel Antibiotic Formulations for Eradication of Biofilms of a _Pseudomonas Aeruginosa_ Clinical Isolate"
Sachin Gharse and Jennifer Fiegel (Department of Pharmaceutical Sciences and Experimental Therapeutics)

Our purpose is to develop formulations consisting of an antibiotic and a nutrient dispersion compound for eradication of pulmonary _Pseudomonas aeruginosa_ biofilms. We studied the efficacy of these formulations against both young and mature in vitro biofilms of a _P. aeruginosa_ clinical isolate obtained from a cystic fibrosis patient using the MBEC assay. Our formulations eradicated the in vitro biofilms at lower antibiotic concentrations than the antibiotic alone. Future studies will aim to develop an animal model mimicking pulmonary chronic bacterial infection and test the in vivo efficacy of our proposed formulations.

"Particle - Lung Surfactant Interactions Depend on Particle Surface Properties"
Bharath Kumar Gowdampally and Jennifer Fiegel (Department of Pharmaceutical Sciences and Experimental Therapeutics)

Lung surfactant plays a crucial role in the respiration process by maintaining the structural stability of the alveoli and preserving low surface tension at the alveolar surface. Foreign particles deposited in the alveoli can alter surfactant function, which may be a contributing factor to respiratory disease. However, these interactions are not well characterized. The current study probed the interfacial properties of Infasurf (Calf lung surfactant) in the presence of nanoparticles of different surface chemistries. Results from this study indicate that nanoparticle-induced dysfunction of lung surfactant is dependent on the particle surface chemistry.

"Smart Mirror"
Liam Hagan, Sy Butler, Daniel Kelly, and Zane Johnson (Creative Kick-Start Program)

A Smart Mirror could display the time, date, weather, calendar, and other useful information. The goal of a device like this is to put all the important information about one's day on a surface that people already spend time looking at every day, increasing personal efficiency. The device works by laying a two-way mirror on a monitor screen powered by an extremely compact computer, the Raspberry Pi 3. The two-way mirror allows for the light from the monitor to shine through, which allows text and images to be seen through the mirror.

"Iowa Marine Autonomous Racing Club (IMARC)"
Abdualrahman Ismael, Michael Watkins. and Brian Von Arb (Creative Kick-Start Program)

The goal of the Iowa Marine Autonomous Racing Club (IMARC) is to design and build an autonomous, robotic boat to navigate and race through an aquatic obstacle course. The task of my sub-group is to design and build the hull and propulsion system for the boat. We plan to design the shape of the hull for speed and maneuverability.

"Hand Garment to Provide Additional Grip Assistance in Peripheral Neuropathy Patients"
Courtney Halaska, Alec Monaghan, **James Moore**, Paul Ruales, Keith White, and Kasra Zarei (Creative Kick-Start Program)

Neuromuscular disorders such as muscular dystrophies and peripheral neuropathies constitute a public health problem. Patients who develop atrophy suffer problems in simple tasks such as holding or picking up objects. Current solutions exist in the form of latex cutouts and full-hand robotic gloves. Latex fingers are not durable. Full-hand robotic gloves are bulky, expensive, and present compliance problems. Our group is creating a hand garment, composed of molded finger casings from a material called Dycem. Such a product can ultimately be used to assist patients and individuals with daily motor needs, while compromising between low cost and durability.

"Creative Kick-Start Project: Custom CNC Machine/3D Printer Build"
David Regan (Creative Kick-Start Program)

The purpose of this project was to gain design and manufacturing experience by building a custom CNC machine/3d Printer that could fit on a desktop. The device will be made from a combination of purchased and custom parts, and controlled by an Arduino.

"Improving AAA Surgery Utilizing 3D Modeling"
Tyler Harken**, Matthew Remy**, Emily Solsrud, and Kathryn Tillman (Creative Kick-Start Program)

Thousands of patients each year are affected by abdominal aortic aneurysms and this condition may lead to rupture and/or death. Endovascular aneurysm repair (EVAR), in comparison to open surgery, consists of a small incision in the groin where a catheter is threaded into the aneurysm. This form of treatment results in shorter operation time and faster patient recovery. Our project aims to design a model that mimics the internal patient anatomy and pathway for EVAR so that surgeons may practice with the anatomical model. This device's goal is to better prepare surgeons and increase the success rate of EVAR surgery.

"The Little Jonny That Could: Providing Independence for Congenital Arm Amputees"
Kylie Hershberger, Mitchell Miller, **Alicia Truka**, and Nathaniel Witt (Creative Kick-Start Program)

We are aiming to create a device that will assist developing children, ages 5-10, who are single arm amputees above the elbow maintain control of the handles while operating their bicycles in order to let them ride independently. We are currently working with a eight year old boy who has difficultly riding his bike due to his missing limb and wants to gain the independence to ride his bike without training wheels.

"Precision Landing System for Unmanned Aircraft"
Mike Watkins (Creative Kick-Start Program)

The goal of this project was to create precision landing system on a UAV platform in order to learn about aerospace and electronics concepts. This was done by building a remote control plane, installing an autopilot board on it and programming it to land at a specified point with the help of additional sensors.

"Buccal Drug Delivery System"
Kasra Zarei and Max Baker (Creative Kick-Start Program)

Timely and prolonged drug treatment is critical for patients with a range of medical conditions. An enhanced Buccal Drug Delivery System has far-reaching applications due to the ability to provide safe controlled release of drugs over prolonged periods of time such as during sleep.

LIST OF PRESENTERS BY ACADEMIC DEPARTMENT

BIOMEDICAL ENGINEERING

Adam, Ryan
Austin, Brett
Beauchene, Madeline
Conlan, Henry
Corrigan, Rae Ann
El-Hattab, Mariam
Gerard, Sarah
Guo, Zhihui
Halberg, Spencer
Hammond, Emily
Hodis, Brendan
Keil, Anna
LuCore, Stephen
Mendenhall, Alyssa
Moghram, Waddah
Moore, Jimmy
Muckenhirn, Logan
O'Connell, Claire
Remy, Matthew
Rendleman, Michael
Schutz, Lauren
Tessmann, Jonathon
Thompson, Jessica
Tollefson, Mallory
Truka, Alicia
Uthoff, Johanna

CHEMICAL & BIOCHEMICAL ENGINEERING

Algharrawi, Khalid
Aljaafari, Haydar
Alsaedi, Abdulsattar
Bartley, Alex
Bess, Alexandra
Boesen, Aaron
Countryman, Alec
Delcau, Michael
Do, Anh-Vu
Dong, Can
Ford, Chad
Giles, Katherine
Givens, Brittany

Green, Brian
Hasa, Erion
Kaalberg, Sara
King, Benjamin
Kloepfer, Nicole
Knapp, Eric
Koonce, Jonathan
Kurpius, Renae
Leigh, Braden
Lennartson, Elizabeth
Lewis, Devyn
Mat Desa, Wan
Mattingly, Taylor
McKee, Austin
McLaughlin, Jacob
Nathan, Janechek
Pattee, Emily
Qian, Jiajie
Rassoolkhani Alan
Ricker, Erica
Seibt, Michael
Shamsul Akmal, Zubair
Sohani, Negin
Weis, Adam
Wersinger, Kyle
Young, Graham

CIVIL & ENVIRONMENTAL ENGINEERING

Abdioskouei, Maryam
Black, Ellen
Drake, Chad
Ewald, Jessica
Herkert, Nicholas
Jadidoleslam, Navid
Jahnke, Jacob
Mattsono, Rebecca
Perez , Gabriel
Yildirim, Enes

ELECTRICAL & COMPUTER ENGINEERING

Balachandrasekaran, Arvind
Biswas, Sampurna

Cho, Myung
Davidson, Lauren
Duan, Wenqi
Finley, Matthew
Haque, K A S M Ehteshamul
Jin, Xin
McClurg, Josiah
Mo, Yuanqiu
Nadeem, Syed Ahmed
Nishimura, Jacob
Pan, Yue
Poddar, Sunrita
Salino-Hugg, Michael
Sermet, Yusuf
Shao, Wei
Sink, Joseph
Snyder, Adam
Su, Qingyang
Walls, Daniel
Xiaoliu, Zhang
Xie, Hui

MECHANICAL & INDUSTRIAL ENGINEERING

He, Li
He, Yusen
Salvador, Rojas-Murillo
Sun, Zhiyu
Berdon, Randall
Butler, Sy
Esmaeilpour, Mehdi
Feldmeier, Chris
Haghighi, Babak
Heiderscheit, Tim
Ismail, Abdualrahman
Regan, David
Samanta, Avik
Volpi, Silvia
Wang, Qinghua
Watkins, Michael
Weger, Nathaniel

OTHER DEPARTMENTS

Brown, Bartley (Center for Bioinformatics and Computational Biology)
Gharse, Sachin (Pharmaceutical Sciences and Experimental Therapeutics)
Gowdampally, Bharath Kumar (Pharmaceutical Sciences and Experimental Therapeutics)

GRADUATE DEGREE CANDIDATES

BIOMEDICAL ENGINEERING

MASTER OF SCIENCE

Bingenheimer, Heidi
Graduation Date: Fall, 2016
Degree: MS
Thesis: Analysis of Hindfoot Alignment for
                 Total Ankle Arthroplasties
Advisor: Jessica Goetz

Brown, Alexander
Graduation Date: Spring, 2017
Degree: MS
Thesis: Maintenance and Modification of
                 Mesenchymal Stromal Cell
                 Immunosuppressive Phenotype
Advisor: James Ankrum

Dougherty, Timothy
Graduation Date: Summer, 2016
Degree: MS
Thesis: Quantitative Computed Tomography
                 Based Measures of Vascular
                 Dysfunction for Identifying COPD
                 Phenotypes and Subphenotypes
Advisor: Eric Hoffman

Ellis, David
Graduation Date: Spring, 2017
Degree: MS
Thesis: Machine Learning Improves
                 Automatic Cortical Surface
                 Segmentation in Human MRI Studies
Advisor: Hans Johnson

Hallier, Andrea
Graduation Date: Fall, 2016
Degree: MS
Thesis: Variant-Curation and Database
                 Instantiation (Variant-CADI): An
                 Integrated Software System for the
                 Automation of Collection, Annotation
                 and Management of Variations in
                 Clinical Genetic Testing
Advisor: Terry Braun

Heckelsmiller, David
Graduation Date: Spring, 2017
Degree: MS

Thesis: Multimodal Evaluation of Local and
                 Whole-Joint Cartilage Changes in an
                 in vivo Animal Model
Advisor: Jessica Goetz

Rink, Colleen
Graduation Date: Summer, 2016
Degree: MS
Thesis: Measuring Hip Fracture Fixation
                 Guide Wire Placement for
                 Performance Assessment in
                 Simulation and the Operating Room
Advisor: Donald Anderson

Sarathy, Srivata
Graduation Date: Summer, 2016
Degree: MS
Thesis: Development of Cylindrical Bacterial
                 Cellulose Membranes for Pulmonary
                 Heart Valve Prostheses
Advisor: M.L. Suresh Raghavan

Simoens, Kevin
Graduation Date: Spring, 2017
Degree: MS
Thesis: Anthropometric Shape Parameters in
                 Obese Subjects: Implications for
                 Obese Total Joint Arthroplasty
                 Patients
Advisor: John Callaghan

Song, Ino
Graduation Date: Spring, 2017
Degree: MS
Thesis: Feasibility and Stability of the Lumbar
                 Spine in Variation of Short Muscle
                 Capacity Under the Compressive
                 Follower Load
Advisor: Tae-Hong Lim

Wang, Jiahui
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Thomas Casavant

Xiong, Xiaofan
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)

Thesis: N/A
Advisor: Edwin Dove

Zarei, Kasra
Graduation Date: Spring, 2107
Degree: MS
Thesis: Objective Quantification of Sensory Function Using a Battery of Smart-phone Applications
Advisor: Mona Garvin

Zasadny, Frederick
Graduation Date: Fall, 2016
Degree: MS
Thesis: Lysomal Reacidification by Degradation of Poly(DL-Lactide-CO-Glycolide) Nanoparticles in a Lipotoxic Cardiomyopathy Model
Advisor: Dale Abel

DOCTOR OF PHILOSOPHY

Adam, Ryan
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Radiographic Assessment of Lung Anatomy, Physiology, and Disease in a Porcine Model of Cystic Fibrosis and People with Cystic Fibrosis
Advisor: David Stolz

Aghvami, Maziar
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Fiber Network and Nonlinear Models of Cell Matrix Interactions and Mechanosensing on Fibrous Gels
Advisor: Edward Sander

Berkowitz, Benjamin
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Development of Metrics to Describe Cerebral Aneurysm Morphology
Advisor: M.L. Suresh Raghavan

Bodduluri, Sandeep
Graduation Date: Fall, 2016
Degree: PhD

Thesis: CT Image Registration-Based Lung Mechanics in COPD
Advisor: Joseph Reinhardt

Dogan, Meeshanthini Vijayendran
Graduation Date: Spring, 2017
Degree: PhD
Thesis: TBA
Advisor: Robert Philibert

Gao, Long
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Network-Based Approaches to Studying Healthy and Disease Development
Advisor: Kai Tan

Hammond, Emily
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Longitudinal Medical Imaging Approaches for Characterization of Porcine Cancer Models
Advisor: Jessica Sieren

Kim, YuJaung
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Mechanisms and Prevention of SUDEP in Dravet Syndrome
Advisor: George Richerson

Permeswaran, Vijay
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Development of a Computational Model to Study Instability and Scapular Notching in Reverse Shoulder Arthroplasty
Advisor: Donald Anderson

Schumacher, Anna
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Development and Evaluation of a Nanometer-Scale Hemocompatible and Antithrombotic Coating Technology for Commercially Available Intracranial Stents and Flow Diverters
Advisor: M.L. Surech Raghavan

Stoner, Kirsten
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Surgical Treatment for Cervical
                Myelopathy: The Effect on Spinal
                Cord Strain Using Magnetic
                Resonance Imaging and Finite
                Element Modeling
Advisor: Nicole Grosland

Wagner, Andrew
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Vibrational Stimulation of Thyroid
                Epithelial Cells
Advisor: Edward Sander

Zhou, Cheng
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Enhanced Phagocytic Capacity
                Endows Chondrogenic Progenitor
                Cells with a Novel Scavenger
                Function within Injured Cartilage
Advisor: James Martin

CHEMICAL & BIOCHEMICAL ENGINEERING

MASTER OF SCIENCE

Delcau, Michael
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Tonya Peeples

Dong, Can
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Charles Stanier

Givens, Brittany
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Vicki Grassian

Janecheck, Nathan
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Charles Stanier

Kaalberg, Sara
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Julie Jessop

Leigh, Braden
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: C. Allan Guymon

DOCTOR OF PHILOSOPHY

Coffel, Joel
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Implementation and Modeling of *in situ* Magnetic Hyperthermia
Advisor: Eric Nuxoll

Ricker, Erica
Graduation Date: Spring, 2017
Degree: PhD
Thesis: The Synergistic Effects of Orthogonal Biofilm Mitigation Strategies: Thermal and Antibiotic Treatments
Advisor: Eric Nuxoll

Schissel, Sage
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Developing Property and Kinetic Control Strategies for Radiation Polymerization
Advisor: Julie Jessop

Scholte, Jon
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Effects of Prepolymer Structure on Photopolymer Network Formation
Advisor: C. Allan Guymon

CIVIL & ENVIRONMENTAL ENGINEERING

MASTER OF SCIENCE

Aryal, Yog Nath
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Gabrielle Villarini

Della Libera Zanchetta, Andre
Graduation Date: Spring, 2017
Degree: MS
Thesis: IFIS MODEL-PLUS - A Web-based
               GUI for Visualization, Comparison
               and Evaluation of Distributed
               Hydrologic Models Outputs
Advisor: Ricardo Mantilla Gutierrez

Fisher, Cole
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Salam Rahmatalla

Jennings, Brandon James
Graduation Date: Spring, 2017
Degree: MS
Thesis: Development of Piezocatalytic
               Nanomaterials for Applications in
               Water Treatment
Advisor: David Cwiertny

Kee, Karin A
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Larry Weber

Luitel, Beda N
Graduation Date: Summer, 2016
Degree: MS
Thesis: Prediction of North Atlantic Tropical
               Cyclone Activity and Rainfall
Advisor: Gabrielle Villarini

Nielsen, Jacob Kevin
Graduation Date: Spring, 2017
Degree: MS

Thesis: Evaluating Spatial and Temporal
               Nitrate-Nitrogen Patterns Across
               Iowa
Advisor: Larry Weber

Rossiter, Jan Davis
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Christopher Stoakes

Snyder, Katie M
Graduation Date: Summer, 2016
Degree: MS
Thesis: Quantitative Analysis in Energy Loss
               and Vertical Mass Transport of
               Various Channel Restoration
               Structures Using Physical Based
               Modeling
Advisor: Jacob Odgaard

Schroer, Hunter William
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Craig Just

Su, Yibing
Graduation Date: Spring, 2017
Degree: MS
Thesis: Real Time Prediction of Stream
               Water Temperature for Iowa
Advisor: Witold Krajewski

Then, Stephanie Rose
Graduation Date: Summer, 2016
Degree: MS
Thesis: A Hydologic Assessment of Surface
               Ponding in a Drained Prairie Pothole
               Wetland
Advisor: Larry Weber

Tokuhisa, Rai A
Graduation Date: Summer, 2016
Degree: MS
Thesis: Hydraulic and Pollutant Conveyance
               Assessment in Highway Bioinfiltration
               Practice in Coralville, Iowa
Advisor: William Eichinger

Vecchi, Anthony Paul
Graduation Date: Spring, 2017
Degree: MS
Thesis: Development of a Hydrologic and
                    Water Quality Model of Cedar Creek
Advisor: Larry Weber

Wantock, Mitchel Franklin
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Salam Rahmatalla

Westlake, Elizabeth J
Graduation Date: Summer, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Paul Hanley

Yildirim, Enes
Graduation Date: Spring, 2017
Degree: MS
Thesis: Optimization and Delivery of Hazus-
                    MH Flood Loss Estimates on Web-
                    Based Systems : Iowa Case Study
Advisor: Ibrahim Demir

Zalenski, Grace Redmond
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Witek Krajewski

DOCTOR OF PHILOSOPHY

Cheng, Zhenyang
Graduation Date: Spring, 2017
Degree: PhD
Thesis: A Numerical Study of Flow
                    Hydrodynamics and Mixing
                    Processes at Open Channel
                    Confluences
Advisor: George Constantinescu

Greenstein, Katherine Elizabeth
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Development of Chemically Active
                    Metal Oxide Composite Nanofiber
                    Filters for Water Treatment
Advisor: David Cwiertny

Liu, Xikun
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Investigating Aerobic Vinyl Chloride
                    Degradation at the Microbial
                    Community Level
Advisor: Timothy Mattes

Mallakpour, Iman E
Graduation Date: Summer, 2016
Degree: PhDs
Thesis: The Tale of Flooding Over the Central
                    United States
Advisor: Gabrielle Villarini

Moustakidis, Iordanis Vlasios
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Floodplain Phosphorus Distribution in
                    an Agricultural Watershed and its
                    Role in Contributing to In-stream
                    Phosphorus Load

Nayak, Munir Ahmad
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Heavy Rainfall and Flooding
                    Associated with Atmospheric Rivers
                    Over the Central United States
Advisor: Gabrielle Villarini

Nicholson, John
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Design of a Large-Scale Constrained
                    Optimization Algorithm and its
                    Application to Digital Human
                    Simulation
Advisor: Jasbir Arora

Peter, Katherine T
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Development of Electrospun
                    Nanofiber Composites for Point-of-
                    Use Water Treatment
Advisor: David Cwiertny

ELECTRICAL & COMPUTER ENGINEERING

MASTER OF SCIENCE

Battacharya, Ipshita
Graduation Date: Fall, 2016
Degree: MS
Thesis: N/A
Advisor: Mathews Jacob

Bechtold, Eric Alan
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: David Andersen

Chau, Brian Joseph
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: David Andersen

Davidson, Lauren Michel
Graduation Date: Spring, 2017
Degree: MS
Thesis: Strategies for High Efficiency Silicon Solar Cells
Advisor: Fatima Toor

Geng, Chao
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: David Andersen

Ghasemi Damavandi, Hamidreza
Graduation Date: Summer, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Ananya Sen Gupta

Haug, Joshua
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisors: Soura Dasgupta
                 Raghuraman Mudumbai

Kersten Jacob Todd
Graduation Date: Summer, 2016

Degree: MS
Thesis: N/A
Advisor: Jon Kuhl

Kumar, Amy
Graduation Date: Fall, 2016
Degree: MS (Non-Thesis)
Thesis: N/A
Advisors: Raghuraman Mudumbai
                 Soura Dasgupta

Lan, Bradley Weichi
Graduation Date: Summer, 2016
Degree: MS
Thesis: N/A
Advisor: Soura Dasgupta

Linder, Douglas Andrew
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: David Andersen

Pan, Yue
Graduation Date: Fall, 2016
Degree: MS
Thesis: Current- And Varifold-Based Registration of Lung Vessels and Lung Surfaces
Advisor: Gary Christensen

Shao, Wei
Graduation Date: Fall, 2016
Degree: MS
Thesis: Identifying the Shape Collapse Problem in Large Deformation Image Registration
Advisor: Gary Christensen

Tollefson, John Dietrich
Graduation Date: Fall, 2016
Degree: MS
Thesis: N/A
Advisor: Guadalupe Canahuate

Tummala, Ramadevi
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)

Thesis: N/A
Advisor: David Andersen

Zhao, Bowen
Graduation Date: Summer, 2016
Degree: MS
Thesis: N/A
Advisor: Gary Christensen

DOCTOR OF PHILOSOPHY

Alshamary, Haider Alijasim
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Coherent and Non-Coherent Data
                  Detection Schemes In Massive Mimo
Advisor: Weiyu Xu

Bhave, Sampada Vasant
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Novel Dictionary Learning Algorithm
                  for Accelerating Multi-dimensional
                  MRI Applications
Advisor: Mathews Jacob

Chen, Cheng
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Finite Element Modeling of
                  Trabecular Bone from Multi-row
                  Detector CT Imaging
Advisor: Punam Saha

Chen, Zhi
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Novel Quantitative Description
                  Approaches Assessing Coronary
                  Morphology and Development
Advisor: Milan Sonka

Ghasemi Damavandi, Hamidreza
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Data Analytics, Interpretation and
                  Machine Learning for Environmental
                  Forensics Using Peak Mapping
                  Methods
Advisor: Ananya Sen Gupta

Ghayoor, Ali
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Improved Interpretation of Brain
                  Anatomical Structures in Magnetic
                  Resonance Imaging Using
                  Information from Multiple Image
                  Modalities
Advisor: Hans Johnson

Goguri, Sairam
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Optimal Precoder Design for
                  Wireless Communication and Power
                  Transfer from Distributed Transmit
                  Arrays
Advisors: Raghuraman Mudumbai
                  Soura Dasgupta

Guzun, Gheorghi
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Distributed Indexing and Scalable
                  Query Processing for Interactive Big
                  Data Explorations
Advisor: Guadalupe Canahuate

Jin, Dakai
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Digital Topologic and Geometric
                  Approaches for CT-Based Multi-
                  Generation Characterization of
                  Airway and Pulmonary Vascular Tree
                  Morphology and Their Association
Advisor: Punam Saha

Kashyap, Satyananda
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Quantitative Analysis and
                  Segmentation of Knee MRI Using
                  Layered Optimal Graph
                  Segmentation of Multiple Objects and
                  Surfaces
Advisor: Milan Sonka

Kumar, Amy
Graduation Date: Spring, 2017
Degree: PhD

Thesis: Scalable Algorithms for Distributed
                      Beamforming and Nullforming
Advisors: Raghuraman Mudumbai
                      Soura Dasgupta

Peiffer, Benjamin Michael
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Theory and Implementation of
                      Scalable, Retrodirective Distributed
                      Arrays
Advisors: Raghuraman Mudumbai
                      Soura Dasgupta

Shah, Abhay
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Multiple Surface Segmentation Using
                      Novel Deep Learning and Graph
                      Based Methods
Advisor: Xiaodong Wu

Song, Joo Hyun
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Methods for Evaluating Image
                      Registration
Advisor: Gary Christensen

Song, Lin
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Multipath Approaches to Avoiding
                      TCP Incast
Advisor: Mark Andersland

Wang, Yichao
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Terahertz Nonlinear Optical
                      Response of Armchair Graphene
                      Nanoribbons
Advisor: Gary Christensen

MECHANICAL & INDUSTRIAL ENGINEERING

MASTER OF SCIENCE

Archer, Lucas
Graduation Date: Fall, 2016
Degree: MS
Thesis: N/A
Advisor: Christoph Beckermann

Ayers, Brennan Scott
Graduation Date: Spring, 2017
Degree: MS
Thesis: The Role of Teamwork in Diagnosis: Team Diagnostic Decision Making in the Medical Intensive Care Unit
Advisor: Priyadarshini Pennathur

Betman, Mark A
Graduation Date: Spring, 2017
Degree: MS (Non-Thesis)
Thesis: N/A
Advisor: Andrew Kusiak

Bottiglieri, Michael John
Graduation Date: Summer, 2016
Degree: MS
Thesis: N/A
Advisor: Frederick Stern

Janechek, Matthew James
Graduation Date: Spring, 2017
Degree: MS
Thesis: N/A
Advisor: James Buchholz

Lain, Kayley Christina
Graduation Date: Spring, 2017
Degree: MS
Thesis: Supporting Energy Transition and Miscanthus Program Development at the University of Iowa
Advisor: H.S. Udaykumar

LeBlanc, Lawrence J
Graduation Date: Spring, 2017
Degree: MS
Thesis: N/A
Advisor: Ching-Long Lin

Nolte, Zachary
Graduation Date: Spring, 2017
Degree: MS
Thesis: N/A
Advisor: Stephen Baek

Panzer, Matthew James
Graduation Date: Fall, 2016
Degree: MS
Thesis: N/A
Advisor: Albert Ratner

Peterson, Bryan Theodore
Graduation Date: Fall, 2016
Degree: MS
Thesis: N/A
Advisor: Hiroyuki Sugiyama

Pontaerlli, Matthew
Graduation Date: Spring, 2017
Degree: MS
Thesis: N/A
Advisor: Pablo Carrica

Stocker, Mark Ryan
Graduation Date: Summer, 2016
Degree: MS
Thesis: N/A
Advisor: Frederick Stern

Wears, Brennen
Graduation Date: Spring, 2017
Degree: MS
Thesis: Development of Compact Collimation Device for Novel Scanning Beam Low-Energy Intraoperative Radiation Therapy (SBIORT) System for Pancreatic Cancer
Advisor: Albert Ratner

DOCTOR OF PHILOSOPHY

Chen, Howard
Graduation Date: Spring, 2017
Degree: PhD
Thesis: The Effects of Movement Speed & Magnetic Disturbances on Inertial

Measurement Unit Accuracy: The Implications of Sensor Fusion Algorithms in Occupational Ergonomics Applications
Advisor: Geb Thomas

Deierling, Philip
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Thermomechanical Response of Metal-Ceramic Graded Composites for High Temperature Aerospace Applications
Advisor: Shaoping Xiao

Esmaeilpour, Mehdi
Graduation Date: Spring, 2017
Degree: PhD
Thesis: A Ship Advancing in a Stratified Fluid: The Dead Water Effect Revisited
Advisor: Pablo Carrica

Galles, Daniel Joseph
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Prediction of Distortions and Pattern Allowances in Steel Sand Castings
Advisor: Christoph Beckermann

Ghaffari Gharehb, Mir Ali
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Numerical Modeling and Simulation of Gear Tooth and Bearing Failure
Advisor: Shaoping Xiao

Ghamari, Mohsen
Graduation Date: Summer, 2016
Degree: PhD
Thesis: An Experimental Examination of Combustion of Isolated Liquid Fuel Droplets with Polymeric and Nanoparticle Additives
Advisor: Albert Ratner

Hart, Robert James
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Electrical Resistance Based Damage Modeling of Multifunctional Carbon Fiber Reinforced Polymer Matrix Composites

Advisor: Jia Lu

Hou, Yuxing
Graduation Date: Spring, 2017
Degree: PhD
Thesis: Applications of Novelty and Change Detection for Longitudinal Data
Advisor: Yong Chen

Jahani, Nariman
Graduation Date: Summer, 2016
Degree: PhD
Thesis: N/A
Advisor: Ching-Long Lin

Li, Huaxia
Graduation Date: Fall, 2016
Degree: PhD
Thesis: An Integrated Multibody Dynamics Computational Framework For Design Optimization of Wind Turbine Drivetrains Considering Wind Load Uncertainty
Advisor: Hiroyuki Sugiyama

Perret, Matias Nicholas
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Local Optical Phase Detection Probes with an Application to a High Speed Boundary Layer
Advisor: Pablo Carrica

Sen, Oishik
Graduation Date: Fall, 2016
Degree: PhD
Thesis: Multiscale Modeling of Multimaterial Systems Using Kriging Based Methods
Advisor: H.S. Udaykumar

Wang, Yeqing
Graduation Date: Summer, 2016
Degree: PhD
Thesis: Modeling of Lightning-induced Thermal Ablation Damage in Anisotropic Compostie Materials and Its Application to Wind Turbine Blades
Advisor: Kyung K. Choi

Yamashita, Hiroki
Graduation Date: Fall, 2016
Degree: PhD
Thesis: N/A
Advisor: Hiroyuki Sugiyama

PUBLICATIONS, PRESENTATIONS & AWARDS

BIOMEDICAL ENGINEERING

Adam, Ryan

Publications

Reznikov, L. R., Meyerholz, D. K., Adam, R. J., Abou Alaiwa, M., Jaffer, O., Michalski, A. S., Powers, L. S., Price, M. P., Stoltz, D. A., Welsh, M. J., "Acid-Sensing Ion Channel 1a Contributes to Airway Hyperreactivity in Mice," *PloS one* 2016, 11 (11), e0166089.

Adam, R. J., Hisert, K. B., Dodd, J. D., Grogan, B., Launspach, J. L., Barnes, J. K., Gallagher, C. G., Sieren, J. P., Gross, T. J., Fischer, A. J., Cavanaugh, J. E., Hoffman, E. A., Singh, P. K., Welsh, M. J., McKone, E. F., Stoltz, D. A., "Acute Administration of Ivacaftor to People with Cystic Fibrosis and a G551D-CFTR Mutation Reveals Smooth Muscle Abnormalities," *JCI Insight* 2016, 1 (4), e86183.

Cook, D.P., Adam, R.J., Abou-Alaiwa, M.H., Stoltz, D.A., Mounier-Kuhn, "Syndrome: A Case of Tracheal Smooth Muscle Remodeling," *Clinical Case Reports* 2016, 5(2)

Wolter, D. J., Cooke, G., Adam, RJ, Carter, S., Grogan, B., Launspach, J. L., Donnelly, S. C., Gallagher, C., Bruce, J. E., Stoltz, D., Welsh, M. J., Hoffman, L. R., McKone, E. F., Singh, P. K., "Restoring CFTR Function Reduces Airway Bacteria and Inflammation in People With Cystic Fibrosis and Chronic Lung Infections," *American Journal of Respiratory and Critical Care Medicine*, 2017.

Presentations

RJ Adam et. al., "Acute and Long Term Effects of Ivacaftor on Air Trapping in Adults with Cystic Fibrosis and the G551D CFTR Mutation," presented at American Thoracic Society Conference, San Francisco, CA, 2016.

RJ Adam et. al.,"Quantitative CT Scan Assessment of Lung Structure and Function After One Year of Ivacaftor Therapy," presented at NACFC 2016 Orlando, FL.

Awards

- Department of Biomedical Engineering Graduate Student Achievement Award 2016
- Graduate Student Senate Travel Grant (2)
- PBDB - Best Paper Competition Finalist
- 2016 College of Engineering Research Open House Poster Popular Choice Award
- Health Science Research Week Scientific Humor Competition Award

Augustine-Akpan, Eno-Abasi

Publications

Liu, H., Busch, T., Eliason, S., Anand, D., Bullard, S., Gowans, L. J., Nidey N., Petrin A., Augustine-Akpan, E.A, & Dunnwald, M. (2016). "Exome Sequencing Provides Additional Evidence for the Involvement of ARHGAP29 in Mendelian Orofacial Clefting and Extends the Phenotypic Spectrum to Isolated Cleft Palate," *Birth Defects Research Part A: Clinical and Molecular Teratology* (2016).

Gowans, L. J. J., Adeyemo, W.L., Eshete, M., Mossey, P.A., Busch, T., Aregbesola, B., Donkor, P., Arthur, F.K.N., Bello, S.A., Martinez, A. and Li, M., Augustine-Akpan, E.A, & Butali, A. "Association Studies and Direct DNA Sequencing Implicate Genetic Susceptibility Loci in the Etiology of Nonsyndromic Orofacial Clefts in Sub-Saharan African Populations," *Journal of Dental Research* 95.11 (2016): 1245-1256.

Austin, Brett

Awards
- Creative Kick-Start Funding Program Spring 2017

Boland, Lauren

Awards
- 3rd Place Poster, 2016 American Physician Scientists Assoc. Midwest Regional Meeting

Chung, Timothy

Awards
- Post Comprehensive Research Award, Graduate College Fall 2016

Corrigan, Rae Ann

Presentations
Rae Ann Corrigan, Michael Schnieders, "Advanced Physics Based Models of Cancer Therapeutics", COE Research Open House, Iowa City, IA, 2016.

Rae Ann Corrigan, Stephanie Gilbertson-White, "Using Protein Structural Models to Facilitate Genotype-to-Phenotype Analysis of Pain and Cytokines in Patients with Advanced Cancer", International Society of Nurses in Genetics 2016 World Meeting, Dublin, Ireland, 2016.

Awards
- Barry M. Goldwater Scholarship 2016-2017
- Basil and Mildred Deegan Scholarship 2016-2017

DeJesus, Aribet

Awards
- Archie A Alexander Outstanding Scholarship Award

El-Hattab, Mariam

Awards
- Philip G. Hubbard Uncommon Leadership Award, April 8th 2016

Gerard, Sarah

Publications
S. E. Gerard, H. J. Johnson, J. E. Bayouth, G. E. Christensen, K. Du, J. Guo, and J. M. Reinhardt, "Alpha Shapes for Lung Segmentation in the Presence of Large Tumors," *PIA: Pulmonary Image Analysis*, 2016.

Y. Pan, G. E. Christensen, O. C. Durumeric, S. E. Gerard, J. M. Reinhardt, and G. D. Hugo, "Current- and Varifold-Based Registration of Lung Vessel and Airway Trees," *7th International Workshop on Biomedical Image Registration*, 2016.

B. Zhao, G. E. Christensen, S. J. Hyun, Y. Pan, S. E. Gerard, J. M. Reinhardt, K. Du, T. Patton, J. E. Bayouth, and G. D. Hugo, "Tissue-Volume Preserving Deformable Image Registration for 4DCT Pulmonary Images," *7th International Workshop on Biomedical Image Registration*, 2016.

Presentations

Sarah E. Gerard, "Alpha Shapes for Lung Segmentation in the Presence of Large Tumors. In PIA: Pulmonary Image Analysis", MICCAI, Athens, Greece, 2016.

Sarah E. Gerard, "Alpha Shapes for Lung Segmentation in the Presence of Large Tumors. In PIA: Pulmonary Image Analysis", Gordon Research Conference, Easton, MA, 2016.

Awards
- Iowa Space Grant Fellowship 2017

Guo, Zhihui

Presentations

Zhihui Guo, et al., "Machine learning in a graph framework for subcortical segmentation", SPIE Medical Imaging Conference, Orlando, FL, 2017

Hammond, Emily

Publications

E. Hammond, J.D Newell, S.K.N. Dilger, N. Stoyles, J. Morgan, F.A. Rohret, J.P. Sieren, D.R. Thedens, E.A. Hoffman, D. K. Meyerholz, J.C. Sieren, "Computed Tomography and Magnetic Resonance Imaging for Longitudinal Characterization of Lung Structure Changes in a Yucatan Miniature Pig Silicosis Model," *Special Issue: Swine in Translational Research, Toxicologic Pathology*, 44(3): 373-81 (2016) PMID: 26839326

E. Hammond, N. Koehn, F. De Stefano, R. Deutsch, S.K.N. Dilger, E.A. Hoffman, J.D. Newell, J.C. Sieren, "A Multi-Level Registration Method to Align Multi-Modal, Longitudinal Image Data for Characterization of Swine Disease Models," *Academic Radiology*, (in review)

E. Hammond, C. Sloan, J.D. Newell, J.P. Sieren, M. Saylor, C. Vidal, S. Hogue, F. De Stefano, A. Sieren, E.A. Hoffman, J.C. Sieren, "Comparison of Low and Ultra-Low Dose Computed Tomography Protocols Through Quantitative Lung Airway and Parenchyma Assessment," *Medical Physics* (in review)

Presentations

T.M. Dougherty, J.D. Newell Jr., C.M. Sloan, E. Hammond, S. Hogue, E.A. Hoffman, "3rd Generation Dual Source/Dual Energy CT Allows for Reduction in Radiation Dose and Iodine Concentration Used to Assess Pulmonary Perfused Blood," American Thoracic Society (San Francisco, CA, USA, 2016)

C.M. Sloan, J.C. Sieren, J.D. Newell Jr, J. Sieren, M. Shirk, C. Vidal, S. Hogue, F. DeStefano, E. Hammond, E.A. Hoffman, "Comparison of Low and Ultra-Low Dose Computed Tomography Protocols Through Quantitative Lung Airway Assessment," American Thoracic Society (San Francisco, CA, USA, 2016)

S.K.N. Dilger, J. Uthoff, E. Hammond, S.L. Mott, B.J. Smith, M. Ahuja, M. Gailey, A. McGruder, J.D. Newell, E.A. Hoffman, J.C. Sieren, "Clinical Computer-Aided Diagnosis Tool for Pulmonary Nodule Characterizations Shows Improved Performance with the Inclusion of Nodule-Associated Parenchymal Features," American Thoracic Society (San Francisco, CA, USA, 2016)

S.K.N. Dilger, J. Uthoff, E. Hammond, M. Ahuja, M. Gailey, A. McGruder, J.D. Newell, E.A. Hoffman, J.C. Sieren, "Identifying Longitudinal Computed Tomography Biomarkers of Malignancy to Improve Noninvasive Lung Cancer Diagnosis," American Thoracic Society (San Francisco, CA, USA, 2016)

E. Hammond, F. De Stefano, S.K.N. Dilger, E.A. Hoffman, J.D. Newell, J.C. Sieren, "Multi-Level Registration of Multi-Modality and Longitudinally Acquired Thoracic Images for Lung Assessment in a Swine Exposure Model," American Thoracic Society (San Francisco, CA, USA, 2016) ($500 Graduate Student Senate Travel Fund Award)

J. Uthoff, N. Koehn, S.K.N. Dilger, E. Hammond, F. De Stefano, M. Muralidharan, E.A. Hoffman, J.D. Newell, R. Sanchez, J.C. Sieren, "Longitudinal Comparison of Four Mathematical Prediction Models of Solitary Pulmonary Nodules Imaged on Computed Tomography," American Thoracic Society (San Francisco, CA, USA, 2016)

E. Hammond, J. Dakai, T.J. Waldron, N. Koehn, F. De Stefano, C. Sloan, F.A. Rohret, C.S. Rogers, D.E. Quelle, B.W. Darbro, J.D. Newell Jr., D.K. Meyerholz, P.K. Saha, J.C. Sieren, "Exploration of an Inducible Sarcoma Model in TP53 Mutant Yucatan Miniature Pigs," Holden Comprehensive Cancer Center Research Retreat (University of Iowa, IA, USA, 2016)

Awards
- Graduate Student Senate Travel Grant, University of Iowa, Iowa (May 2016)
- Ballard Seashore Dissertation Fellowship Recipient, University of Iowa, 2016 - 2017
- CIRTL, Associate Level, (Summer 2016)
- Graduate Certificate in College Teaching (December 2016)

Herrmann, Jacob

Publications
Mondoñedo JR, Herrmann J, McNeil JS, Kaczka DW, "Comparison of Pneumotachography and Anemometry for Flow Measurement During Mechanical Ventilation with Volatile Anesthetics," *Journal of Clinical Monitoring and Computing*, 2016. In press.

Herrmann J, Tawhai MH, Kaczka DW, "Regional Gas Transport in the Heterogeneous Lung During Oscillatory Ventilation," *Journal of Applied Physiology*, 121(6):1306-1318, 2016.

Amini R, Herrmann J, Kaczka DW, "Intratidal Overdistension and Derecruitment in the Injured Lung: A Simulation Study," *IEEE Transactions on Biomedical Engineering*, 41(12):2699-2711, 2016.

Presentations
Herrmann J, Hoffman EA, Kaczka DW, "Temporally-Resolved Computed Tomographic (CT) Imaging to Assess High-Frequency Periodic Deformation," International Workshop on Pulmonary Imaging. Philadelphia, PA., March 2017. Oral presentation and poster.

Herrmann J, Kaczka DW, "Optimization of Spectral Content in Oscillatory Ventilator Waveforms," Biomedical Engineering Society Annual Meeting. Minneapolis, MN. Oct 2016. Platform presentation.

Herrmann J, Tawhai MH, Kaczka DW, "Multi-Frequency Oscillatory Ventilation (MFOV): Impact on Eucapnic Ventilation Distribution in Simulated Lung Injury," American Thoracic Society International Conference. San Francisco, CA. May 2016. Poster discussion.

Abston E, Herrmann J, Taft P, Eberlein M, Kaczka DW, Stoltz DA, Zabner J, "The Effects of Chest Wall Strapping in a Porcine Model of ARDS," American Thoracic Society International Conference. San Francisco, CA. May 2016. Poster discussion

Huhle R, D'Antini D, Herrmann J, Herzog M, Bluth T, Vidal-Melo M, Cinnella G, Abreu MGD, "End-Expiratory Airway Pressure Effects on Respiratory System Mechanics and Incidence of Tidal Hyper-Inflation During Open Abdominal Surgery," American Thoracic Society International Conference. San Francisco, CA. May 2016. Poster discussion.

Awards
- Trainee Travel Stipend - 2017 International Workshop on Pulmonary Imaging

Hodis, Brendan

Presentations
Hodis B, Kristensen DM, "A Computational Approach to Genus-Wide Profiling of Viral Genomes," Poster session presented at: Informatics Showcase. University of Iowa; 2016 Apr 22; Iowa City, IA.

Hodis B, Kristensen DM, "Representing Pangenomes Using Prokaryotic Virus Orthologous Groups," Poster session presented at: Informatics Showcase. University of Iowa; 2017 Feb 18; Iowa City, IA.

Kalantari, John

Awards
- R.F. and H.W. Poston Scholarship

Long, Steven

Publications
Long S, Thomas GW, Anderson DD, "Designing an Affordable Wire Navigation Surgical Simulator," *ASME. J. Med. Devices*, 2016;10(3):030921-030921-2. doi:10.1115/1.4033799.

Long SA, Thomas GW, Anderson DD, "Designing an Extensible Wire Navigation Simulation Platform," *16th Annual Design of Medical Devices Conference*, April 11-13, 2017, Minneapolis, MN.

Long SA, Karam M, Thomas GW, Anderson DD, "Augmented Reality Simulator Training Leads to Improved Wire Navigation Performance in First-Year Orthopaedic Residents," *American Academy of Orthopaedic Surgeons*, March 14-18, 2017. San Diego, Ca.

Long SA, Karam M, Thomas GW, Anderson DD, "An Augmented Reality Simulator Improves Guide Wire Navigation Skills for First-Year Residents," *Council of Orthopaedic Residency,* June 23-24, 2017, Charlotte, NC

Moore, Jimmy

Awards
- Lichtenberger Engineering Library Creative Kick-Start 2017

Muckenhirn, Logan

Presentations
Logan Muckenhirn, "Undergrad Research", Chemistry Building, Iowa City, Iowa, 2016

Awards
- Nominated for Fullbright 2015-2016

O'Connell, Claire

Presentations
Claire O'Connell, "Accurate and Precise Estimates of Protein Thermodynamics: Advanced Alchemical Free Energy Methods", ICRU Fall Research Festival, Iowa City, IA, 2016.

Permeswaran, Vijay

Awards
- Post Comprehensive Research Award, Graduate College Fall 2016
- Three-Minute Thesis Competition, Graduate College – Honorable Mention

Remy, Matthew

Awards
- Creative Kick-Start Funding Program Spring 2017

Rendleman, Michael

Presentations
Michael Rendleman, "Developing Machine Learning Tools for Cancer Prediction from Genomic Data", CoE Research Open House, Iowa City, IA, 2016.

Awards
- UI National Scholars Award, Fall 2016

Schumacher, Anna

Presentations
Schumacher A, Antiga L, Correa T, Hasan D, Raghavan ML, "Development and Evaluation of an Image Analysis Approach for the Study of Recurrence in Coil Embolized Cerebral Aneurysms", Summer Biomechanics, Bioengineering, and Biotransport Conference, National Harbor, MD; June 29 - July 2 2016.

Awards
- First Lego League Team Mentor Appreciation Award (for mentoring the Weber Elementary I-C Bots First Lego League Team)

Stoner, Kristen

Awards
- Three-Minute Thesis Competition, Graduate College – First Place

Thomas, Holly

Presentations
Thomas HD, Dibbern KN, Willey MC, Goetz JE. "Evaluating the Effects of Simulating Pathological Versus Normal Gait on Hip Joint Mechanics in Dysplasia Patients,'" Midwest American Society of Biomechanics Regional Meeting, February 23–24, 2017, Grand Rapids, Michigan. Podium Presentation.

Tollefson, Mallory

Presentations
Tollefson, M., Booth, K., Azaiez, H., Schnieders, M.J., Smith, R. (2016 April), "Evaluating Genetic Variants of Unknown Significance Using Protein Thermodynamic Simulations in the Context of Non-Syndromic Hearing Loss," Poster session presented at Molecular Biology of Hearing and Deafness, Hinxton, United Kingdom and College of Engineering Research Festival, Iowa City, Iowa.

Awards
- University of Iowa President's List, University of Iowa, May 2016 and December 2016
- Outstanding Senior Award, University of Iowa College of Engineering, December 2016
- Best Undergraduate Research Poster Presentation, University of Iowa College of Engineering, April 2016

Truka, Alicia

Presentations
Kylie Hershberger, Mitchell Miller, Alicia Truka, Nathaniel Witt, "The Little Jonny That Could: Providing Independence for Congenital Arm Amputees," BME Senior Design Poster Presentation, Iowa City, IA, 2016

Kylie Hershberger, Mitchell Miller, Alicia Truka, Nathaniel Witt, "The Little Jonny That Could: Providing Independence for Congenital Arm Amputees," BME Senior Design Prototype Day, Iowa City, IA, 2016

Awards
- Creative Kick-Start Grant 2016-1017

Uthoff, Johanna

Publications
Kalpathy-Cramer J, Mamomov A, Zhao B, Lu L, Cherezov D, Napel S, Echegaray S, Rubin D, McNitt-Gray M, Lo P, Sieren JC, Uthoff J, Dilger SK, Driscoll B, Yeung I, Hadjiski L, Cha K, Balagurunathan Y, Gillies R, Goldgof D., "Radiomics of Lung Nodules: A Multi-Institutional Study of Robustness and Agreement of Quantitative Imaging Features," *Tomography* 2016 Dec; 2(4):430-437.

Presentations
J. Kalpathy-Cramer, B. Zhao, D. Cherezov, S. Echegaray, M. McNitt-Gray, J.C. Sieren, J. Uthoff, B. Driscoll, I. Yeung, L. Hadjiiski, Y. Balagurunathan, R. Gillies, S. Napel, D. Goldgof. "Radiomics in Lung Nodules: A Multi-Institutional Study of Robustness and Agreement of Imaging Features," Radiological Society of North America. (Chicago, IL, USA, 2016)

M. Muralidharan, S.K.N. Dilger, J. Uthoff, J.C. Sieren, "A Graphical User Interface for Comparison of Lung Cancer Risk Prediction Models," American Thoracic Society (San Francisco, CA, USA, 2016)

N. Koehn, S.K.N. Dilger, J. Uthoff, E. Hammond, F. De Stefano, M. Muralidharan, E.A. Hoffman, J.D. Newell, R. Sanchez, J.C. Sieren, "Longitudinal Comparison of Four Mathematical Prediction Models of Solitary Pulmonary Nodules Imaged on CT," American Thoracic Society (San Francisco, CA, USA, 2016)

S.K.N. Dilger, J. Uthoff, E. Hammond, S.L. Mott, B.J. Smith, M. Ahuja, M. Gailey, A. McGruder, J.D. Newell, Jr., E.A. Hoffman, J.C. Sieren, "Clinical Computer-Aided Diagnosis Tool for Pulmonary Nodule Characterization Shows Improved Performance with the Inclusion of Nodule-Associated Parenchymal Features," American Thoracic Society (San Francisco, CA, USA, 2016)

S.K.N. Dilger, J. Uthoff, E. Hammond, M. Ahuja, M. Gailey, A. McGruder, J.D. Newell, Jr., E.A. Hoffman, J.C. Sieren, "Identifying Longitudinal Computed Tomography Biomarkers of Malignancy to Improve Noninvasive Lung Cancer Diagnosis," American Thoracic Society (San Francisco, CA, USA, 2016)

J. Uthoff, S. Dilger, F. A. De Stefano, N. Koehn, J.C. Sieren, "Survey of Semi-Automatic Segmentation Tools for Computed Tomography Lung Nodule Assessment," American Thoracic Society (San Francisco, CA, USA, 2016)

J. Uthoff, S. Dilger, F. A. De Stefano, N. Koehn, J.C. Sieren, "Survey of Semi-Automatic Segmentation Tools for Computed Tomography (CT) Lung Cancer Assessment," Holden Comprehensive Cancer Center Research Retreat (University of Iowa, IA, USA, 2016)

F. De Stefano, J. Uthoff, K. Panzer, B Darbro, J.C. Sieren, "Positron Emission Tomography (PET) for the Assessment of Malignancy in Neurofibromatosis Type 1 Patients," Fall Undergraduate Research Festival (Iowa City, IA, Nov. 2016)

R. Deutsch, S. Walsh, M Acevedo, E Hammond, J Uthoff, J.C. Sieren, "A Web Based Data Collection Tool to Track System Use and Parameter Settings for a Shared Resource Micro-CT Imaging System," Fall Undergraduate Research Festival (Iowa City, IA, Nov. 2016)

Zarei, Kasra

Awards
- Creative Kick-Start Grant 2016-1017
- Iowa Space Grant Consortium Fellowship (ISGC)

CHEMICAL & BIOCHEMICAL ENGINEERING

Alalwan, Hayder

Publications

H.A. Alalwan, D.M. Cwiertny, V.H. Grassian, "Co3O4 Nanoparticles as Oxygen Carriers for Chemical Looping Combustion: A Materials Characterization Approach to Understanding Oxygen Carrier Performance," *Chemical Engineering Journal* (2017), doi: http://dx.doi.org/10.1016/j.cej.2017.02.134

Algharrawi, Khalid

Presentations

Khalid Algharrawi, "Production of Theobromine by N-Demethylation of Caffeine Using Metabolically Engineered E. coli", 2016 AIChE Annual Meeting, San Francisco, CA

Alsaedi, Abdulsattar

Presentations

W. Cheng, A. Rassoolkhani, J. Koonce, S. Al Saedi, S. Mubeen, "Engineering Materials and Electrochemical Systems for Energy Conversion," Poster session presented at: Research Open House, 14th Annual College of Engineering Research Open House at the University of Iowa. 2016 April 7-8; Iowa City, IA.

A.S. Alsaedi, S. Mubeen, "Three-Dimensional Electrodes for Electrodialysis," Poster session presented at: American institute of chemical engineers (AICHE) conference, 2016 Annual meeting, November 13-18; San Francisco

Awards

- Graduate and professional student government (GPSG).
- Graduate student senate (GSS).

Boesen, Aaron

Presentations

Boesen, A.C.; Martinez, A.; & Hornbuckle, K.C., "Air-Water Exchange of PCBs in Southern Lake Michigan: Chicago a Source of Airborne PCBs," ISRP Monthly Meeting - Project 4, Oakdale, IA, Feb. 2017

Boesen, A.C.; Martinez, A.; & Hornbuckle, K.C., "Measurement & Flux Modeling of Southern Lake Michigan's Polychlorinated Biphenyl Content Near Chicago," American Institute of Chemical Engineers Student Conference, San Francisco, CA, Nov. 2016

Awards

- Koch Spring Undergraduate Teaching Fellow 2016.

Bryngelson, Nathan

Awards

- Undergrad Best Poster Award at 2016 Research Open House

Classon, Katie

Publications
Lapin SC and Classon KE, "Electron Beam Curing Properties of Water Based Monomer and Polymer Materials," *UV+EB Technology*, Vol. 2(4), 2016, pp. 28-37.

Awards
- MESD VI 3rd Place in Undergraduate Student Poster Competition, 2016 AIChE Annual Student Conference, November 2016.

Coffel, Joel

Publications
Coffel, J., S. Gandhi, and E. Nuxoll, "Unified Polymer Erosion Model for Pulsatile Drug Delivery," *Journal of Membrane Science*, 2016. 512: p. 61-72.

Coffel, J. and E. Nuxoll, "Poly(Vinyl Alcohol) Tissue Phantoms as a Robust *in vitro* Model for Heat Transfer," *International Journal of Polymeric Materials and Polymeric Biomaterials*, 2016. 65: p. 797-806.

Presentations
"How to Kill a Biofilm: A Chemical Engineer's Prospective" presented to Coe College Department of Physics, Cedar Rapids, IA, March 29, 2016.

Countryman, Alec

Awards
- Iowa Space Grant Consortium Scholarship 16-17.

Delcau, Michael

Presentations
Michael Delcau, "Temperature Dependence on Expression of Atrazine-Degrading Genes in *Pseudomonas sp.* ADP Biofilms", Center for Biocatalysis and Bioprocessing Fall Conference, Iowa City, IA, 2016.

Michael Delcau, "Temporal and Temperature-Dependence on Expression of Atrazine-Degrading Genes in *Pseudomonas sp.* ADP Biofilms", American Chemical Society National Meeting and Exposition, San Francisco, CA, 2017.

Awards
- NIH/CBB Fellowship in Biotechnology Training Grant Recipient 2016-2017

Do, Anh-Vu

Publications
Do, A.-V., Akkouch, A., Green, B., Ozbolat, I., Debabneh, A., Geary, S., & Salem, A. K. (2016), "Controlled and Sequential Delivery of Fluorophores from 3D Printed Alginate-PLGA Tubes," *Annals of Biomedical Engineering*, 1-9. doi:10.1007/s10439-016-1648-9

Behnoush Khorsand, Nate Nicholson, Anh-Vu Do, John E. Femino, James A. Martin, Emily Petersen, Brian Guetschow, Douglas C. Fredericks, Aliasger K. S (2017), "Regeneration of Bone Using Nanoplex Delivery of

FGF-2 and BMP-2 Genes in Diaphyseal Long Bone Radial Defects in a Diabetic Rabbit Model," *Journal of Controlled Release* (Accepted for publication)

Kareem Ebeid , Xiangbing Meng , Kristina Thiel , Anh-Vu Do, Erica L Pham, Amaraporn Wongrakpanich , Darryl J Murry , Kimberly Leslie, Aliasger K Salem (2017), "Synthetically Lethal Nanoparticles for Treatment of Endometrial Cancer," *Nature Nanotechnology*, (Submitted)

Anh-Vu Do, Kee Jang, Dongrim Seol, Phillip Tobias, Sean Geary, James Martin, Aliasger Salem, "Using Ultrasound to Enhance Tumor Cell Killing by Anti-PD1 and Doxorubicin-Loaded Particles," *Proceed. Intern. Symp. Control. Rel. Bioact. Mater.* (2016)

A. Do, A. Akkouch, B. Green, I. Ozbolat, A. Debabneh, S. Geary, A.K. Salem. "Controlled and Sequential Delivery of Fluorophores from 3D Printed Alginate-PLGA Devices," *Proceed. Intern. Symp. Control. Rel. Bioact. Mate*r. (2016)

K. Ebeid, X. Meng, A. Do, A. Wongrakpanich, K. Thiel, S. Geary, K. Leslie, A.K. Salem, "The Combination of BIBF 1120 (BIBF) and Paclitaxel (PTX) Independently Loaded in PLGA Nanoparticles as a Treatment for Endometrial Cancer (EC)," *Proceed. Intern. Symp. Control. Rel. Bioact. Mater.* (2016)

B. Khorsand, S. Elangovan, A. Do, L.Hong, A. Dewerth, M. Kormann, R.D. Ross, D. Rick Sumner, Aliasger K. Salem, "Modified RNA Activated Matrices Enhance Bone Regeneration," *Proceed. Intern. Symp. Control. Rel. Bioact. Mater*. (2016)

I. Ozbolat, K.K. Moncal, A. Do and A.K. Salem, "Thermally-Controlled Bioprinting of Bone Marrow Stem Cell Loaded by Composite Collagen Type –I / Pluronic F127 Ink for Bone Regeneration," *Proceedings of 10th World Biomaterials Congress*, Montréal, Canada, 17 May - 22 May, 2016

S. Elangovan, B. Khorsand, A. Do, L. Hong, A. Dewerth, M. Kormann, R.D. Ross, D.R. Sumner, C. Allamargot, and A.K. Salem, "Osteogenic Potential of Chemically Modified RNA Encoding BMP-9," *Proceedings of the American Association for Dental Research*. 2016

Presentations
"Controlled Delivery of Fluorophores from 3D Two-Photon Photolithographic Printed Poly (Ethylene Glycol) Methacrylate Scaffolds," Anh-Vu Do and Kristin Worthington, Budd Tucker, Aliasger K. Salem. American Association of Pharmaceutical Scientists, Denver, Co October 2016.

"Using Ultrasound to Enhance Tumor Cell Killing by anti-PD1 and Doxorubicin-loaded Particles," Anh-Vu Do, Dongrim Seol, Phillip Tobias, Ino Song, James A. Martin, Aliasger K. Salem. American Association of Pharmaceutical Scientists, Denver, Co October 2016.

Awards
- 2nd Place at The 18th Jakobsen Memorial Conference in Biological and Health Sciences- Spring 2016
- 2nd Place at Research Open House for Popular Choice - Spring 2016
- Mani Subramanian Poster Award-CBB 25th Annual Conference- Fall 2016
- Finalist and Honorable Mention in 3 Minute Thesis Competition- Fall 2016
- University of Iowa Graduate Recipient of Iowa Space Grant Consortium Fellowship-Fall 2016

Dong, Can

Awards
- CGRER traveling award, 2016

- Post-Comprehensive Research Award, 2017

Giles, Katie

Awards
- 2016-2017 ICRU Fellowship, UI

Givens, Brittany

Publications
Brittany E. Givens, Zhenzhu Xu, Jennifer Fiegel, Vicki H. Grassian, "Bovine Serum Albumin Adsorption on SiO2 and TiO2 Nanoparticle Surfaces at Circumneutral and Acidic pH: A Tale of Two Nano-Bio Surface Interactions," *Journal of Colloid and Interface Science*. 2017; 493 334-341.

Presentations
Brittany E. Givens, "Amorphous Silicon Dioxide Nanoparticle Interactions with Pulmonary Epithelial Cells with and without a Pre-Existing Protein Corona", AIChE Annual Meeting, San Francisco, CA, 2016.

Awards
- Lilia A Abron Distinguished Mentoring Award.

Green, Brian

Publications
Worthington, Kristan, Green, Brian, Rethwisch, Mary, Wiley, Luke, Tucker, Budd, Guymon, C. Allan, Salem, Aliasger, "Neuronal Differentiation of Induced Pluripotent Stem Cells on Surfactant Templated Chitosan Hydrogels" *Biomacromolecules*. 2016, 17, 1684-1695

Presentations
Green, Brian, McLeod, Robert, Guymon, C. Allan, "Improving 3D Photocured Systems," 2016 Photopolymerization Center IUCRC Annual Meeting, Estes Park, CO, Oct 2016

Awards
- Graduate College Post-Comprehensive Research Award, Spring 2017

Hasa, Erion

Presentations
Erion Hasa, "Nano/Microstructured Materials Obtained Using Photopolymerization-Induced Phase Separation", Industry/University Cooperative Research Center (IUCRC) Meeting, Boulder, CO, 2016.

Henry, Victoria

Publications
Henry, V., Jessop, J.L.P., Peeples, T.L., "Differentiating *Pseudomonas sp. S*train ADP Cells in Suspensions and Biofilms Using Raman Spectroscopy and Scanning Electron Microscopy," *Analytical & Bioanalytical Chemistry*, 409(5), 2017, 1441-1449.

Janechek, Nathan

Publications

Janechek, N. J., Hansen, K. M., and Stanier, C. O., "Comprehensive Atmospheric Modeling of Reactive Cyclic Siloxanes and Their Oxidation Products," *Atmos. Chem. Phys. Discuss*. 2017, 1-27 (in review).

Presentations

"Experimental Characterization of Secondary Aerosol from D5 Cyclic Siloxane Oxidation," AAAR Conference, Portland, OR, 2016.

"Atmospheric Modeling of Cyclic Volatile Methyl Siloxanes," AAAR Conference, Portland, OR, 2016.

Awards
- University of Iowa Ballard and Seashore Dissertation Fellowship, 2017.
- Department of Chemical & Biochemical Engineering Vetter Service Award, 2016.
- Graduate Best Poster, Center for Global & Regional Environmental Research, Research Open House, Iowa City, 2016.

Kaalberg, Sara

Publications

Kaalberg, Sara, and Julie L. P. Jessop. "Combining Oxiranes and Oxetanes to Enhance Kinetics and Improve Physical Properties," *UV+EB Technology,* 2 (3), 2016, 56-60.

Presentations

Sara Kaalberg, "Combining Oxiranes and Oxetanes to Enhance Kinetics and Improve Physical Properties", RadTech 2016 Technical Conference, Chicago, IL, May 16th, 2016.

Awards
- Graduate College Post-Comprehensive Research Award for Fall 2016, March 31st, 2016.
- Best Student Paper, RadTech 2016 Technical Conference, May 16-18th.
- James Osborn (Teaching & Mentoring) Graduate Award, U of I Department of Chemical & Biochemical Engineering, April 2016.

King, Benjamin

Presentations

Benjamin King, "The Role of Natural Fluids in Studies of In-Vitro Pulmonary Drug Delivery," AIChE Midwest Regional Conference, Chicago, IL, 2016

Awards
- Graduate College Post-Comprehensive Research Award 2016
- Graduate College Summer Fellowship, University of Iowa 2016

Knapp, Eric

Awards
- Summer 2016 ICRU Fellowship, UI.

- FURF 2016 Distinguished Poster Presentation, UI ICRU, December 2016.

Leigh, Braden

Presentations
"Engineered Zwitterionic Polymers to Improve the Neural Interface in Cochlear Implants" IUCRC Estas Park, CO 2016

Awards
- Post-comprehensive research award fall 2016
- Excellence in graduate student research award fall 2016

Lui, Lu

Awards
- 1st Place paper award, AIChE Mid-America Student Regional Conference, April 2016.

Qian, Jiajie

Publications
Qian, J., Jennings, B., Cwiertny, D.M., Martinez, A., "Development and Application of Electrospun Nanofiber Mats as Passive Sampler Media for Hydrophilic and Hydrophobic Organic Compounds," *Environmental Science: Processes & Impacts*. Submitted.

Presentations
Martinez, A., Qian, J., Jennings, B., Cwiertny, D.M., "Nanofiber-Enabled, Multi-Target Passive Sampling Device for Determination of the Freely-Dissolved Sediment Pore Water Concentrations of Organic Contaminants", Presented at the Society for Environmental Toxicology and Chemistry (SETAC) 37th North America Annual Meeting, Orlando, FL, November 6-10, 2016.

Martinez, A., Qian, J., Jennings, B., Cwiertny, D.M., "Nanofiber-Enabled, Multi-Target Passive Sampling Device for Determination of the Freely-Dissolved Sediment Pore Water Concentrations of Organic Contaminants", Presented at the Battelle 10th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 22-26, 2016.

Rassoolkhani, Alan

Presentations
Alan Rassoolkhani, "Acid Stable bismuth Vanadate for Photo Electrochemical Chlorine Production", ECS Prime, Honolulu, Hawaii, 2016

Awards
- Sloan travel grant Fall 2016

Ricker, Erica

Publications
Ricker EB and Nuxoll E., "Synergistic Effects of Antibiotics and Heat on *Pseudomonas aeruginosa* Biofilms," *Biotechnology and Bioengineering*. (In Preparation)

Ricker EB, Coffel J, and Nuxoll E., "Wireless Heating of Pseudomonas aeruginosa Biofilms Using Iron Oxide Nanoparticle Coatings," *Advanced Healthcare Materials*. (In Preparation)

Ricker EB, Bader TM, Al-Jaafari H, Hundley BS, and Nuxoll E., "Effect of Growth Conditions on Thermal Shock Susceptibility of *Pseudomonas aeruginosa* Biofilms," *International Journal of Hyperthermia*. (In Preparation)

Presentations

Ricker E. and Nuxoll E. "The Synergistic Effects of Antibiotics and Heat on *Pseudomonas aeruginosa* Biofilms," 25th Annual CBB Conference Oral Presentation, October 2016.

Ricker E. "Implant Infection Mitigation." University of Iowa Three Minute Thesis Competition, University of Iowa, October 2016.

Ricker E. "Implant Infection Mitigation," Chemical and Biochemical Engineering Seminar Three Minute Thesis Competition, University of Iowa, October 2016.

Ricker, E, O'Toole A, Bader T, Hundley B, and Nuxoll E. "Remote, Wireless Heating of *Pseudomonas aeruginosa* Biofilms for *in situ* Implant Mitigation," Montana Biofilm Science and Technology Presentation, Center for Biofilm Engineering, Montana State University, July 2016.

Ricker, E, Coffel J, and Nuxoll E. "Remote, Wireless Heating of Surfaces to Mitigate Biofilm Infections," College of Engineering Research Open House Poster Presentation, University of Iowa, April 2016.

Awards

- Ballard and Seashore Dissertation Fellowship, Spring 2017

- Finalist in the University Wide Three Minute Thesis Competition, Fall 2016

- Osburn Teaching Award, Spring 2016

- First Place Winner of the Chemical and Biochemical Engineering Seminar Three Minute Thesis Competition, Fall 2016

Schissel, Sage

Presentations

Sage M. Schissel, Stephen C. Lapin, and Julie L. P. Jessop (2016), "Accelerating EB's Potential: Understanding the Effects of Dose Rate in Electron-Beam Polymerization," RadTech 2016. Chicago, IL.

Sohani, Negin

Presentations

Oral presentation at 3rd Symposium on High Performance Computing for Weather, Water, and Climate, AMS 97th Annual Meeting, Title: "Performance Analysis and Optimization of the Weather Research and Forecasting Model (WRF) Advection Schemes" Seattle, WA, January 2017

Awards

- Graduate College Summer Fellowship, University of Iowa, Iowa City, IA 2016

- Best student oral presentation award, 3rd Symposium on the High Performance Computing for Weather, Water, and Climate, American Meteorological Society (AMS) 97th Annual Meeting, Seattle,WA 2017

Wang, Yi

Publications

Wang, Yi, Jun Wang, Xiaoguang Xu, Daven K. Henze, Yuxuan Wang, and Zhen Qu, "A New Approach for Monthly Updates of Anthropogenic Sulfur Dioxide Emissions from Space: Implications for Air Quality Forecasts," *Geophysical Research Letter*, 43, 9931–9938, 2016.

Presentations

Wang, Yi, Jun Wang, Xiaoguang Xu, and Robert Levy, "Retrieving MODIS Aerosol Optical Depth over Turbid Coastal Water," American Geophysical Union Fall Meeting, San Francisco, CA, DEC. 12-16, 2016.

Weis, Adam

Presentations

Monica Hemingway, Austin McKee, Mark Miller, Kevin Nguyen, Shannon Pham, Scott Tentinger, Adam Weis, Graham Young, Syed Mubeen, "Mubeen Lab Group: Undergraduate Projects Developing Sustainable Energy Storage and Production with Electrochemical Techniques", Research Open House, Iowa City, IA, 2016.

Awards

- National Academy of Engineering Grand Challenges Scholarship 2016-2017

Worthington, Kristan

Publications

K.S. Worthington, B.J. Green, M. Rethwisch, L.A. Wiley, B.A. Tucker, and C.A.Guymon and A.K. Salem, "Neuronal Differentiation of Induced Pluripotent Stem Cells on Surfactant Templated Chitosan Hydrogels," *Biomacromolecules*. 2016. [CA] [IF = 5.75]

K.S. Worthington, L.A. Wiley, A. Guymon, A.K. Salem and B.A. Tucker, "Differentiation of Induced Pluripotent Stem Cells to Neural Retinal Precursor Cells on Porous PLGA Scaffolds," *Journal of Ocular Pharmacology and Therapeutics*. 2016. [CA] [IF = 1.754]

CIVIL & ENVIRONMENTAL ENGINEERING

Abdioskouel, Maryam

Presentations

Maryam Abdi-Oskouei, "Understanding the Impact of Oil and Gas Extraction Activities on Air Quality in the Northern Front Range Metropolitan Area (NFRMA)", AMS Conference

Maryam Abdi-Oskouei "Evaluate the Representation of Methane in the GFDL Atmospheric Chemistry Model", AMS Conference, Seattle 2017

Maryam Abdi-Oskouei "Methane in the GFDL climate chemistry model", GFDL-NOAA, Princeton, NJ 2016

Awards

- Midwest Big Data Hackaton Award, October 2016
- Advanced Study Program (ASP) summer Colloquium Fellowship, August 2016
- Cooperative Institute for Climate Science (CICS) Summer Fellowship, Summer 2016

Bozograd, Ashkan

Awards

- R.F. and H.W. Poston Scholarship

Black, Ellen

Presentations

Black, Ellen, Chimenti, Michael, Just, Craig. (2017, March), "The Impact of Freshwater Mussels on Anaerobic Ammonium Oxidizers and Other Nitrogen-Cycle Bacteria in Upper Mississippi River Sediment.," Oral presentation at Freshwater Mollusk Conservation Society Annual Meeting, Cleveland, OH.

Black, Ellen, Chimenti, Michael, Just, Craig. (2016, October)., "16S Metagenomic Profiling of Freshwater Mussel Bed Microbial Communities Reveals Influence on Nitrogen-Transforming Bacteria," Poster presented at 25th annual Center for Biocatalysis and Bioprocessing Conference, Iowa City, IA. Achieved poster award.

Black, Ellen, Just, Craig. (2016, June), "Freshwater Mussels Expand the Niche of Anaerobic Ammonium Oxidizing (Anammox) Bacteria Through Coupled Biogeochemistry," Poster presented at Gordon Research Conference; Environmental Sciences: Water. Holderness, NH.

Black, Ellen, Just, Craig. (2016, April), "Freshwater Mussels Expand the Niche of Anaerobic Ammonium Oxidizing (Anammox) Bacteria Through Coupled Biogeochemistry,' Poster presented at 18th Annual Jakobsen Conference, Iowa City, IA.

Black, Ellen. (2016, April), "Characteristics of Anaerobic Ammonium Oxidation in a Bioreactor and Freshwater Mussel Bed," Environmental Engineering and Science Graduate Seminar Presentation.

Awards

- Neil B. Fisher Fellowship 2016-2017
- UI Center for Biocatalysis and Bioprocessing Poster Award

Drake, Chad

Presentations

Chad Drake, "IIHR Nutrient Trading Update: Catfish Creek", update for City of Dubuque, Iowa League of Cities, and Catfish Creek Watershed Management Authority, Dubuque, IA, 2016.

Chad Drake, "2016 Water Quality Results: Slough Creek CREP Wetland", Mitchell County Conservation Nature Center, Osage, IA, 2017.

El Sadaani, Mohamed

Awards

- UCAR Comet Program, National Water Center Research Grant

Ewald, Jessica

Presentations

"Polychlorinated Biphenyl Biodegraders in a Altavista Lagoon", Center for Biocatalysis and Bioprocessing Conference, Iowa City, IA, 2016.

Herkert, Nicholas

Publications

Herkert, N. J., Martinez, A., Hornbuckle, K. C., "A Model Using Local Weather Data to Determine the Effective Sampling Volume for PCB Congeners Collected on Passive Air Samplers," *Environmental Science and Technology,* 2016; 50(13), 6690-97.

Presentations

Nicholas J. Herkert, "Simulated Sampling Rates Across the Global Atmospheric Passive Sampling (GAPS) Network," 7th SETAC World Congress/37th SETAC North America Annual Meeting, Orlando, FL, 2016

Nicholas J. Herkert, "A Model Using Local Weather Data to Determine the Effective Sampling Volume for PCB Congeners Collected on Passive Air Samplers," University of Iowa Environmental Engineering & Science Seminar, Iowa City, IA, 2016

Awards

- William W. Kersten-IWPCA Scholarship Environmental Engineering and Science Program

- 7th SETAC World Congress/37th SETAC North America Annual Meeting Student Travel Award

- Center for Global & Regional Environmental Research (CGRER)-Graduate Student Travel Award-Conferences

Jadidoleslam, Navid

Publications

S Faraji, B Sadri, B Vajdi Hokmabad, N Jadidoleslam, and E Esmaeilzadeh, "Experimental Study on the Role of Electrical Conductivity in Pulsating Modes of Electrospraying," *Experimental Thermal and Fluid Science*. 2017; 81:327-335.

Lehman, Jacob

Awards
- Daniel Mead Ethics Paper Scholarship

Mattson, Rebecca

Awards
- Iowa Space Grant Consortium Fellowship 2016-17

Muerdter, Claire

Awards
- Wayne L. Paulson Scholarship

Nicholson, John

Awards
- Ballard and Seashore Dissertation Fellowship, University of Iowa Graduate College

Perez, Gabriel

Publications
Perez, G., Mantilla, R., & Witold, K. (2017), "Spatial Patterns of Peak Flow Quantiles Based on Power-Law Scaling in the Mississippi River Basin," *In A. A. Tsonis (Ed.), 30 Years of Nonlinear Dynamics in Geosciences*. Springer.

Schroer, Hunter

Awards
- American Chemical Society Environmental Chemistry Division student award

Scott, Ryan

Awards
- Daniel Mead Ethics Paper Scholarship

Webb, Danielle

Awards
- Wayne L. Paulson Scholarship

Yildirim, Enes

Presentations
Yildirim Enes, S., Yusuf, D., Ibrahim, "Flood Emergency Decision Support System and Loss Estimation on the Web using HAZUS," UIOWA Informatics Symposium, February 17, 2017, Iowa City, IA, USA.

Yildirim Enes, S., Yusuf, D., Ibrahim, 'Flood Emergency Decision Support System and Loss Estimation on the Web using HAZUS," American Geophysical Union Fall Meeting 2016, December 12-16, 2016, San Francisco, CA, USA (Lightning Talk)

Yildirim Enes, S., Yusuf, D., Ibrahim, 'Flood Emergency Decision Support System and Loss Estimation on the Web using HAZUS," American Geophysical Union Fall Meeting 2016, December 12-16, 2016, San Francisco, CA, USA

Yildirim Enes, D., Ibrahim, "Real Time Flood Loss Estimation and Emergency Decision Support Systems on the Web," CyberGIS16 - Third International Conference on CyberGIS and Geospatial Data Science, July 26-28, 2016, Urbana, IL, USA

Yildirim Enes, D., Ibrahim, "Real-Time Emergency Response and Flood Loss Estimation via HAZUSMH on the Web," UIOWA Informatics Symposium, April 22, 2016, Iowa City, IA, USA.

ELECTRICAL & COMPUTER ENGINEERING

Alshamary, Haider

Awards
- Seashore-Ballard Dissertation Fellowship, Fall 2016

Asgharzadeh (Shishavan), Amir

Publications
A. A. Shishavan, E. C. Foresman and F. Toor, "Performance Analysis of Crystalline Silicon and Amorphous Silicon Photovoltaic Systems in Iowa: 2011 to 2014," *2016 IEEE 43rd Photovoltaic Specialists Conference (PVSC)*, Portland, OR, 2016, pp. 2625-2630.

A. A. Shishavan, L. Nordin, P. Tjossem, M. D. Abramoff, and F. Toor, "PMMA Based Ophthalmic Contact Lens for Vision Correction of Strabismus," *Metamaterials, Metadevices, and Metasystems 2016*, Vol. 9918, N. Engheta, M. A. Noginov, and N. I. Zheludev, Eds., ed Bellingham: SPIE-Int Soc Optical Engineering, 2016.

C. Deline, S. MacAlpine, B. Marion, F. Toor, A. Asgharzadeh and J. S. Stein, "Evaluation and Field Assessment of Bifacial Photovoltaic Module Power Rating Methodologies," *2016 IEEE 43rd Photovoltaic Specialists Conference (PVSC)*, Portland, OR, 2016, pp. 3698-3703.

C. W. Hansen, J. S. Stein, C. Deline, S. MacAlpine, B. Marion, A. Asgharzadeh, et al., "Analysis of Irradiance Models for Bifacial PV Modules," *2016 IEEE 43rd Photovoltaic Specialists Conference (PVSC)*, 2016, pp. 0138-0143.

C. Deline, S. MacAlpine, B. Marion, F. Toor, A. Asgharzadeh and J. S. Stein, "Assessment of Bifacial Photovoltaic Module Power Rating Methodologies ˮInside and Out," *IEEE Journal of Photovoltaics*, Vol. 7, no. 2, pp. 575-580, March 2017.

A. Asgharzadeh, T. Lubenow, J. Sink, B. Marion, C. Deline, C. Hansen, J. Stein, F. Toor, "Analysis of the Impact of Installation Parameters and System Size on Bifacial Gain and Energy Yield of PV Systems, " *2017 IEEE 44th Photovoltaic Specialists Conference (PVSC)*, 2017. (Submitted)

B. Marion, S. MacAlpine, C. Deline, A. Asgharzadeh, F. Toor, D. Riley, J. Stein, C. Hansen, "An Irradiance Model for Bifacial PV Module, " *2017 IEEE 44th Photovoltaic Specialists Conference (PVSC)*, 2017. (Submitted)

C. Hansen, D. Riley, M. Lave, C. Deline, A. Asgharzadeh, F. Toor, J. Stein, "A Detailed Performance Model for Bifacial PV Modules," *33rd European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC)*, 2017. (Submitted)

Presentations
Amir Asgharzadeh, Leland J. Nordin, Paul J. H. Tjossem, Michael D. Abramoff, Fatima Toor, "PMMA Based Ophthalmic Contact Lens for Vision Correction of Strabismus", SPIE Optics and Photonics Conference, 2016

Amir Asgharzadeh, Eric Forseman, and Fatima Toor, "Performance Analysis of Crystalline Silicon and Amorphous Silicon Photovoltaic Systems in Iowa: 2011 to 2014", 43rd IEEE PVSC Conference, 2016.

Amir Asgharzadeh, Eric Forseman, and Fatima Toor, "Performance Analysis of Photovoltaic Systems Installed at The University of Iowa Humid Continental Climate Zone: Measurements and Simulations from 2011 to 2014", College of Engineering Research Open House, University of Iowa, Iowa City, 2016

Amir Asgharzadeh, "Dual Dielectric Substrate Loaded with Graphene", COMSOL Workshop, The University of Iowa, Iowa City, 2016.

Balachandrasekaran, Arvind

Publications

Arvind Balachandrasekaran, Greg Ongie, Mathews Jacob, "Accelerated Dynamic MRI Using Structured Low Rank Matrix Completion," *Internatonal Conference on Image Processing (ICIP)* 2016, Phoenix, Arizona, USA.

Arvind Balachandrasekaran, Mathews Jacob, "Novel Structured Low-Rank Algorithm to Recover Spatially Smooth Exponential Image Time Series," *International Symposium on Biomedical Imaging (ISBI)* 2017, New York, USA.

Arvind Balachandrasekaran, Greg Ongie and Mathews Jacob, "Continuous Domain Compressed Sensing (CD-CS): Application to Accelerated Dynamic MRI," *International Society for Magnetic Resonance in Medicine (ISMRM)* 2017, Honolulu, Hawaii.

Arvind Balachandrasekaran, Mathews Jacob, "Novel Annihilation Filter Framework for Accelerated Parameter Mapping", *International Society for Magnetic Resonance in Medicine (ISMRM)* 2017, Honolulu, Hawaii.

Wenna Duan, H. Michael Gach, Arvind Balachandrasekaran, Parshant Sehrawat, Ashish B. Bhumkar, Paresh B. Boraste, James T. Becker, Oscar L. Lopez, and Weiying Dai, "Cross-Sectional and Longitudinal Cerebral Blood Flow Changes in the Progression from Normal Cognition to Alzheimer's Disease Measured with Continuous Arterial Spin Labeling (CASL)," *International Society for Magnetic Resonance in Medicine (ISMRM)* 2017, Honolulu, Hawaii.

Presentations

Arvind Balachandrasekaran, Gregory Ongie and Mathews Jacob. "Super Resolution Imaging Using Piecewise Smooth Image Models", invited talk at IVMSP 2016, Bordeaux, France.

Biswas, Sampurna

Presentations

G. Ongie, S. Biswas, and M. Jacob, "Structured Matrix Recovery of Piecewise Constant Signals with Performance Guarantees," International Conference on Image Processing, 2016.

Chen, Zhi

Publications

"Fenotipo del Engrosamiento Intimal Patológico: No Tan Inocente Como Se Pensaba: Estudio de la hHstología Virtual de una Serie de Casos con Ecografía Intravascular 3D T Kovarnik," Z Chen, A Wahle, L Zhang, H Skalicka, A Krala, JJ Lopez, ... *Revista Española de Cardiología* 70 (1), 25-33, 2017.

"Pathologic Intimal Thickening Plaque Phenotype: Not as Innocent as Previously Thought. A Serial 3D Intravascular Ultrasound Virtual Histology Study," T Kovarnik, Z Chen, A Wahle, L Zhang, H Skalicka, A Kral, JJ Lopez, ...Revista Española de Cardiología (English Edition) 70 (1), 25-33, 2017.

"TCT-96 Progression of Coronary Atherosclerosis Despite Lipid-Lowering Therapy in Diabetic Patients Compared to Non-Diabetic Ones. Study with 3D Intravascular Ultrasound and Virtual Histology," T Kovarnik, Z Chen, A Wahle, A Kral, M Chval, K Kopriva, J Lopez, *Journal of the American College of Cardiology,* 68 (18), B39, 2016.

"Evaluation of Variable Thin-Cap Fibroatheroma Definitions and Association of Virtual Histology-Intravascular Ultrasound Findings With Cavity Rupture Size," T Hirai, Z Chen, L Zhang, S Baaj, T Kovarnik, K Porcaro, J Kaminski, ...*The American Journal of Cardiology* 118 (2), 162-169, 2016

Cho, Myung

Publications

Myung Cho, Christos Thrampoulidis, Weiyu Xu, and Babak Hassibi, "Phaseless Super-Resolution in the Continuous Domain, *Proceedings of International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2017, to appear.

Myung Cho, Jian-Feng Cai, Suhui Liu, Yonina C. Eldar, and Weiyu Xu, "Fast Alternating Projected Gradient Descent Algorithms for Recovering Spectrally Sparse Signals," *Proceedings of International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2016, pp. 4638 - 4642.

Awards
- Earn While You Learn Scholarship, 2017

Cui, Chen

Awards
- Graduate College Post Comprehensive Research Award, Fall 2016

Davidson, Lauren

Publications

Fatima Toor, Jeffrey Miller, Lauren Davidson, Wenqi Duan, Michael Jura, Joanne Yim, Joanne Forziati, Marcie Black, Review: "Metal Assisted Catalyzed Etch (MACE): Optics and Device Physics," *Nanoscale*, 8, 15448-15466, 2016.

Fatima Toor, Jeffrey Miller, Lauren Davidson, Logan Nichols, Wenqi Duan, Michael Jura, Joanne Yim, Joanne Forziati, Marcie Black, Review: "Nanostructured Silicon via Metal Assisted Catalyzed Etch (MACE): Chemistry Fundamentals and Pattern Engineering," *Nanotechnology*, 27(41), 412003, 2016.

L. Davidson and F. Toor, "Design Optimization of Thin-Film/Wafer-Based Tandem Junction Solar Cells Using Analytical Modeling," *SPIE Photonics West*, 2016, pp. 97430O-97430O-8.

Awards
- ECE Kurtz Senior Merit Award 2016
- Iowa Heritage Award 2016
- UI Old Gold Scholarship 2016
- UI National Scholars Award 2016

Duan, Wenqi

Publications

Fatima Toor, Jeffrey Miller, Lauren Davidson, Wenqi Duan, Michael Jura, Joanne Yim, Joanne Forziati, Marcie Black, Review: "Metal Assisted Catalyzed Etch (MACE): Optics and Device Physics," *Nanoscale*, 8, 15448-15466, 2016.

Fatima Toor, Jeffrey Miller, Lauren Davidson, Logan Nichols, Wenqi Duan, Michael Jura, Joanne Yim, Joanne Forziati, Marcie Black, Review: "Nanostructured Silicon via Metal Assisted Catalyzed Etch (MACE): Chemistry Fundamentals and Pattern Engineering," *Nanotechnology*, 27(41), 412003, 2016.

W. Duan and F. Toor, "Surface Characterization of Nanostructured 'Black Silicon' Using Impedance Spectroscopy," *SPIE Optics and Photonics*, 2016, pp. 992711-992711-9.

L. Nichols, W. Duan, and F. Toor, "Thermal Characterization of Nanoporous 'Black Silicon' Surfaces," *SPIE Optics and Photonics*, 2016, pp. 99290K-99290K-7.

Presentations

Wenqi Duan, Fatima Toor, "Surface Characterization of Nanostructured 'Black Silicon' Using Impedance Spectroscopy", SPIE Optics and Photonics Conference, 2016.

Wenqi Duan, Fatima Toor, Munir Tanas, Ben Miller, Michael Henry, and Mohammed Milhem, "Virtual Frozen Section Assessment of Surgical Margins in Sarcoma Resection Specimens by Fourier Transform Infrared (FTIR) Spectroscopy", 9th Holden Comprehensive Cancer Center Retreat, 2016.

Finley, Matthew

Presentations

Matthew Finley, Qingyang Su, "Farm Equipment Roadway Study Instrumentation", Statewide Traffic Records Coordinating Committee, Iowa City, IA, 2016.

Hagan, Liam

Awards

- Creative Kick-Start Grant 2016-1017

Kashyap, Satyananda

Publications

"Machine Learning in a Graph Framework for Subcortical Segmentation," Z Guo, S Kashyap, M Sonka, I Oguz, *SPIE Medical Imaging*, 101330H-101330H-7 2017

"Automated Segmentation of Knee MRI Using Hierarchical Classifiers and Just Enough Interaction Based Learning: Data from Osteoarthritis Initiative," S Kashyap, I Oguz, H Zhang, M Sonka International *Conference on Medical Image Computing and Computer-Assisted Intervention*, 2016

"Globally Optimal Label Fusion with Shape Priors," I Oguz, S Kashyap, H Wang, P Yushkevich, M Sonka International Conference on Medical Image Computing and Computer-Assisted Intervention 2016

McClurg, Josiah

Publications

G. Guzun, J. McClurg, G. Canahuate, and R. Mudumbai, ``Power Efficient Big Data Analytics Algorithms Through Low-Level Operations,'' *International Conference on Big Data (IEEE BigData)*, 2016 IEEE, 2016

J. McClurg, R. Mudumbai, and J. Hall, ``Fast Demand Response with Datacenter Loads,'' I*nnovative Smart Grid Technologies (ISGT)*, 2016 IEEE, 2016

Nadeem, Syed Ahmed

Publications
Nadeem, Syed Ahmed,Jin, Dakai, Hoffman, Eric A. & Saha, Punam K., "An Iterative Method for Airway Segmentation Using Multiscale Leakage Detection," *Proc. SPIE 10133, Medical Imaging* 2017: Image Processing, 1013308 (February 24, 2017); doi: 10.1117/12.2254507

Nadeem, Syed Ahmed,Jin, Dakai, Hoffman, Eric A. & Saha, Punam K., "A Novel Iterative Method for Airway Tree Segmentation from CT Imaging Using Multiscale Leakage Detection," *ACCV 2016 Workshops, Part III, LNCS* 10118, pp. 1-15, 2017. DOI: 10.1007/978-3-319-54526-4 4

Presentations
Syed Ahmed Nadeem, " An Iterative Method for Airway Segmentation Using Multiscale Leakage Detection", SPIE Medical Imaging Conference, Orlando, FL, 2017.

Pan, Yue

Publications
Pan Y, Christensen G E, Durumeric O C, et al., "Current-and Varifold-Based Registration of Lung Vessel and Airway Trees," *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops.* 2016: 126-133.

B Zhao, GE Christensen, JH Song, Y Pan, SE Gerard, JM Reinhardt, K Du, T Patton, JM Bayouth, GD Hugo, "Tissue-Volume Preserving Deformable Image Registration for 4DCT Pulmonary Images, Workshop on Biomedical Image Registration 2016 (WBIR)," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2016, pp. 41-49.

Poddar, Sunrita

Publications
S. Poddar, M. Jacob, "Dynamic MRI Using Smoothness Regularization on Manifolds (SToRM)," *IEEE Transactions on Medical Imaging*, vol 35, no 4, April 2016.

S. Poddar, X. Bi, D. Wang, M. Jacob, "A Calibration-Less Approach to Free-Breathing Ungated Cardiac MRI," *ISMRM* 2017, Honolulu, USA.

M. Mani, S. Poddar, V. Magnotta, M. Jacob, "Trajectory Correction of Radial Data using MUSSELS," *ISMRM* 2017, Honolulu, USA.

A. Parekh, S. Poddar, X. Bi, D. Wang, M. Jacob, "Free-Breathing and Ungated Cine MRI Using Joint Smoothness Regularization on Image and Patch Manifolds," *ISMRM* 2017, Honolulu, USA.

S. Poddar, M. Jacob, "Convex Clustering and Recovery of Partially Observed Data," *ICIP* 2016, Phoenix, USA.

- Post-Comprehensive Research Award from the Graduate College at the University of Iowa, Spring 2017

- Trainee Educational Stipend to attend ISMRM 2017

- Best Graduate Poster Award, Iowa Institute of Biomedical Imaging at the Research Open House 2016.

Sermet, Yusuf

Presentations

Villanueva, P., Sermet, Yusuf, Demir, I., "Virtual Stream Stage Sensor Using Projected Geometry and Augmented Reality for Crowdsourcing Citizen Science Applications," American Geophysical Union (AGU) Fall Meeting, December 12-16, 2016, San Francisco, CA, USA.

Demir, I., Sermet, Yusuf, "Knowledge Discovery, Integration and Communication for Extreme Weather and Flood Resilience Using Artificial Intelligence: Flood AI Alpha," American Geophysical Union (AGU) Fall Meeting, December 12-16, 2016, San Francisco, CA, USA.

Sit, M.A., Sermet, Yusuf, Demir, I., "Flood and Weather Monitoring Using Real-time Twitter Data Streams," American Geophysical Union (AGU) Fall Meeting, December 12-16, 2016, San Francisco, CA, USA.

Sermet, Yusuf, Sit, M.A., Demir, I., "Benchmark of Client and Server-Side Catchment Delineation Approaches on Web-Based Systems," American Geophysical Union (AGU) Fall Meeting, December 12-16, 2016, San Francisco, CA, USA.

Yildirim, E., Sermet, Yusuf, Demir, I., "Flood Damage and Loss Estimation for Iowa on Web-Based Systems Using HAZUS," American Geophysical Union (AGU) Fall Meeting, December 12-16, 2016, San Francisco, CA.

Sit, M.A., Sermet, Yusuf, Demir, I., "Real-Time Flood Monitoring and Preparedness Using Twitter Data Streams," 12th Int. Conference on Hydroinformatics (HIC) 2016, August 21-26, 2016, Incheon, South Korea.

Sermet, Yusuf, Demir, I., "Towards a Generalized Knowledge Engine for Disaster Preparedness and Response," 12th Int. Conference on Hydroinformatics 2016, August 21-26, 2016, Incheon, South Korea.

Sermet, Yusuf, Demir, I., "Information Centric Disaster Ontology for Environmental Cyberinfrastructure Systems" 12th Int. Conference on Hydroinformatics (HIC) 2016, August 21-26, 2016, Incheon, South Korea.

Sermet, Yusuf, Sit, M.A., Demir, I., "Real-Time Watershed Delineation on the Client-side Web Applications," The 3rd International Conference on CyberGIS and Geospatial Data Science, July 26-28, 2016, Urbana, IL

Sermet, Yusuf, Demir, I., "Web-Based Knowledge Generation for Early Disaster Response and Recovery," AWWA Annual Conference and Exposition (ACE16), June 20-22, 2016, Chicago, IL, USA.

Chitale, A., Hegeman, J., Sermet, Yusuf, Thirupatti, B., "Towards an IoT Based Concussion Assessment and Impact Analysis Framework," Modern Marvels, May 5, 2016, Iowa City, IA, USA.

Sermet, Yusuf, Demir, I., "Computational Knowledge Engine for Hydrological Systems Using Semantic Web," Iowa Informatics Showcase Symposium, April 22, 2016, Iowa City, IA, USA.

Sermet, Yusuf, Demir, I., "Client-Side GPGPU Web Application for Catchment Delineation and Watershed Segmentation," GPU Technology Conference, April 4-7, 2016, San Jose, CA, USA.

Sermet, Yusuf, Demir, I., Krajewski, W.F., "Automatic Knowledge Generation for Disaster Management

Using Ontology," Iowa Water Conference, March 23-24, 2016, Ames, IA, USA.

Sermet, Yusuf, Demir, I., Krajewski, W.F., "Information Centric Disaster Ontology for Environmental Cyberinfrastructure Systems," Iowa Water Conference, March 23-24, 2016, Ames, IA, USA.

Awards

- 2016 Award, Conference Travel Grant by CyberGIS 16, Support: $800

- 2016 Award, Conference Travel Grant by CGRER, Support: $750 (2)

- 2016 Award, Conference Travel Grant by UI Graduate Student Senate, Support: $500

- 2016 2nd rank in Poster Contest, Iowa Water Conference, Iowa Water Center

- 2016 Elected, Member for Sigma Xi - The Scientific Research Society

- 2016 Innovation Award, Combining IoT with Crowdsourcing for Natural Disasters, HackISU

- 2016 Award, Conference Registration Grant by NVIDIA, Support: $750

- 2016 Best Machine Vision/Object Detection Hack, Holographic Zombie Survival Game using HoloLens HackISU

Shao, Wei

Publications

Wei Shao, Gary E. Christensen, Hans J. Johnson, Joo Hyun Song, Oguz C. Durumeric, Casey P. Johnson, Joseph J. Shaffer, Vincent A. Magnotta, Jess G. Fiedorowicz, and John A. Wemmie. "Population Shape Collapse in Large Deformation Registration of MR Brain Images," *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*, pp. 109-117. 2016.

Tosado, Joel

Awards

- Dimond Scholarship

- Luther H Smith Honorable Service Award

- GAANN Fellowship Spring 2017

Wang, Yichao

Publications

Yichao Wang and David R. Andersen, "First-Principles Study of the Terahertz Third-Order Nonlinear Response of Metallic Armchair Graphene Nanoribbons, *Phys. Rev*. B 93 235430 (2016).

Yichao Wang and David R. Andersen, "Quantum Size Effects in the Terahertz Nonlinear Response of Metallic Armchair Graphene Nanoribbons," *IEEE J. Sel. Topics in Quantum Electronics* 23 5100108 (2017).

Yichao Wang and David R. Andersen, "Third-Order Terahertz Response of Gapped, Nearly-Metallic Armchair Graphene Nanoribbons," *J. Phys.: Condens. Matter* 28 475301 (2016).

Yichao Wang and David R. Andersen, "Nonlinear THz Response of Metallic Armchair Graphene Nanoribbon Superlattices," *J. Phys. D: Appl. Phys*. 49 46LT01 (2016).

Yichao Wang and David R. Andersen, "Nonlinear Response of Metallic acGNR to an Elliptically-Polarized Terahertz Excitation fFeld," *IEEE J. Sel. Topics in Quantum Electronics* 23 5100506 (2017).

MECHANICAL & INDUSTRIAL ENGINEERING

Archer, Lucas

Awards
- Sweigert Graduate Award, 2016-2017

Butler, Sy

Awards
- Creative Kick-Start Grant Recipient 2016-1017

Chen, Howard

Publications
Schall Jr, M. C., Cullen, L., Pennathur, P., Chen, H., Burrell, K., & Matthews, G. (2017), "Usability Evaluation and Implementation of a Health Information Technology Dashboard of Evidence-Based Quality Indicators," *CIN: Computers, Informatics, Nursing*.

Presentations
Chen, H., "Using Inertial-Based Motion Capture Systems in Workplace Environments," Auburn Industrial Engineering Graduate Seminar (Invited Lecture). 2017 January 11; Auburn, AL.

Chen, H., Schall Jr., M.C., Fethke, N.B., "Characterizing Errors of Inertial Measurement Units," National Occupational Research Agenda (NORA) Symposium; 2016 May 4, Minneapolis, MN

Chen, H., Schall Jr., M.C., Fethke, N.B., "Characterizing Operable Conditions of Inertial Measurement Units: Preliminary Results," 1st Annual Occupational Health and Safety Research Conference. 2016 April 1; Iowa City, IA.

Awards
- Liberty Mutual-Harvard School Of Public Health Post-Doctoral Fellowship In Occupational Injury And Disability Research

Esmaeilpour, Mehdi

Publications
Mehdi Esmaeilpour, J. Ezequiel Martin, and Pablo M. Carrica, "Near-Field Flow of Submarines and Ships Advancing in a Stable Stratified Fluid," *Ocean Engineering*, Volume 123, 1 September 2016, Pages 75-95.

Martin, J. E., Esmaeilpour, M., and Carrica, P. M., 2016, "Near-Field Wake of Surface Ships and Submarines Operating in a Stratified Fluid," *31st Symp. Naval Hydrodyn*., Monterey, CA.

Mehdi Esmaeilpour, J. Ezequiel Martin, and Pablo M. Carrica., "Computational Fluid Dynamics Study of the Dead Water Problem," *Journal of Fluids Engineering*, Under review.

Feldmeier, Chris

Publications

Nakajima, T., Feldmeier, C. and Sugiyama, H., 2016, "Flexible Moving Track Model for Curve Negotiation Analysis of Railroad Vehicles with Rail Roll Deflection," *IMechE Journal of Multi-Body Dynamics*, Vol. 230, pp. 85-98.

Feldmeier, C., Li, H., Yamazaki, Y., Kato, T., Fujimoto, T., Kondo, O. and Sugiyama, H., 2016, "Profile Wear Prediction Using Multi-Hertzian Contact Approach and Experimental Validation," *Proceedings of Asian Conference on Multibody Dynamics*, Kanazawa, Japan.

He, Yusen

Publications
Y. He, A. Kusiak, and T. Ouyang, "Data-Driven Modeling of Truck Engine Exhaust Valve Failures: A Case Study," *Journal of Mechanical Science and Technology*. In Press.

T. Ouyang, A. Kusiak, and Y. He, "Modeling Wind-Turbine Power Curve: A Data Partitioning and Mining Approach," *Renewable Energy*, Vol. 102 (Part A), 2017, pp. 1-8.

T. Ouyang, A. Kusiak, and Y. He, "Predictive Model of Yaw Error in a Wind Turbine," *Energy*, Vol. 123, No. 1, 2017, pp. 119-130.

Ismail, Abdulrahman

Awards
- Creative Kick-Start Grant 2016-1017

Li, Huaxia

Awards
- Sharada Devi Planjery Memorial Graduate Award in Mechanical Engineering

Moon, Minyeong

Awards
- Rajyalakshmi & Shankar N Planjery Memorial Graduate Award in Mechanical Engineering

Powell, Jaemin

Presentations
Presentation on Bicycle Simulator Research, Wellman Rotary Club in Wellman, Iowa on February 8th: "The Design of an Electro-Mechanical Bicycle for an Immersive Virtual Environment"

Regan, David

Awards
- Creative Kick-Start Grant 2016-1017

Rojas-Murillo, Salvador

Publications

Thomas GW, Rojas-Murillo S, Hanley JM, Kreiter CD, Karam MD, Anderson DD., "Skill Assessment in the Interpretation of 3D Fracture Patterns from Radiographs," https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC4910797/

Rojas-Murillo S, Kreiter CD, Hanley JM, Karam MD, "Assessing the Effect of Top-Down Information in the Generation of Three-Dimensional Mental Models from the Observation of Tibia Plateau Radiographs," Vision Research Journal (Submitted)

Presentations
"Identification of Object Features - Edges, Landmarks and Textures That Visually Guide an Assembly Process In Real and Virtual Environments," Invited Lecture Coe College, February 2017

"Assessing the Effect of Top-Down Information in the Generation of Three-Dimensional Mental Models from the Observation of Tibia Plateau Radiographs," Invited lecture Cornell College Fall 2016

Awards
- Research grant from the Graduate & Professional Student Government, The University of Iowa Fall 2016

Salehi, Hamed

Publications
Hamed Salehi, Priyadarshini R. Pennathur, Laura M. Cullen, Lister N. Onsongo, Toni Tripp-Reimer, Michele M. Farrington, "Traffic Patterns of Nurses During Pain Management for Post-Op Patients," Orlando, Florida: *Applied Human Factors and Ergonomics (AHFE)*, August 2016.

Hamed Salehi, Alexis Wickersham, Aparna Kamath, and Priyadarshini Pennathur, "Benefits and Barriers in Smartphone Use for Clinical Communication," Baltimore, Maryland: *Human Factors and Ergonomics Society HFES*, April 2015.

NewsPaper article published in 2016: Hamed Salehi, "Caspian Airlines Flight 7908 Accident, Turbine Disc Fatigue, Maintenance Quality and Crew Management," T*he Khodnevis*, 2016

Presentations
Hamad Salehi, Amirmasoud Momenipour, Priyadarshini Pennathur, "Cognitive Decline, Work and Technology Use: Exploring the Relationship," Iowa City: Research Open House, University of Iowa, Iowa March 2015.

Awards
- Research Open House 2015 2nd place Popular Choice Award

Sun, Zhiyu

Publications
Baek, S., Sun, Z., Mate, S.S., (2016), "Development of Full-Resolution Anthropometric Human Models Based on Nonlinear Statistical Shape Analysis," *7th International Conference of Applied Human Factors and Ergonomics*.

Volpi, Silvia

Publications

Stern, F., Volpi, S., Gaul, N.J., Choi, K.K., Diez, M., Broglia, R., Durante, D., Campana, E. and Iemma, U., "Development and Assessment of Uncertainty Quantification Methods for Ship Hydrodynamics," *55th AIAA Aerospace Sciences Meeting*, Grapevine, TX, USA, 9-13 January 2017.

Volpi S., Diez M., Sadat-Hosseini H., Kim D.-H., Stern F., Thodal R.S., Grenestedt J.L., "Full-Scale Fluid-Structure Interaction Simulation and Experimental Validation of High-Speed Planing-Hull Slamming with Composite Panels," *Proceedings of the 31st Symposium on Naval Hydrodynamics,* Monterey, CA, USA, 11-16 September 2016.

Diez, M., Serani, A., Campana, E.F., Volpi, S. and Stern, F., "Design Space Dimensionality Reduction for Single- and Multi-Disciplinary Shape Optimization," *17th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Washington DC, USA, 13-17 June 2016.

Presentations
Silvia Volpi, "Full-Scale Fluid-Structure Interaction Simulation and Experimental Validation of High-Speed Planing-Hull Slamming with Composite Panels," 31st Symposium on Naval Hydrodynamics, Monterey, CA, USA, 11-16 September 2016.

Awards
• Dr. Richard B. Stewart Thermal-Fluids Graduate Scholarship; The University of Iowa

Wang, Qinghua

Publications
Shuangyu Liu, Shixian Chen, Qinghua Wang, Yanqing Li, Hong Zhang, Hongtao Ding, "Analysis of Plasma Characteristics and Conductive Mechanism of Laser Assisted Pulsed Arc Welding," *Optics and Lasers in Engineering*, 92: 39-47.

Baoqing Zhang, Qinghua Wang, Ninggang Shen, Hongtao Ding, "Experimental Investigation and Numerical Analysis of Mechanical Ruling for an Aluminum Coated Diffraction Grating," *ASME Journal of Manufacturing Science and Engineering*, 139: 021003, doi:10.1115/1.4034282.
Ninggang Shen, Hongtao Ding, Qinghua Wang, Hua Ding, "Effect of Confinement on Surface Modification for Laser Peen Forming without Protective Coating," *Surface and Coating Technology*, 289: 194-205, doi: 10.1016/j.surfcoat.2016.01.054.

Qinghua Wang, Baoqing Zhang, Ninggang Shen, Hongtao Ding, "Mechanical Ruling of Diffraction Grating Part I: Aluminum Film Preparation and Characterization," *2016 ASME Manufacturing Science and Engineering Conference (MSEC 2016)*, June 27-July 1, 2016, Blacksburg, Virginia, USA, MSEC 2016-8713.

Qinghua Wang, Ninggang Shen, Baoqing Zhang, Hongtao Ding, "Mechanical Ruling of Diffraction Grating Part II: Experimental Investigation and Numerical Simulation," *2016 ASME Manufacturing Science and Engineering Conference (MSEC 2016)*, June 27-July 1, 2016, Blacksburg, Virginia, USA, MSEC 2016-8715.

Presentations
Qinghua Wang, Ninggang Shen, Baoqing Zhang, and Hongtao Ding, "A Numerical Analysis of Mechanical Ruling Process for Diffraction Gratings," College of Engineering 14th Annual Research Open House, University of Iowa, April 7th, Iowa City, IA, USA.

Watkins, Michael

Awards
- Creative Kick-Start Grant Recipient 2016-1017

Weger, Nathaniel

Awards
- ASCO Automation Scholarship
- Grand Challenges Scholarship
- Honors Fellows Scholarship
- Dean's List
- Provost Scholarship
- Iowa Scholars Award
- Old Gold Scholarship

Williams, Thomas

Awards
- Sharada Devi Planjery Memorial Graduate Award in Mechanical Engineering

Zang, Guiyan

Awards
- Venkatachalam Memorial Graduate Award in Mechanical Engineering

LIST OF SCHOLARSHIP & FELLOWSHIP RECIPIENTS 2016-2017

Name	**Department**	**Scholarship/Fellowship**
Abdioskouel, Maryam	Civil & Environmental Engineering	Advanced Study Program (ASP) Summer Colloquium Fellowship Cooperative Institute for Climate Science (CICS) Summer Fellowship
Alshamary, Haider	Electrical & Computer Engineering	UI Graduate College Ballard and Seashore Dissertation Fellowship
Archer, Lucas	Mechanical & Industrial Engineering	Sweigert Graduate Fellowship
Black, Ellen	Civil & Environmental Engineering	Neil B. Fisher Fellowship
Boesen, Aaron	Chemical & Biochemical Engineering	Koch Undergraduate Teaching Fellow
Bozograd, Ashkan	Civil & Environmental Engineering	R.F. and H.W. Poston Scholarship
Chen, Howard	Mechanical & Industrial Engineering	Liberty Mutual-Harvard School Of Public Health Post-Doctoral Fellowship In Occupational Injury And Disability Research
Cho, Myung	Electrical & Computer Engineering	Earn While You Learn Scholarship
Corrigan, Rae Ann	Biomedical Engineering	Barry M. Goldwater Scholarship Basil and Mildred Deegan Scholarhship
Countryman, Alec	Chemical & Biochemical Engineering	Iowa Space Grant Consortium Scholarship
Davidson, Lauren	Electrical & Computer Engineering	Kurtz Senior Merit Scholarship Iowa Heritage Scholarship UI Old Gold Scholarship UI National Scholarship
Delcau, Michael	Chemical & Biochemical Engineering	NIH/CBB Fellowship in Biotechnology Training
Do, Anh-Vu	Chemical & Biochemical Engineering	Iowa Space Grant Consortium Fellowship
El-Hattab, Mariam	Biomedical Engineering	Philip G. Hubbard Uncommon Leadership Award
Gerard, Sarah	Biomedical Engineering	Iowa Space Grant Consortium Fellowship
Giles, Katie	Chemical & Biochemical Engineering	UI ICRU Fellowship
Hammond, Emily	Biomedical Engineering	UI Graduate College Ballard and Seashore Dissertation Fellowship
Herkert, Nicholas	Civil & Environmental Engineering	William W. Kersten-IWPCA Scholarship Environmental Engineering and Science Program

Janechek, Nathan	Chemical & Biochemical Engineering	UI Graduate College Ballard and Seashore Dissertation Fellowship Vetter Service Award
Kaalberg, Sara	Chemical & Biochemical Engineering	James Osborn (Teaching & Mentoring) Graduate Award
Kalantari, John	Biomedical Engineering	R.F. and H.W. Poston Scholarship
King, Benjamin	Chemical & Biochemical Engineering	Graduate College Summer Fellowship
Knapp, Eric	Chemical & Biochemical Engineering	UI ICRU Fellowship
Lehman, Jacob	Civil & Environmental Engineering	Daniel Mead Ethics Paper Scholarship
Li, Huaxia	Mechanical & Industrial Engineering	Sharada Devi Planjery Memorial Graduate Award
Mattson, Rebecca	Civil & Environmental Engineering	Iowa Space Grant Consortium Fellowship
Moon, Minyeong	Mechanical & Industrial Engineering	Rajyalakshmi & Shankar N Planjery Memorial Graduate Award
Muerdter, Claire	Civil & Environmental Engineering	Wayne L Paulson Scholarship
Nicholson, John	Civil & Environmental Engineering	UI Graduate College Ballard and Seashore Dissertation Fellowship
Rendleman, Micahel	Biomedical Engineering	UI National Scholars Award
Ricker, Erica	Chemical & Biochemical Engineering	UI Graduate College Ballard and Seashore Dissertation Fellowship
Schroer, Hunter	Civil & Environmental Engineering	American Chemical Society Environmental Chemistry Division Student Award
Scott, Ryan	Civil & Environmental Engineering	Daniel Mead Ethics Paper Scholarship
Sohani, Negin	Chemical & Biochemical Engineering	Graduate College Summer Fellowship
Tosado, Joel	Electrical & Computer Engineering	Dimond Scholarship GAANN Fellowship
Volpi, Silvia	Mechanical & Industrial Engineering	Dr. Richard B. Stewart Thermal-Fluids Graduate Scholarship
Webb, Danielle	Civil & Environmental Engineering	Wayne L Paulson Scholarship
Weger, Nathaniel	Mechanical & Industrial Engineering	ASCO Automation Scholarship Grand Challenges Scholarship Honors Fellows Scholarship Provost Scholarship Iowa Scholars Award Old Gold Scholarship

Weis, Adam	Chemical & Biochemical Engineering	National Academy of Engineering Grand Challenges Scholarship
Williams, Thomas	Mechanical & Industrial Engineering	Sharada Devi Planjery Memorial Graduate Award
Zang, Guiyan	Mechanical & Industrial Engineering	Venkatachalam Memorial Graduate Award
Zarei, Kasra	Biomedical Engineering	Iowa Space Grant Consortium Fellowship

THE UNIVERSITY OF IOWA

College of Engineering

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