Celebrating Graduate Research

GRADUATE RESEARCH INNOVATION EXCHANGE (GRIE)

Annual Graduate Research Poster Celebration

Tuesday, April 9, 2019

Rubin Campus Center, Upper Level

ABSTRACT BOOKLET

wpi.edu/+gradresearch

WPI

WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Narges Ahani

Poster Title (100 characters or less): Placement Optimization in Refugee Rese

Abstract (1,000 characters or less):

Every year thousands of refugees are resettled to dozens of host countries, and there is growing evidence that the initial placement of refugee families profoundly affects their lifetime outcomes. Our research combines techniques from operations research, machine learning, econometrics, and interactive visualization to create the interactive software tool, Annie MOORE (Matching and Outcome Optimization for Refugee Empowerment). Annie is the first software designed for resettlement agencies to recommend data-driven, optimized matches between refugees and local affiliates while respecting refugee capacities. Initial back-testing indicates that Annie can improve short-run employment outcomes by 22%-37%. Future research directions include dynamic pipeline and quota management, incorporating preferences of refugees and local communities, and further software customizations.

Level (Master's or Ph.D.): Ph.D.

Department: Data Science

Advisor: Professor Andrew Trapp

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

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Full Name: Salah Ahmed

Poster Title (100 characters or less): High-Performance Event Trend Detection Using Compute Clusters

Abstract (1,000 characters or less):

Many stream-based applications from stock trend analytics to check fraud discovery involve the detection of sequence patterns over high-volume event streams. The process of finding complex sequence trends specified by the Kleene closure pattern query is NP hard in terms of both CPU time and memory consumption. To tackle this difficult challenge, we design Compact Event Stream (CES) that encodes the core relationships among incoming events imposed by the sequence pattern query into a compact graph structure. We investigate four different algorithms: Iterative Join, Vertical Partitioning, Horizontal Slicing and Graphx Pregel, for computing all longest event sequences and for finding their effectiveness in distributed environment. In the Apache Spark compute cluster, the Vertical Partitioning with a robust optimizer for load balancing is found to be the best, which processed over billions of trends and outperformed other algorithms by a factor of four or more.

Level (Master's or Ph.D.): Ph. D

Department: Computer Science

Advisor: Elke A. Rundensteiner

List co-advisors if any (separate with a comma):

Mohamed Y. Eltabakh

List co-authors if any (separate with a comma):

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Arsalan Akhter

Poster Title (100 characters or less): Multi-Robot Task Traversal with Fuel Constrained Robots and a Mobile Charger Robot

Abstract (1,000 characters or less):

We consider the problem of visiting tasks in a Euclidean space using multiple worker robots. These worker robots are fuel constrained. A charger robot attempts to keep all the worker robots charged so that the worker robots could keep operating. The goal is to maximize the operation time of worker robots as well as to visit as many tasks as possible. We explore different policies that can be employed to achieve the above goal.

Level (Master's or Ph.D.): PhD

Department: Robotics Engineering

Advisor: Carlo Pinciroli

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

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Full Name: Rameez Ali

Poster Title (100 characters or less): Design and syntheses of phomoxanthone A analogs as anticancer agents

Abstract (1,000 characters or less):

The mycotoxin phomoxanthone A is a dimeric tetrahydroxanthone that shows impressive anticancer activities in both cisplatin-sensitive and cisplatin-resistant cell lines. Compared to healthy cells, phomoxanthone A induces apoptosis in Jurkat cancer cells with 120-fold more selectivity. Despite these remarkable properties, no structure-activity relationship (SAR) has been done to identify the pharmacophore present in phomoxanthone A. One of the biggest reasons for the absence of such studies on phomoxanthone A is the lack of efficient methods to synthesize these highly complex molecules. In order to fill this gap, we have invented efficient routes to rapidly prepare a diverse library of phomoxanthone A analogs. Compounds prepared in this manner were then tested for the anti-cancer activities in Jurkat cells. Using results of these studies, we have identified some of the major structural features present in phomoxanthone A that are responsible for its remarkable anti-cancer activities.

Department: Chemistry and Biochemistry

Advisor: Prof. Anita E. Mattson

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Anita E. Mattson

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GRIE Abstract Form

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Full Name: Habibeh Ashouri Choshali

Poster Title (100 characters or less): The Effects of Mechanical Stress on the Collective Cell Behavior on Micropatterned Substrates

Abstract (1,000 characters or less):

Acto-myosin machinery of the cell creates contractile forces which results in stress and strain fields within the cell aggregate. Recent evidences propose that the mechanical stresses regulate collective cell behavior including cell migration, cell differentiation, apoptosis and cell proliferation. However, it still remains unclear what is the exact mechanical signal that leads to local tissue pattern formation. This work explores the effect of substrate shape, stiffness and cell monolayer inhomogeneity on the collective cell behavior both numerically by finite element modeling (FEM) and experimentally by measuring the traction forces. It is observed that the maximum principal stress predicted by FEM in the cell layer, is inversely proportional to the patterns of proliferation. The results suggest a non-constant material property for the cell monolayer in a way that the contractility decreases when moving towards the center of the cell layer.

Level (Master's or Ph.D.): Ph.D.

Department: Civil and Environmental Engineering

Advisor: Nima Rahbar

List co-advisors if any (separate with a comma):

Kristen L Billiar

List co-authors if any (separate with a comma):

Heather A Cirka, Zachary Goldblatt

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GRIE Abstract Form

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Full Name: Jonathan Attard

Poster Title (100 characters or less): Thioureas, Squaramides, and Silanediols: Comparing Anion Preferences in Enantioselective Catalysis

Abstract (1,000 characters or less):

Thioureas, squaramides, and silanediols have all been utilized in enantioselective reactions likely proceed through an anion binding mechanism. In selected reactions, striking differences in enantioselectivities were observed by simply modifying the counter ion in the ion pair intermediate, as well as by modifying the class of catalyst. Apparently, different classes of catalysts preferred different anions for maximum enantioelectivity. We attempt to explain this interesting divergence in anion preference by comparing the binding constants of representative members of each catalyst class with enantioselectivities obtained. We observed that the association constant (K11) between catalyst and anion does not always correlate to enantioselectivity. Maximum enantioselectivity is obtained when silanediol is paired with triflate, whereas thioureas and squaramides work best with chloride. The association constants for Cl- and OTf- followed the trend squaramide > thiourea > silanediol.

Department: Chemistry and Biochemistry

Advisor: Anita Mattson

List co-advisors if any (separate with a comma):

Shin-ichi Kondo

List co-authors if any (separate with a comma):

Kohei Osawa, Yong Guan, Jessica Hatt

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Shima Azizi

Poster Title (100 characters or less): Improving Community Paramedicine via Data Driven Optimization

Abstract (1,000 characters or less):

Community paramedicine is a recent healthcare innovation that enables proactive visitation, often as follow-up visitations shortly after Emergency Department (ED) discharge. To date there appears to be little treatment of the concept from an analytical viewpoint. To this end, we purpose to reduce ED costs and increase patient welfare via a data-driven optimization approach. We develop patient visitation priorities based on disease acuity from real data, and use this information in our optimization model to both select patients and route healthcare providers to visit them in manner that maximizes overall patient welfare. We conclude by discussing computational findings.

Level (Master's or Ph.D.): Ph.D.

Department: Business Administration

Advisor: Andrew C. Trapp

List co-advisors if any (separate with a comma):

Renata Konrad,Sharon Johnson, Brenton Faber

List co-authors if any (separate with a comma):

Renata Konrad,Sharon Johnson, Brenton Faber

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Full Name: Avery Brown

Poster Title (100 characters or less): Changes in the chemical structure of hydrothermal chars during Raman Spectroscopy

Abstract (1,000 characters or less):

Hydrothermal carbonization is technique for the valorization of biomass. Allowing us to produce adsorbents, possible catalysts and solid fuels from waste biomass in a single step. Raman spectroscopy is a tool for the characterization of the chemical bonds, carbon structure, and chemical functionality of these materials. In this work we challenge the traditional convention of Hydrochar Raman spectra by demonstrating that hydrochar undergoes a change in its chemical structure during Raman characterization.
We have determined the change in temperature that our carbon samples undergo during Raman spectroscopy and developed a technique to counteract them. By producing Potassium Bromide pellets of our char samples we increase their thermal conductivity. By applying our own fitting method to the new Raman spectra obtained using KBr pellets we characterize hydrothermal chars produced at reaction times ranging from 4 hours to 24 hours based on furan/arene sub-groups.

Level (Master's or Ph.D.): PhD

Department: Chemical Engineering

Advisor: Michael Timko

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Lucia Carichino

Poster Title (100 characters or less): Effect of Biochemical Signaling, Proximity to a Wall and Pairing on Sperm Motility

Abstract (1,000 characters or less):

Sperm are navigating in a complex three-dimensional (3D) fluid environment in order to achieve fertilization. Sperm trajectories can vary form planar to quasi-planar, and to helical, depending on the species, on the external fluid properties and on the proximity to walls. Biochemical signaling along the sperm flagellum, such as changes in calcium, regulates trajectories and flagellum beat patterns. We propose a fluid-structure interaction model of the sperm flagellum 3D motion in a Newtonian viscous fluid that accounts for (a) the calcium dynamics in the flagellum, (b) the interaction of the sperm cell with a planar wall, and (c) the interactions between two sperm cells. The model is used to investigate the effect of (a), (b) and (c) on the 3D emergent trajectories, compared to the planar (2D) case. Results show a similar behavior next to a wall comparing 3D to 2D motility, however calcium coupling effect and sperm-pairing seem to be influenced by considering 2D or 3D motility.

Department: Mathematical Sciences

Advisor: Sarah Olson

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Sarah Olson (Department of Mathematical Sciences, WPI)

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Full Name: Paulo Carvalho

Poster Title (100 characters or less): Towards MRI Compatible Electrical Actuation for Surgical Devices

Abstract (1,000 characters or less):

Intra-operative medical imaging based on magnetic resonance imaging (MRI) coupled with robotic manipulation of surgical instruments enables precise feedback-driven procedures. Electrically powered non-ferromagnetic motors based on piezoelectric elements have shown to be well suited for MRI robots. However, even avoiding ferrous materials, the high metal content on commercially available motors still cause distortions to the magnetic fields. We study, design and evaluate custom piezoelectric actuators and drivers to mitigate the effects of the motors on image quality.

Level (Master's or Ph.D.): Ph.D.

Department: Robotics Engineering

Advisor: Gregory Fischer

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Cristopher Nycz, Katie Gandomi

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Full Name: Simone Cassani

Poster Title (100 characters or less): A cellular automaton model of cartilage regeneration

Abstract (1,000 characters or less):

Articular cartilage (AC) is a connective tissue that covers articular joints to provide a surface that allows bones to slide over each other, and absorb shocks. AC is composed of a dense extracellular matrix (ECM), including fluid, a collagen network, and proteins, and chondrocytes (cells). Nutrients and oxygen are provided via diffusion through the ECM. Pathologies, injuries and normal wear and tear cause the erosion and damage of AC. Cartilage is produced in vitro to be implanted at the site of the damage to restore normal functionality. A mathematical model is used to investigate the phenomena of AC growth in a tissue-engineered construct to elucidate the influence of different biological factors, such as scaffold porosity and sensitivity to porosity. The model couples a discrete approach for the chondrocytes, described using an off-lattice cellular automaton model, with a continuous phenomenological approach for the other components of the matrix and nutrients.

Department: Mathematical Sciences

Advisor: Sarah Olson

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Sarah Olson

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Full Name: Jenny Yun-Chen Chan

Poster Title (100 characters or less): Experience with a Dynamic Algebra Notation System Predicts Students' Algebra Performance

Abstract (1,000 characters or less):

Algebra is a foundation for higher mathematics, yet many students struggle with algebra notation. We developed Graspable Math (GM), a web-based tool that allows students to explore algebra symbols as tangible objects, and found that experience with GM is associated with better algebra performance in middle-school students. Here, we further explore how three aspects of student behavior within GM, (a) problem-solving duration, (b) error rate, and (c) number of actions taken per math problem, are related to students' algebra performance. We found that students' problem-solving duration and error rate, but not the number of actions taken, in GM predict their later algebra performance above and beyond their knowledge in algebra before using GM. Students who took less time or made fewer errors during problem-solving in GM performed better on an algebra test after using GM. The findings suggest that aspects of behavior in GM may be differentially related to students' algebraic skills.

Department: Learning Sciences & Technologies; SSPS

Advisor: Erin Ottmar

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Taylyn Hulse, Katharine Sawrey, Erin Ottmar

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Full Name: Kavin Chandrasekaran

Poster Title (100 characters or less): Postural Activity Transition Monitoring for Healthcare Assessments

Abstract (1,000 characters or less):

A variety of health conditions like infections and TBI(Traumatic Brain Injury), can affect a person's mobility. The level of mobility impairment can range from a discomfort while performing certain activities like standing up from while sitting in a chair, to inability to perform such activities. In our DARPA WASH project we are trying identify bio-markers that can indicate a person's change in mobility through their smartphone sensors. We chose the time taken to transition between various postures like laying down, sitting and standing, as a way to quantify mobility. In order to measure the time, we needed to accurately identify the postural states and transitions. We use the data collected from the smartphone's accelerometer and gyroscope sensors. In our approach, we use a two step approach to classify the transitions. We first use a Bidirectional GRU model to classify if the person is in one of the postures or if they are in a transition between postures. We then classify the postural transitions based on the postures prior to and after the transitions. We use the sampling frequency of the sensor and the number data points to calculate the time taken during each type of postural transition. We compare the efficacy of various machine learning techniques in classifying different postural activities and transitions.

Level (Master's or Ph.D.): Ph.D

Department: Data Science

Advisor: Prof. Emmanuel Agu, Prof. Elke Rundensteiner

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Haowen Zhu, Jiaming Di, Lei Shi, Mo Cheng

Poster Title (100 characters or less): Clinical Supply Chain Shipment Profiling

Abstract (1,000 characters or less):

Pfizer is one of the world's premier biopharmaceutical companies in the world. The Global Clinical Supply(GCS) of Pfizer ships clinical supplies to investigational sites on a routine basis and IRT system will efficiently deploy the drug shipment. Each individual protocol has a unique and isolated IRT arrangement so that for most shipments from vendor to site, it mainly includes only one protocol. However, some of the shipments are delivered to a common destination, though there is no current linking of those destinations between the isolated IRT protocols.That may lead to some unnecessary waste for the company. Our Team aims to find the duplicate sites in the current process and evaluate the cost saving if aggregating the protocols into less shipments. We deal with the address data, and evaluate the saving by the number of shipment saving in multiple time spans and aggregate the shipment with same vendor and same site.

Level: Master's

Department: Data Science

Advisors: Prof. Chun-Kit Ngan & Prof. Fatemeh Emdad

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GRIE Abstract Form

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Full Name: Shou-Shan Chiang

Poster Title (100 characters or less): Unconstrained and Calibration-Free Gaze Estimation

Abstract (1,000 characters or less):

Gaze estimation has promise for seamless human-robot interaction. Many studies have been undertaken on head pose-invariant and calibration-free gaze estimation. However, the methods and existing data sets focus on the scenario where the users are close to the camera. In this human-robot interaction scenario, the users are required to keep a distance from the robot, and the bandwidth of the sensor data transmission is also limited. The head positions are further away from the camera, and the resolution of the eye images are lower than in the conventional data set. To confront this issue, we proposed a method based on edge gradients for iris tracking, which achieves robust gaze estimation at low resolution images. We implemented this method on the humanoid robot "r1", which can interact with human by following the gaze in real time.

Department: Robotics Engineering

Advisor: Cagdas Denizel Onal

List co-advisors if any (separate with a comma):

Lorenzo Natale, Giorgio Metta

List co-authors if any (separate with a comma):

Elisa Maiettini, Vadim Tikhanoff

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GRIE Abstract Form

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Full Name: Hee June Choi

Poster Title (100 characters or less): HACKSing the heterogeneity of cellular motion

Abstract (1,000 characters or less):

Cell protrusion is morphodynamically heterogeneous at the subcellular level. However, the mechanism of cell protrusion has been understood based on the ensemble average of actin regulator dynamics. Here, we establish a computational framework to deconvolve the subcellular heterogeneity of lamellipodial protrusion from live cell imaging. HACKS (deconvolution of Heterogeneous Activity in Coordination of cytosKeleton at a Subcellular level) identifies distinct subcellular phenotypes based on machine-learning algorithms and reveals their underlying actin regulator dynamics at the leading edge. Using our method, we discover ‘accelerating protrusion’ and 'bursting protrusion' which is driven by previously unknown temporal coordination of Arp2/3 and VASP activities. We validate our finding by drug treatment assays and further identified fine regulation of Arp2/3 and VASP recruitment associated with accelerating protrusion.

Level (Master’s or Ph.D.): PostDoc (Research Scientist)

Department: Biomedical Engineering

Advisor: Kwonmoo Lee

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

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Full Name: Joseph Collins

Poster Title (100 characters or less): Third-Generation Sequencing of Non-Conventional Yeasts

Abstract (1,000 characters or less):

Non-conventional yeasts with attractive metabolisms have the potential to replace the model yeast S. cerevisiae. However, non-conventional yeasts lack high-quality genomic and phenotypic data, genome editing tools, and parts like promoters and terminators. A high-quality genome is the key to transcriptomics, synthetic biology, and metabolic engineering in these yeasts. New inexpensive sequencers, like the Oxford Nanopore MinION and the Illumina iSeq platform, enable distributed, fast acquisition of sequence. Furthermore, new processing algorithms enable fast assembly of high quality genomes. This is essential as sequencing is becoming ever more prevalent in research workflows across disciplines. To this end, we developed an integrated pipeline consisting of trimming, assembly, and Illumina iSeq polishing of sequencing data from the MinION. We then apply this pipeline to the non-conventional yeasts Y. lipolytica, K. marxianus, D. hansenii, and X. dendrorhous.

Level (Master's or Ph.D.): Ph.D.

Department: Chemical Engineering

Advisor: Eric Young

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

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Full Name: Jacob Crislip

Poster Title (100 characters or less): Engineering Dynamics into Zeolite Crystallization.

Abstract (1,000 characters or less):

Despite versatility in industrial applications and more than half a century of research, the zeolite crystallization mechanism remains a mystery. Chemists have been limited by classical synthesis techniques. This inefficient batch process demands extreme temperatures and pressures, expensive structure-directing agents, and hazardous treatment of solvent waste. The classical approach neglects key control variables associated with transport phenomena, thermodynamics, and reaction kinetics leading to unnecessary variability and suboptimal crystallization performance. Conflicting characterization data show strong evidence for two leading theories: classical direct monomer addition or non-classical indirect aggregation then restructuring of crystalline subunits. This fresh, radical approach for reactor design, specifically a continuous process, is essential for understanding the physics and chemistry that drive zeolite crystallization.

Level (Master's or Ph.D.): PhD

Department: Chemical Engineering

Advisor: Andrew Teixeira

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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Full Name: Elizabeth A. Crowley

Poster Title (100 characters or less): Loss of pRB promotes genomic instability

Abstract (1,000 characters or less):

Most human cancers exhibit inactivation or loss of the retinoblastoma protein (pRB). Loss of pRB promotes DNA damage and mitotic chromosome missegregation. However, the mechanism by which pRB regulates these aspects of genome stability, and the relationship between mitotic DNA damage and compromised chromosome segregation remain unclear. My initial work to define the origin of mitotic DNA damage indicates that pRB–deficient cells have an intact G2/M DNA damage checkpoint, preventing mitotic entry when damage is present. Also, upon mitotic arrest, cells lacking pRB acquire additional damage. Together these findings suggest mitotic DNA damage is generated de novo following pRB loss and does not result from lesions earlier in the cell cycle. This finding is important as it indicates that, even in the presence of checkpoints, pRB loss compromises genomic integrity. My ongoing work will define the mechanism by which pRB-dependent regulation of chromatin protects against mitotic DNA damage.

Level (Master's or Ph.D.): PhD

Department: Biology and Biotechnology

Advisor: Dr. Amity Manning

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Dr. Amity Manning

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GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Claire Danaher, Xinye Fan, Satish Rajendran, Mihir Sawant

Poster Title (100 characters or less): Structuring the Unstructured: Natural Language Ar

Abstract (1,000 characters or less):

Kronos is a company which specializes in providing workforce management solutions to over 40,000,000 people from 30,000 customers in over 100 countries worldwide. To support both Kronos staff and customers, Kronos maintains a knowledge base(KB) of articles with documentation to support the use of their products and services. The WPI team was tasked with analyzing the unstructured language data stored within the KB. Using natural language processing and machine learning techniques, coherent terminological themes and relationships contained within the corpus were extracted. Advanced visualization techniques were used to express the story unearthed from the data.

Level: Master's

Department: Data Science

Advisors: Professor Fatemeh Emdad and Professor Chun-Kit Ngan

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Full Name: Francis Darmont Araya

Poster Title (100 characters or less): Development of a Mechatronic Tongue

Abstract (1,000 characters or less):

The objective of this project is to develop a mechatronic tongue that will mimic the deglutition motion (swallowing motion) of the human tongue. This development seeks to mitigate and fulfill the technological needs of industries as psychology, education, speech pathology, creative arts and medicine. Specific focus is being laid on designing a system that improves the rehabilitation efforts of total glossectomy patients who have undergone aggressive surgical procedures limiting their ability to swallow, eat and speak. Through detailed axiomatic design methods, simulation and prototyping, a scaled workable version of the actual tongue prosthetic will be developed. Recommendations will be provided for future model improvements and considerations.

Level (Master's or Ph.D.): Master's

Department: Mechanical Engineering

Advisor: Pradeep Radhakrishnan

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Dharini Dutia

Poster Title (100 characters or less): Multi-Robot Task Planning with Space-Time Constraints for Coordination Tasks

Abstract (1,000 characters or less):

Self-organization in multi-robot systems is mainly described by the coordination among robots. Multi-robot coordination tasks require simultaneous task allocation, team formation and scheduling, to be solved optimally. We consider a task planning problem with varying task complexity, uncertain execution time and static tasks with temporal dynamics. A complete mixed integer linear programming (MILP) model for this problem is presented and criticized. This work focuses on spatially organizing tasks with applications in foraging, clustering, construction, and exploration.

Level (Master's or Ph.D.): Master's

Department: Robotics Engineering

Advisor: Prof. Carlo Pinciroli

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Elizabeth English

Poster Title (100 characters or less): Wound Healing: Skinach as Platform for Tissue Engineered Skin

Abstract (1,000 characters or less):

A critical limitation to current skin substitutes is the absence of robust internal vascular networks for effective transfer of nutrients and gas. Recently, we have developed decellularized spinach leaves as a vascularized, biocompatible scaffold. By functionalizing these scaffolds with coatings of poly-l-lysine (PLL), type I collagen, or RGD peptide, we can guide cell attachment for neonatal human keratinocytes and thus create Skinach. Confocal images showed these surfaces promoted the adhesion of a contiguous layer of keratinocytes with characteristic cobblestone morphology. Histological analyses of cell-seeded scaffolds showed that keratinocytes formed stratified and differentiated epithelial layers on the surfaces comparable to a keratinocyte-seeded acellular dermis control. These findings demonstrated the ability to used plant-based scaffolds as vascularized scaffolds for a new standard of care for the treatment of traumatic wounds.

Level (Master's or Ph.D.): Master's

Department: BME

Advisor: Dr. George Pins

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Joshua R. Gershlak PhD, David M. Dolivo PhD, Jeremy Goverman MD, Glenn R. Gaudette PhD, Tanja Dominko PhD, George Pins PhD

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Mi Feng

Poster Title (100 characters or less): Quantifying and Supporting People's Interactions with Visualizations on the Web

Abstract (1,000 characters or less):

More people are gaining access to complex data now than ever before, thanks in part to a sharp rise in the number of interactive visualizations deployed on the web. Yet, in practice, visualization creators have reported that their audiences seldom interact meaningfully with the visualizations they are creating. According to our initial evidence, several challenges exist in supporting people's interactions with visualizations.

We approach this challenge through three research tasks: (1) We develop simple yet generally accessible interaction techniques supporting people's explorations. (2) We develop new metrics that may better characterize people's intrinsic visualization explorations. (3) We develop a visual analytics system that re-visualizes aggregated interaction traces, providing scalable, low-effort feedback to creators.

Successful results in the research may enable visualization creators to reflect on their alternative designs and better support their audiences' interactions.

Level (Master's or Ph.D.): Ph.D.

Department: Computer Science

Advisor: Lane T. Harrison

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Evan M. Peck

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Giorgi Gachechiladze

Poster Title (100 characters or less): Integration of Optical Flow and Facial Expression Recognition

Abstract (1,000 characters or less):

Although optical flow provides a wealth of spatio-temporal information, it is rarely used for automatic facial expression recognition (FER), partly due to high computational costs. The rise of Deep Learning in flow estimation promises better results with low computational costs that makes it suitable for real-time applications. Recently, Optical Flow researchers have shown great progress in training CNN estimators in an unsupervised way that makes its application to FER systems much more compelling. In this research, we explore the integration of specialized Optical Flow estimator into FER system and measure its ability to facilitate accurate automatic facial expression recognition.

Level (Master's or Ph.D.): Master's

Department: Computer Science

Advisor: Jacob R. Whitehill

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Giulia Galotto

Poster Title (100 characters or less): Investigating myosin XI-dependent tip growth mechanism in Physcomitrella patens

Abstract (1,000 characters or less):

Physcomitrella patens is a great model to study plant cell growth because of its amenability for genetic manipulation and simple cytology. Protonemal cells elongate by tip growth; the actin-associated motor myosin XI is essential for polarized growth. To characterize the role of myosin XI in tip growth we developed conditional mutant plants in which myosin XI protein is temperature sensitive (TS). At the restrictive temperature, TS cells undergo morphological changes visible within 3 hr: the zone behind the tip swells, and the tip narrows. Furthermore, when exposed at the restrictive temperature for 24 hr, a high number of caulonema cells die. This suggest myosin XI is involved in guiding exocytosis to the cell apex and that myosin XI is important for cell survival. Cells treated with low concentration of an actin depolymerizing drug form cytoplasmic clusters rich in myosin XI, secretory vesicles and F-actin. TS cells deprived of functional myosin XI fail to generate those structures.

Level (Master's or Ph.D.): PhD

Department: BBT

Advisor: Prof. Luis Vidali

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Jeffrey Bibeau, Yen-Chen Liu, Pattipong Wisanpitayakorn, Erkan Tuzel

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Kyle Gerlach

Poster Title (100 characters or less): Assessment of Ferrate for Treatment of Algal Blooms

Abstract (1,000 characters or less):

Cyanobacterial blooms in public water supplies pose a serious threat to public health. Microcystis aeruginosa is a common species of cyanobacteria that releases harmful cytotoxins and disinfection byproduct (DBP) precursors during treatment. Filtration, dissolved air flotation, and chemical oxidation with ozone or permanganate are several of the current options used to treat algal blooms. These options can be costly; increase the formation of DBPs; or disrupt coagulation and filtration processes. Ferrate (Fe(VI)) may be an effective alternative oxidant with several benefits. This research aims to better understand the impact of varying potassium ferrate(VI) dose on algal blooms under varying water conditions. Results for this research are being obtained through bench-scale testing and measurement of water quality parameters such as particle counts, turbidity, TOC/DOC, total nitrogen, and iron fractionation before and after treatment with potassium ferrate.

Level (Master's or Ph.D.): Master's

Department: Environmental Engineering

Advisor: Jeanine D. Plummer

List co-advisors if any (separate with a comma):

Joseph Goodwill - Assistant Professor URI

List co-authors if any (separate with a comma):

Erika Addison - Graduate Research Assistant URI

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Binod Giri

Poster Title (100 characters or less): Optimization of Close Space Sublimation of Vertical SnS2 Nanoflakes

Abstract (1,000 characters or less):

Tin disulfide (SnS2) is a 2-D material with layers held together by weak Van der Waals forces. It has excellent optoelectronic properties that are suitable for a number of applications including photoelectrochemical (PEC) water splitting. In spite of several published reports on SnS2, very few researchers have optimized the morphology to maximize PEC performance. In this work, vertically aligned SnS2 nanoflakes were grown directly on FTO-glass substrates using a scalable close space sublimation (CSS) method. The experimental parameters were optimized to obtain the highest-reported photocurrent density of 4.5mA/cm2 at 1.23V vs. RHE under simulated sunlight in pH7 buffer containing Na2SO3 hole-scavenger. Careful examination of the morphology as well as optoelectronic properties of the obtained nanoflakes revealed that the high photocurrent was the result of optimized height of vertical nanoflakes as well as the tapered structure with steps that exposes multiple edge sites per unit area.

Level (Master's or Ph.D.): PhD

Department: Mechanical Engineering

Advisor: Prof. Pratap M. Rao

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Maryam Masroor, Kateryna Kushnir, Alexander Carl, Haochuan Zhang, Yanyan Zhao, Arthur McClelland, Ronald L. Grimm, Dunwei Wang, Lyubov V. Titova

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Sanket Gujar

Poster Title (100 characters or less): Pointwise and Instance Segmentation for 3D Point Clouds

Abstract (1,000 characters or less):

LiDAR is the safest perception sensor for autonomous vehicles being invariant to lighting condition. When dealing with LiDAR data, perception stacks mostly uses projection methods to identify vehicles. While this method is fast, it is not completely robust. We developed a pipeline to do point wise and instance segmentation on point clouds using only LiDAR data. Point wise segmentation and instance segmentation will provide the information about each point's class and which object the point belongs to. Point wise methods utilize the LiDAR data efficiently allowing for more accurate predictions of the target position and pose in the frame. We developed a deep learning model focusing on local, global and spatial features of the point cloud to precisely segment each instance in the point cloud without using any other information except LiDAR data.3D Point wise methods makes a more robust and camera independent pipeline for detecting vehicles and pedestrians for an autonomous vehicle.

Level (Master's or Ph.D.): Masters

Department: CS

Advisor: Prof. Michael Gennert

List co-advisors if any (separate with a comma):

Prof. Jacob Whitehill

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Thomas Hartvigsen

Poster Title (100 characters or less): Partial Recurrent State Updates for Irregular Multivariate Time Series

Abstract (1,000 characters or less):

Development of sensor networks has motivated classification of multivariate time series from heterogeneous sources for many applications. However, combining observations from different sensors results time series plagued by mis-aligned timestamps and pervasive missing values, henceforth referred to as irregular time series. Additionally, the fact that a value is missing may itself be informative (\eg a sensor \textit{not} collecting data may be useful context for classification). Existing methods for analyzing such irregular time series rely on extensive pre-processing, adding bias prior to classification. To correct for this bias, we introduce missingness-informed state skipping (MISS) to a recurrent network, learning to probabilistically update recurrent hidden nodes when observing informative values, otherwise leaving its nodes unchanged. This allows for unimpeded information flow across long timesteps, and since each node updates independently, multiple update frequencies allow capture of mis-aligned input variables. Moreover, this reduces computational graph size as there are fewer nonlinear computations between input signals and final predictions, minimizing complexity. Using publicly-available electronic health records, we demonstrate that MISS outperforms state-of-the-art methods in predicting clinical outcomes while maintaining dramatically lower recurrent complexity.

Level (Master's or Ph.D.): Ph.D.

Department: Data Science

Advisor: Elke Rundensteiner

List co-advisors if any (separate with a comma):

Xiangnan Kong

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Conor Herlihy

Poster Title (100 characters or less): H3K9 Methylation Regulates Error Correction During Mitosis

Abstract (1,000 characters or less):

Cancer is typically considered a genetic disease. However, deregulation of epigenetic mechanisms is prevalent in many cancer contexts, and is increasingly appreciated as a contributing factor in tumorigenesis. Di and Tri-methylation of Histone 3 lysine 9 (H3K9me2/3) is a mark of constitutive heterochromatin, which is coordinated by lysine methyltransferases (KMTs) and lysine demethylases (KDMs). While previous studies have demonstrated that loss of H3K9me compromises mitotic fidelity, the impact of increased H3K9me remains unclear. We show that depletion of KDMs to increase H3K9me alters mitotic fidelity, suggesting that cancer-relevant epigenetic changes in H3K9me regulation may contribute to tumorigenesis. To further investigate this, we are utilizing a system in D. Melanogaster to knockdown H3K9me regulators in germline stem cells and descendants. This system allows us to investigate how altered H3K9me effects mitotic fidelity and tumorigenesis in an in vivo stem cell context.

Department: Biology and Biotechnology

Advisor: Dr. Amity Manning

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Yao-Chun Hsieh, Yang Tao, Xin Zhang, Wei Zhao, Brendan Foley

Poster Title (100 characters or less): Clinical Supply Chain Data Profiling

Abstract (1,000 characters or less):

Data quality is vital to all large-scale companies. Around 25 percent of the revenue is lost because of the unsatisfactory data quality according to Talend. This project aims at helping Pfizer - one of the biggest pharmaceutical companies - to understand the quality of their data using state-of-art profiling techniques. We focus on issues including site/center country code conflict, address validation, time zone validation, naming convention and relationships between different attributes across system. In addition, six data criteria including completeness, conformity, consistency, accuracy, duplicates and integrity are used for evaluation. Insights and recommendations have been delivered for these issues respectively to Pfizer. Our objective is to assist Pfizer to achieve 100% good data, since failure in medicine delivery or incorrect amount of dose can cause tremendous lost to patients or researchers.

Level: Master's

Department: Data Science

Advisors: Fatemeh Emdad, Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Nathan Hsu, Umesh Nair, Dekun Geng

Poster Title (100 characters or less): Fleet Maintenance Data Mining

Abstract (1,000 characters or less):

National Grid is a major Electricity & Gas supplier in Northeastern United States. It owns a fleet of almost 10,000 vehicles to run its daily business and construction, which costs around 50 million dollars a year to maintain and repair. The different types of vehicles increases the complexity of maintenance as well. The goal of this project is to analyze the vehicle maintenance records, find actionable insights which can increase the vehicle availability, improve the fleet management, and reduce the maintenance costs. The project also aims to build an actionable process to find the problematic vehicle models, and then perform some subsequent analyses like finding the cumulative repair percentage and cumulative cost over time for the afore-identified models. Through vivid data visualization and interactive dashboards, National Grid will be able to locate potential problems in its fleet, and furthermore, make decisions like whether to go ahead with the repairs or sell the vehicle.

Level: Master's

Department: Data Science

Advisors: Prof. Fatemeh Emdad, Prof. Chun-Kit Ngan

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Taylyn Hulse

Poster Title (100 characters or less): Measuring Math Proficiency within a Dynamic Learning Technology

Abstract (1,000 characters or less):

Within the learning sciences field, we need to break away from correctness-based assessment and design more formative measures that help students succeed by measuring the entire learning process in real time. Utilizing clickstream data, we explore algebraic problem solving within a dynamic mathematics learning technology. This work aims to tease apart components of mathematical proficiency more efficiently and at a deeper level than traditional summative assessment.

Level (Master's or Ph.D.): Ph.D.

Department: SSPS, LS&T

Advisor: Erin Ottmar

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Avery Harrison, Daniel Manzo, Erin Ottmar

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Vinayak Vasantrao Jagtap

Poster Title (100 characters or less): Walking Controllers Based on a Reactive Balancing Controller for Humanoid Robots

Abstract (1,000 characters or less):

Current state of the art walking controllers for humanoid robots use simple models like Linear Inverted Pendulum to approximate Center of Mass(COM) dynamics of the robot. This dynamic model is used to generate COM trajectories that keep the robot balanced. These controllers need prior information of footholds that is generated by a footstep planner. With such controllers, any change in the goal position when the robot is walking ends up in aborting existing plan and replanning footsteps followed by COM trajectory generation. We present a novel approach of building reactive balancing controllers that take virtual forces in the control law. Walking is an emergent behavior from such controllers which can be achieved by applying virtual forces in the direction of goal. Application of virtual forces makes the robot controller unstable and the robot steps forward to avoid a fall. Stepping location is decided based on instantaneous capture point (ICP) which is the point at which the robot should step to stay balanced. As the footstep parameters are derived based on ICP, prior knowledge of footholds is not required.

Level (Master's or Ph.D.): Ph.D.

Department: Robotics Engineering

Advisor: Prof. Michael Gennert

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Chen Liang, Chenjie Jiang, Krushika Tapedia, Mukund Khandelwal

Poster Title (100 characters or less): Bridging the communication gap in global fire safety using Neural Machine Translation

Abstract (1,000 characters or less):

According to the National Fire Protection Association (NFPA), more than 1.3 million fires were reported by fire departments in the United States in 2017, resulting in an estimated 3,400 civilian deaths and $23 billion in property loss. Further, these tragedies almost certainly occur at a higher frequency across the world. As NFPA aims to be the global leader in the elimination of loss from fire, it is imperative that the codes and standards are accessible in various major languages such as Spanish.
To achieve this objective, NFPA's Research and Data Analytics (RDA) team has collaborated with Worcester Polytechnic Institute (WPI) to develop a machine translation platform optimized for the specific terminology and jargon used in fire safety.
The purpose of this research is to:
- Develop state-of-the-art domain-specific translation models using advanced Artificial Intelligence capabilities
- Develop Graphical User Interface (GUI) using TensorFlow Serving to enable seamless translation

Level: Master's

Department: Data Science

Advisors: Prof. Fatemeh Emdad, Prof. Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Hrachya Kocharyan

Poster Title (100 characters or less): Investigation of wave propagation through liquid immersed granular materials

Abstract (1,000 characters or less):

Wave propagation through 2D assemblies of polyurethane cylinders of around 1•length and 1/2• diameter immersed in liquids with varying viscosities was investigated. An enclosed drop-tower based experimental setup was developed to load the assembly of the cylindrical particles arranged into two different configurations. Deformation of the particles was recorded by a high-speed camera operating at 4000-8000 fps frame rates. Digital image correlation (DIC) was used to calculate the kinematics and strain fields in each individual particle. Earlier research on liquid immersed granular materials focused on random granular materials, while the wave propagation through ordered granular materials is less investigated. It was found that with increasing viscosity, there is an increase in wave attenuation, which slows down with further increase in viscosity. Also, a new mathematical model to describe interparticle interaction in the presence of liquid was developed.

Level (Master's or Ph.D.): Ph.D.

Department: Aerospace Engineering

Advisor: Nikhil Karanjgaokar

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Abhishek Shah, Janvi Kothari, Sai Sahithi Kireeti Dandamudi

Poster Title (100 characters or less): Analytical Approach to Account Management

Abstract (1,000 characters or less):

Optimizing solutions and retaining customers for repeated purchases forms a bridge to building long relations with the clients; thus increasing overall business revenue. We present here a way to look into this for AndPlus which is an engineering company that provides web, mobile & IoT solutions. Each client for AndPlus is considered as an account and we present here a way to look into this by learning "time taken range" for diverse projects and its development through tickets. We use supervised machine learning to make an accurate prediction about the time range each development ticket would need to be complete. This is based on its complexity, user story content length, number of use cases and time spent on each ticket. We also use information about ticket request & completion month, team size working on each ticket, type of application, and industry and domain information. We propose a model that has excellent learning capability to predict the time range.

Level: Master's

Department: Data Science

Advisors: Prof. Ngan and Prof. Emdad

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Mahtab Kouhizadeh

Poster Title (100 characters or less): Blockchain Technology and Sustainable Supply Chain Management: A Barriers Analysis

Abstract (1,000 characters or less):

Blockchain technology became popular through the advancement of cryptocurrency and Bitcoin. The unique characteristics of blockchain inspired broader use of this technology. Blockchain provides a decentralized, transparent, and authenticated platform that is showing promise for easing some global supply chain management problems and improving sustainability. However, as a disruptive technology, blockchain implementation would face barriers and require preparation. This poster presents a comprehensive overview of various barriers of adopting blockchain to trace sustainability in supply chains. A Decision Making Trial and Evaluation Laboratory (DEMATEL) approach is employed to investigate the relative importance and interrelationships between the barriers. This would help managers, stakeholders, and policy-makers to address a few critical barriers for effective and successful blockchain implementation in supply chains.

Level (Master's or Ph.D.): Ph.D.

Department: Business

Advisor: Joseph Sarkis

List co-advisors if any (separate with a comma):

Sara Saberi

List co-authors if any (separate with a comma):

Joseph Sarkis, Sara Saberi

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Ananthalakshmy Krishna Moorthy

Poster Title (100 characters or less): Extended Orbital Flight of a CubeSat in the Lower Thermosphere with Active Attitude Control

Abstract (1,000 characters or less):

A wide variety of scientifically interesting missions could be enabled by orbital flight altitudes of 150 – 250 km. The present study investigates the feasibility of using primarily commercial, off-the-shelf hardware to build a nanosat specifically to allow extended mission times. CubeSats flying in the lower thermosphere have the potential to enable close monitoring of the Earth's surface for scientific, commercial, and defense-related missions. This study extends prior work by incorporating an active attitude control system for attitude maintenance. Candidate technologies for primary propulsion include electrospray thrusters, and pulsed plasma thrusters (PPT). For the attitude control system, the propulsive options are more limited, mainly as a result of the limited volume available to accommodate hardware associated with multi-axis control. Micro-PPTs, magnetorquers and reaction wheels which can provide full control over three rotational degrees of freedom will be investigated.

Level (Master's or Ph.D.): Ph.D.

Department: Aerospace Engineering Program

Advisor: John J. Blandino

List co-advisors if any (separate with a comma):

Nikolaos A. Gatsonis, Michael A. Demetriou

List co-authors if any (separate with a comma):

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Caitlin Kuhlman

Poster Title (100 characters or less): FARE: Diagnostics for Fair Ranking using Pairwise Error Metrics

Abstract (1,000 characters or less):

Ranking, a critical tool for decision making across many domains, may embed unfair bias. Recently, methods have been proposed to assess fairness of automated decision procedures with regard to the treatment of protected groups. However this has largely been limited to classification tasks, and these approaches are not applicable for ranking. Therefore, in this work we propose three error-based fairness criteria for rankings: Rank Equality, Rank Calibration, and Rank Parity, which cover a broad spectrum of fairness considerations from proportional group representation to error rate similarity. The criteria are formulated to be rank-appropriate, using pairwise discordance to measure prediction error in a model-agnostic fashion. Further, we design a fair auditing mechanism which captures fairness throughout the entire ranking, generating in-depth yet nuanced diagnostics. We demonstrate our approach using real-world scenarios to provide guidance in the selection of fair-ranking algorithms.

Level (Master's or Ph.D.): PhD

Department: Computer Science

Advisor: Elke Rundensteiner

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

MaryAnn VanValkenburg, Elke Rundensteiner

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Thomas Le Baron

Poster Title (100 characters or less): Using smart scheduling to optimize defenses for embedded systems

Abstract (1,000 characters or less):

Real-time embedded systems can be found in a large number of devices we use, including safety-critical systems. Useful for their small size and low power consumption, they are also harder to protect against state of the art attacks than general purpose systems due to their lack of hardware features. Even current defenses may not be applicable since instrumentation added to defend real-time embedded systems may cause them to miss their deadlines, rending them inoperable. We show that the static properties obtained by the scheduling policies can be used as security guarantees for the tasks composing the program. By completely securing a subset of the tasks of the program only using the scheduler, we remove the need to add external instrumentation on these tasks, reducing the amount of extra instructions needed to entirely protect the system. With less instrumentation, the overhead added by the defenses is reduced and can therefore be applied to a larger number of systems.

Level (Master's or Ph.D.): Master

Department: Computer science

Advisor: Robert J Walls

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Robert J Walls, Bryan Ward

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Guangjiang Li

Poster Title (100 characters or less): Transient suppression of conductivity in MXene thin film by ultrafast optical pulses

Abstract (1,000 characters or less):

MXenes, a new class of 2D transition metal carbides and nitrides, have recently generated interest of a scientific community as candidates for a variety of optoelectronic and electrochemical applications. In our recent study, we have investigated free carrier dynamics of a Ti3C2Tx MXene film by THz spectroscopy. We found that Ti3C2TX has a high intrinsic charge carrier density, a high mobility of carriers within the individual nanoplates and a large absorption in the THz range. We have also found that Ti3C2Tx conductivity and THz transmission can be manipulated by photoexcitation. In experiments in Germany, we found that excitation of Ti3C2Tx with ultrafast optical pulses results in suppression of conductivity that lasts for ~ 1 ns. We have explored the physics behind this effect. The possibility to suppress conductivity and enhance THz transmission by photoexcitation makes Ti3C2Tx an attractive candidate for THz modulation devices and electromagnetic shielding applications.

Department: Physics

Advisor: Lyubov Titova

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Guangjiang Li, Shuohan Huang, Hassan Hafez, Mischa Bonn, Sergii Chertopalov, Vadym Mochalin, Dmitry Turchinovich, Lyubov Titova

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Guangjiang Li

Poster Title (100 characters or less): Tuning Photoinduced Carriers Dynamics in 2D GeS by Zerovalent Metal Intercalation

Abstract (1,000 characters or less):

Germanium monosulfide(GeS) belongs a class of 2D group-IV monochalcogenides, which is a semiconductor with similar structure to black phosphorus. Theory calculation predicts it has both high carrier mobility and room temperature ferrroelectricity. In this work, we use time-resolved teraherz spectroscopy to study the impact of intercalation of zero-valent metals Cu and Sn between layers of GeS nanoribbons on its photoresponse property. We find that free carriers excited by 800nm pulse dominate photoresponese which fits Drude model well. Also, Cu drastically reduces the lifetime of the free carriers, while Sn modestly increase the lifetime of free carriers. These results shows that zero-valent metal intercalation is a promising avenue for tuning the ultrafast photoresponse of GeS nanostructures for high-speed electronic devices.

Level (Master's or Ph.D.): Ph.D.

Department: Physics

Advisor: Lyubov Titova

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Mengjing Wang, Kateryna Kushnir, Kristie J. Koski

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Ruojun Li

Poster Title (100 characters or less): Detecting Blood Alcohol Level from Smart-phone Sensors using Bidirectional LSTM

Abstract (1,000 characters or less):

In recent years, driving under the influence (DUI) caused a significant number of deaths. The smart phone is a convenient wearable tool in the daily life which contain Gait-level data captured with wearable sensors. This study aims to detect the blood alcohol content (BAC) through deep learning algorithm using smartphone sensors. In addition, the application can help alcohol-users determine whether their BAC exceeds the legal limit.
Using 65 individuals' accelerometer and gyroscope data, we hand-craft time, frequency and energy features. In this study, we propose a variety of long short-term memory-based models (LSTM), including LSTM, Bidirectional LSTM(Bi-LSTM) and Bi-LSTM with attention. Comparing to Random Forest, Multilayer Perceptrons and Convolution Neural Networks, Bi-LSTM is proved to be the faster and higher-accurate algorithm.

Level (Master's or Ph.D.): Ph.D.

Department: Electrical and Computer Engineering

Advisor: Agu Emmanuel O

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Jiaming Nie

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WPI GRADUATE STUDIES

GRIE Abstract Form

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Full Name: Masoud S. Loeian

Poster Title (100 characters or less): Circulating Tumor Cell Mircoarray

Abstract (1,000 characters or less):

Cancer is the second leading cause of death in the United States. People do not die of primary tumor but metastasis. The key initiators of metastatic cancers are circulating tumor cells (CTCs). By engineering nanomaterials namely carbon nanotubes, and microarray manufacturing techniques, we have been able to successfully develop the world's first microarray for CTC capture. Our group has designed and fabricated a new microarray technology called the "Nanotube-CTC-chip," for liquid biopsies. The current design is a new approach for isolating CTCs and consists of a 76-element microarray of carbon nanotube (CNT) devices on a 4-inch wafer. We have demonstrated the capture of spiked breast cancer cells in blood using both antigen-dependent and independent capture with >90% capture rate and elimination of 99% contaminating leukocytes. Further, using triple-negative breast cancer patient-derived xenografts (PDX), we have demonstrated the capture of highly invasive CTCs.

Level (Master's or Ph.D.): Ph.D.

Department: Mechanical Engineering

Advisor: Balaji Panchapakesan

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Lida Mehdizadegan Namin

Poster Title (100 characters or less): Developing Viable Catalysts for Ethanol Oxidation in Direct Ethanol Fuel Cells

Abstract (1,000 characters or less):

Fuel cells enable the conversion of different chemicals directly into electrical energy, and are much more efficient than conventional combustion engines. Direct ethanol fuel cells (DEFCs) use ethanol as a fuel source. However, DEFCs are not commercialized due to the lack of an efficient catalyst. In this study, using density functional theory (DFT) we modeled different catalysts to be used in DEFCs. We started with platinum based catalysts and then extended our calculations to transition metals and alloys. We also investigated electronic structure properties of different bimetallic iridium alloys to better understand their catalytic activities and stabilities in the reaction conditions. We modeled carbon-carbon bond breaking in metals including Pt, Ir, Rh, Au, Ag, alloys including Ir-Rh, Ir-Rh-Sn, and Pt-based catalysts including Pt-SnO2, and Pt-Rh-SnO2. We also compared the catalytic ability of Rh and Rh2O3 catalysts in the carbon-carbon bond cleavage to form CO2 and CH4.

Level (Master's or Ph.D.): Ph.D.

Department: Chemical Engineering

Advisor: N. Aaron Deskins

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Koretaka Yuge

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Tess B Meier

Poster Title (100 characters or less): Evaluation and Mechanical Revision of a Hand Exoskeleton with Implementation of Intuitive User Input

Abstract (1,000 characters or less):

Individuals with upper limb impairments can use assistive devices, such as hand exoskeletons, to restore function to their affected hand. Individuals with hypertonia and spacticity have a difficult time using existing hand exoskeletons which are primarily designed for flexion assistance. An exoskeleton was created in the AIM lab for the purpose of extending a person's fingers, opening up the hand. This thesis work includes testing the hand exoskeleton with impaired individuals and mechanically revising the hand exoskeleton to better assist individuals with hypertonia and spactiticy in a real-world setting. Multiple gripping patterns will be accomplished with the addition of an actuated thumb component. Electromyography methods for control will be evaluated for viability with the specified user group. Voice control will be implemented as an intuitive user control method. The completed hand exoskeleton system will be designed and tested for usability during ADL applications.

Level (Master's or Ph.D.): Master's

Department: Robotics Engineering

Advisor: Gregory S. Fischer

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Christopher J. Nycz

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Dayna Mercadante

Poster Title (100 characters or less): Modeling Centrosome Clustering

Abstract (1,000 characters or less):

Supernumerary centrosomes are prevalent in cancer, where they promote the formation of multipolar mitotic spindles. Clustering extra centrosomes enables the formation of a functional bipolar spindle. Disruption of clustering promotes multipolar division and can result in non-proliferative daughter cells with compromised viability. Hence molecular pathways required for clustering are promising therapeutic targets. We investigated Aurora A kinase activity and our results provide evidence that it enhances spindle pole clustering. Many molecular targets of Aurora A are known however it remains unclear which target(s) may be responsible for clustering activity.

We are modeling mitotic spindle formation in cells with extra centrosome by solving differential equations for force balance to determine the position of centrosomes and chromosomes in time. Using this model, we can generate experimentally testable predictions regarding the molecular and force requirements for centrosome clustering.

Level (Master's or Ph.D.): Ph.D.

Department: Bioinformatics & Computational Biology

Advisor: Amity Manning

List co-advisors if any (separate with a comma):

Sarah Olson

List co-authors if any (separate with a comma):

Bernat Navarro-Serer, Eva Childers, Nicole Hermance, Amity Manning

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Nadia Mofidi

Poster Title (100 characters or less): Soot and Species Characterization of Burning Wildland Porous Fuel Bed

Abstract (1,000 characters or less):

Wildland Urban Interface (WUI) is rising rapidly by human population growth and developing suburbs. The risk to human life and destruction of properties is directly attributed to the fire itself, and therefore investigated heavily. But, the toxicity of the released smoke and effect of the particulate matters from a wildfire has not been studied thoroughly. The smoke generated from wildfires in WUI is perceived as a one of key elements to fire spread as well. Moreover, soot emissions significantly contribute to earth ' s radiation budget and climate. It has been reported previously that soot radiation force emitted from wildfires results in the largest uncertainties in estimation of its effects on climate change. A set of systematic experiments is conducted using Fire Propagation Apparatus (FPA) to investigate the influence of oxygen concentration and heat flux on combustion products of porous fuels. Soot particles are collected from the plume and analyzed using SEM.

Level (Master's or Ph.D.): Master's

Department: FPE

Advisor: Albert Simeoni

List co-advisors if any (separate with a comma):

Michael Timko

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Rushikesh Naidu , Yun Yue, Huanhan Liu , Yi Pan

Poster Title (100 characters or less): Machine Estimation of Exposure

Abstract (1,000 characters or less):

Massachusetts Department of Environment Protection (MassDEP) ensures the timely cleanup of hazardous waste sites and spills. Immediate Response Action (IRA) Reports document mandatory risk reduction measure which must be taken at sites which have been impacted by sudden chemical releases or conditions requiring rapid notification to MassDEP. The officials at MassDEP review IRA reports and summarize the reports to flag conditions of exposure. The project seeks to understand the semantics and pattern of language used to define a flag condition within the report. The reports contains different styles and formats, tables and figures within the reports and the project uses technicalities of natural language processing to handle inconsistent data and build a product to develop priority review for the MassDEP officials and reduces the time required to review all the reports.

Level: Master's

Department: Data Science

Advisors: Fatemah Emdad, Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Umesh Nair, Ran Lin, Rui Li, Mohamad El-Rifai, Shujun Zhou

Poster Title (100 characters or less): Empowering Fraud Detection

Abstract (1,000 characters or less):

Waters Empower 3 is a leading software in the area of Chromatography which gives its users the ability to analyze the chemical components of a given sample. Customers rely on Waters Empower 3 to verify whether products are complying with the market standards. The temptation of shipping products could encourage the users to misuse the system in order to generate the desired results in an improper manner.
The key aspect of our project is to be able to use the power of machine learning and state of the art literature in the area of unsupervised anomaly detection to build models that can detect abnormal behavior in the use of Empower 3 Software and flag these cases as suspicious and due for a further review and investigation.

Level: Master's

Department: Data Science

Advisors: Dr. Fatemeh Emdad, Prof. Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Hussein Nasralah

Poster Title (100 characters or less): Portfolio optimization for small time horizons

Abstract (1,000 characters or less):
The portfolio optimization problem is a classical problem in mathematical finance which is concerned with finding an optimal trading strategy for an investor in a given financial market. We consider a simple financial market consisting of one stock (risky asset) and one bond (risk-free asset). In this poster presentation, we illustrate a method to derive a trading strategy which is close-to-optimal in the sense that it approximates the optimal trading strategy for small trading horizons.

Department: Mathematical Sciences

Advisor:

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):
Rohini Kumar

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Heramb Nemlekar

Poster Title (100 characters or less): Prompt Human to Robot Handovers

Abstract (1,000 characters or less):

Handing over objects is the foundation of many human-robot interaction and collaboration tasks. In the scenario where a human is handing over an object to the robot, the human chooses where the object needs to be transferred. This work presents an efficient method for predicting the Object Transfer Point (OTP), which synthesizes (1) an offline OTP calculated based on human preferences observed in a human-robot motion study with (2) a dynamic OTP predicted based on the observed human motion. Our proposed OTP predictor is implemented on a humanoid nursing robot and experimentally validated in human-robot handover tasks. Compared to only using static or dynamic OTP estimators, it has better accuracy at the earlier phase of handover (less than 45%) and can render fluent handovers with a response time (about 3.1 secs) close to natural human receiver's response. In addition, the OTP prediction accuracy is maintained across the robot's visible workspace.

Level (Master's or Ph.D.): Master's

Department: Robotics Engineering

Advisor: Zhi Li

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Dharini Dutia

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Holly Nguyen

Poster Title (100 characters or less): Machine Learning Models for Synthesizing Actionable Care Decisions on Lower Extremity Ulcer Images

Abstract (1,000 characters or less):

Lower extremity chronic wounds affect 4.5 million people in the United States. Caregivers in many remote areas often do not have adequate wound care training, which results in varied, non-standard wound care. This research investigates machine learning wound care decision classifiers learned from expert wound doctors. The proposed system would be deployed as a smartphone clinical decision support system, which would generate actionable decisions about four wound types using as inputs wound image data, Electronic Health Record data, and doctors' comments. The three output actionable decisions, which reflect how well the wound is healing, are: 1) Continue current treatment, 2) Request order for non-urgent change in treatment from wound wound specialist (e.g., change dressing), or 3) Refer patient to a wound specialist.

Level (Master's or Ph.D.): Master's

Department: Computer Science

Advisor: Professor Emmanuel Agu

List co-advisors if any (separate with a comma):

Professor Bengisu Tulu, Professor Diane Strong, Professor Peder Pedersen, Professor Clifford Lindsay, Raymond Dunn, Lorraine Loretz

List co-authors if any (separate with a comma):

Haadi Mombini, Ziyang Liu, Shubham Jain, Ameya Wagh

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Zahra Noori

Poster Title (100 characters or less): Fundamental Understanding of Bound Water Removal in Paper Drying Process: Microscopic Approach

Abstract (1,000 characters or less):

In the fabrication of paper, a slurry with cellulose fibers and other matter is pressed and dried, which requires a significant expense in energy. In the structure of paper, there are two different types of water: free water and bound water. Free water can be removed relatively efficiently, but removing bound water, which consists of both fluid regions dominated by capillarity, along with water which is inside the fibers, consumes a large portion of energy during the process. This paper strives to understand the different possible physical mechanisms in fiber scale for bound water removal in a paper drying process. Therefore, using the results of this research and by controlling the studied parameters on the evaporation of the thin liquid film, the related industries will be able to control the drying of bound water in the final stages of drying processes in order to increase the efficiency of paper-making.

Level (Master's or Ph.D.): Ph.D.

Department: Mechanical Engineering

Advisor: Prof. Jamal Yagoobi and Prof. Burt Tilley

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Lorena Novoa-Aponte

Poster Title (100 characters or less): The interplay of a metallosensor with two metal-chaperones defines

Abstract (1,000 characters or less):

Copper homeostasis in pathogenic bacteria is critical for virulence. The cytoplasm of P. aeruginosa contains a Cu-metallosensor, CueR, and two chaperones, CopZ1 and CopZ2, forming a unique system for studying Cu-homeostasis. We found that these chaperones are two separate cellular Cu-pools. CopZ1 metallates CueR, eliciting the translation of Cu efflux transporters involved in metal tolerance. In contrast, CopZ2 function is defined by its distinctly high abundance during Cu-stress. Under resting conditions, CopZ2 remains largely in its apo form. Metal stress quickly induces CopZ2 expression, and its holo form predominates, reaching levels commensurate with the cytoplasmic Cu levels. In summary, these results show that CopZ1 acts as chaperone delivering Cu to the sensor, whereas CopZ2 functions as a fast-response Cu-sequestering storage protein. We propose that equivalent proteins likely play similar roles in most bacterial species.

Department: Chemistry and Biochemistry

Advisor: José Argüello

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

David Ramírez

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Robert Orr

Poster Title (100 characters or less): A Myosin XI-RabE GTPase Interaction is Required for Polarized Growth

Abstract (1,000 characters or less):

The diverse morphologies observed across species requires a coordinated asymmetry of intracellular components organized by the cytoskeleton and molecular motors. Here we demonstrate the first direct association between a plant myosin XI and secretory vesicles through a Rab GTPase. Using a yeast two-hybrid screen with the P. patens' myosin XI globular tail domain as bait we identified a RabE subfamily member (Sec4 in yeast, Rab8 in human) as a putative binding partner. Consistent with a role in polarized secretion, RabE polarizes to the growing apical region and is spatiotemporally correlated with myosin XI. Additional yeast two-hybrid and mutagenic analysis with myosin XI-tail suggests a direct interaction between RabE and myosin XI at a structurally conserved site. Abolishment of the myosin XI:RabE interface abrogates polarized growth. Experiments with chimeric myosin XIs suggests a sequence-level conservation of myosin XI-mediated polarized transport across the plant kingdom.

Level (Master's or Ph.D.): Ph.D

Department: Biology & Biotechnology

Advisor: Prof. Luis Vidali

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Robert Orr, Fabienne Furt, Erin Armstrong, Erin Agar, Jennifer Garbarino, Sarah Kaptur, Allison Butt, Mary Munson, and Luis Vidali

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Hiromi Bosman, Mihin Sumaria, Rahul Pande, Rushikesh Naidu

Poster Title (100 characters or less): Human Activity Recognition

Abstract (1,000 characters or less):

Wearable technologies have enabled us to gather a large amount of health-related data from people. By utilizing the data collected from a wearable device, we could reduce the number of clinical visits, discover novel biomarkers of a disease of interest and identify novel targets for drug/therapeutics development. Using 3-axial linear acceleration and angular velocity from accelerometers and gyroscope our goal was to capture the relationship between human activities and people's health conditions/genetic information. We explored the UCI Human Activity Recognition actigraphy dataset and developed a classification model using machine learning and deep learning techniques to identify different types of body movements in individuals based on measurements captured by wearable sensors (IMU). Our results show that machine learning methods classify activities with 0.94 f1-score while deep learning methods improve it to 0.96 f-1 score.

Level: Master's

Department: Data Science

Advisors: Fatemeh Emdad, Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Jayam Umesh Patel

Poster Title (100 characters or less): Mixed-Granularity Human-Swarm Interaction

Abstract (1,000 characters or less):

We present an augmented reality human-swarm interface that combines two modalities of interaction: environment-oriented and robot-oriented. The environment-oriented modality allows the user to modify the environment (either virtual or physical) to indicate a goal to attain for the robot swarm. The robot-oriented modality makes it possible to select individual robots to reassign them to other tasks to increase performance or remedy failures. Previous research has concluded that environment-oriented interaction might prove more difficult to grasp for untrained users. In this paper, we report a user study which indicates that, at least in collective transport, environment-oriented interaction is more effective than purely robot-oriented interaction, and that the two combined achieve remarkable efficacy.

Level (Master's or Ph.D.): Ph.D.

Department: Robotics Engineering

Advisor: Prof. Carlo Pinciroli

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Koohyar Pooladvand

Poster Title (100 characters or less): Multifunctional testing artifacts for efficient investigation of distortions and residual stresses

Abstract (1,000 characters or less):

We design testing artifacts with the objective of simplifying boundary conditions and reducing computational costs while minimizing uncertainties in the extraction of the parameters of interest. Testing artifacts defined by combined thin-thick cantilever structures allow the measurements of natural frequencies, mode shapes, and dimensions as well as to observe distortions and deformation of printed specimens. We apply Optical Non-Destructive Testing (ONDT) methods together with computational modelings to predict artifact properties and 3D printing parameters. The complementary application of experiments and simulations on these testing artifacts allows us to systematically investigate the distortions, residual stresses, and module of elasticity and to better understand the interrelationship between these characteristics and the printing process and parameters. This combined solution provides insight on the interconnection between the process parameters and components properties.

Level (Master's or Ph.D.): Ph.D

Department: Mechanical Engineering

Advisor: Prof. Cosme Furlong

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Anand Ramakrishnan

Poster Title (100 characters or less): Toward Automated Classroom Observation: Predicting Positive and Negative Climate

Abstract (1,000 characters or less):

We devised and evaluated a multi-modal machine learning system to analyze videos of classrooms for 'positive' and 'negative' climate, which are two dimensions of CLASS. School classrooms are highly cluttered scenes containing many overlapping faces and voices. Due both to the difficulty of labeling them and to their sensitive nature, classroom video datasets are scarce, and their labels are sparse. Thus, the overarching challenge we encountered was how to harness modern deep learning-based perceptual approaches despite the paucity of labeled data. Through training CNN-based facial attribute detectors as well as a direct audio-to-climate regressor, and by integrating information over time using a bi-directional RNNs, we constructed automated detectors of positive and negative climate with accuracy (10-fold cross-validation Pearson correlation on 241 videos) of 0.381 and 0.504, respectively. his work represents the first automated system designed to detect dimensions of the CLASS.

Level (Master's or Ph.D.): PhD

Department: Computer Science

Advisor: Jacob Whitehill

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Yundong Ren

Poster Title (100 characters or less): Optical Fiber Sensors for Moisture and Strain Measurements in Food

Abstract (1,000 characters or less):

Relative humidity and moisture content are important in many industrial applications, including food processing, pharmaceutical packaging, and environment monitoring. For example, moisture in food products are not only important for the texture and shelf life but also essential parameters for the drying process control. However, the widely used electrical sensors are large, limited in resolution, and incompatible with microwave drying.
In this poster, we present an optical fiber relative humidity sensor based on lossy mode resonances. Compared to the electrical sensors, our optical fiber sensors have much smaller foot prints, immunity to electromagnetic interference, wide temperature range, and high resolution. We experimentally characterized the sensors and used them to measure relative humidity and moisture content changes of both cookies and Cheetos. Research is underway to develop optical fiber strain sensors to enable multiphysical sensing for food industry.

Level (Master's or Ph.D.): Ph.D.

Department: Mechanical Engineering

Advisor: Yuxiang Liu

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Mucheng Li

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WPI GRADUATE STUDIES

GRIE Abstract Form

For all fields, do not use all capital letters

Full Name: Jessica Rosewitz

Poster Title: Naturally motivated concrete healing

Abstract:

Fixing decaying infrastructure involves demolishing and replacing the existing structures, which generates heat and carbon dioxide. There are economic and environmental advantages to repair rather than replace cracked structures. However, repair is a slow, exothermic process involving agents such as epoxies and microbes, and results in structures with reduced strength and reliability. Here, we describe a novel method to heal cracked and damaged concrete using trace amounts of the ubiquitous enzyme *Carbonic anhydrase* (CA). CA catalyzes the reaction between calcium chloride and carbon dioxide to create calcium carbonate that naturally incorporates into concrete structures as verified by in-situ X-ray diffraction. The crystals produced are impressively semi-transparent, dense, and adherent onto concrete substrates over the surface contours as verified by optical microscopy and scanning electron microscopy. This new repair paradigm consumes carbon dioxide, generates less heat than present methods, and avoids using unhealthy ingredients. Moreover, it is completely safe and results in a strong, naturally repaired structure.

Level (Master's or Ph.D.): PhD

Department: Civil Engineering

Advisor: Nima Rahbar

List co-advisors if any (separate with a comma):

Suzanne Scarlata

List co-authors if any (separate with a comma):

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Devdip Sen

Poster Title (100 characters or less): Affordable Pressure Ulcer Prevention: Device, System, and Algorithm

Abstract (1,000 characters or less):

The incidence and prevalence of wound problems in an aging and longer lived population continue to increase substantially. Pressure ulcers (bedsores) are painful, increase risk for secondary infection, and add $ 11 billion annually to health care costs in the US. When a sufficient fraction of the patient's weight is supported in a region with a bony prominence, the resulting localized concentration of external pressure reduces the cross-sectional area of blood vessels, restricting blood flow and limiting oxygen supply to the at-risk tissue, leading to pressure ulcers. Despite extensive work in this area of pressure ulcer prevention, a survey of available options shows that there is no compact, low-cost solution. The proposed work will develop a wireless sensor patch to work as an alert system. Alerting a patient or caregiver would allow early intervention to prevent pressure ulcer formation, easing workload on caregivers, and enabling more independence for mobile at-risk patients.

Level (Master's or Ph.D.): Ph.D

Department: Electrical and Computer Engineering

Advisor: Prof. John McNeill

List co-advisors if any (separate with a comma):

Prof. Yitzhak Mendelson, Raymond Dunn M.D.

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Yuchen Shen, Weiqing Li, Yingnan Han

Poster Title (100 characters or less): Dive into the Health Insurance World

Abstract (1,000 characters or less):

Fallon Health, founded in 1977, is a leading, not-for-profit, health care services organization. The US government (CMS) will handle a survey called HOS and give stars to the health insurance companies. The stars are rated in five aspect: Physical Change Score, Mental Change Score, Monitoring Physical Activities at baseline, Reducing Risk of Falling at baseline and Improving Bladder Control at baseline.

As Fallon is getting worse in CMS star these years, they would like to know which factors may affect the result. First, we merged the data from 7 different sources. And then, we performed different pre-processing to numerical and categorical data, including PCA for decomposition. After that, we did a correlation analysis and did some insight analysis on the significant features.

From our study, we found that, age, marriage and income and other features such as the frequency for the hospital may have huge impact on the result.

Level: Master's

Department: Data Science

Advisors: Prof. Fatemeh Emdad, Prof. Chun-kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Alexander Shoop, Rosemarie Day, Jack Zhang, Xiao Du, Manasee Godsay

Poster Title (100 characters or less): Automated Process for Data Acquisition, Analysis, and Preprocessing

Abstract (1,000 characters or less):

The objective of this research was to create libraries that will enhance the automation of data acquisition, analysis and pre-processing for integration with the Findability Platform. During this process, four libraries were created using Java, Spark, Cassandra and the Maven build tool to collect data from various sources, analyze the data coming in, and transform the data based on the information obtained. The data acquisition phase allowed for the import of structured data into the Cassandra data store with support for Excel and Text files such as CSV. Once imported, the analysis phase collects relevant statistical data about the table such as outliers, missing values, and unique values. Using the statistical data and the original dataset, the preprocessing phase performs feature generation to create a final modified dataset. This final dataset can be then sent off for modeling and predictions.

Level: Master's

Department: Data Science

Advisors: Professor Fatemeh Emdad and Professor Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Suhas Srinivasan

Poster Title (100 characters or less): Real-Time Simulation of Infection Dynamics in a Confined Environment

Abstract (1,000 characters or less):

Infection outbreak is a major health threat to passengers in confined, close quarter environments such as airplanes and cruise ships. On cruise ships, perhaps the most notorious and frequent disease outbreaks have been attributed to the highly contagious norovirus. To date, no work on modeling an infection spread on a passenger vessel has been published. Here, a novel approach to study real-time dynamics of an infection outbreak in a confined environment is introduced. We propose a framework for integrating agent-based modeling, 3D geographic environment representation and an explicit virologic model.
This new framework allows the properties and behaviors of individual hosts and pathogens, and their interactions to be explicitly modeled. We also model containment protocols and see their effects on the disease spread.
The future applications of this approach may include accurate real-time modeling of an infection outbreak in any confined environment e.g. schools, hospitals, etc.

Level (Master's or Ph.D.): Ph.D.

Department: Data Science

Advisor: Prof. Dmitry Korkin

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Zachary Zapatka, Jeffrey King

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: ML Tlachac

Poster Title (100 characters or less): Predicting Mental Health from Smartphone Text Messages

Abstract (1,000 characters or less):

Depression, a serious and debilitating mental illness, is frequently undiagnosed. This can be due to not recognizing symptoms, lack of access to medical resources, or fear of stigma. However, diagnosis is important as it is the first step towards treatment. The PHQ9 is a 9-question screening tool for depression. Many other studies have used a variety of data types and features to predict the PHQ-9 scores for individuals. In this study, we focus on the predictive power of a single underutilized modality: received text messages. We extract features from text messages collected from 291 participants over two-weeks. These features include patterns of activity, linguistic style, emotional expression, and sentiment. We demonstrate that machine learning methods can exploit the received text to predict an individual s PHQ-9 score with high accuracy.

Level (Master's or Ph.D.): Ph.D.

Department: Data Science

Advisor: Elke Rundensteiner

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Ermal Toto

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Derek Tsaknopoulos

Poster Title (100 characters or less): Optimization of Coupled Computational Modeling and Experimentation for Metallic Systems

Abstract (1,000 characters or less):

The use of trial-and-error practices in alloy design and processing adds substantial barriers that impede novel alloy qualification and subsequent adoption within the metallurgical market. However, with access to large sets of material properties data, the cost of trial-and-error methods can be sidestepped by way of iteratively coupling computational models with supportive experimental testing; thus, expediting the materials' design process. At present, Thermo-Calc, a computational thermodynamic and kinetic software, is combined with dynamic nanoindentation to establish representative correlations between microstructural features and mechanical properties for metallic systems. Through the developed techniques, comparisons of material properties for various conditions are enabled, such as differences in processing methods, alloy compositions, and processing heat treatments.

Level (Master's or Ph.D.): Ph.D.

Department: MTE

Advisor: Richard Sisson Jr.

List co-advisors if any (separate with a comma):

Danielle Cote

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Alexandra Valiton

Poster Title (100 characters or less): Perception-Action Coordination in Virtual Reality Telepresence

Abstract (1,000 characters or less):

Telepresence teleaction robots enable human workers to reliably perform difficult tasks in remote, cl uttered and human environments. However, the effort to control coordinated manipulation and active perception motions may exhaust and intimidate novice workers. We hypothesize that such cognitive efforts would be effectively reduced if the teleoperators are provided with autonomous camera selec tion and control aligned with the natural perception action coupling of the human motor system. Thus , we conducted a user study to investigate the coordination of active perception control and manipula tion motions performed with visual feedback from various wearable and standalone cameras. Our st udy discovered rich information of camera control behavior and camera selection preference to infor m telepresence system configuration and possible teleoperation assistance design and reduce the c ognitive efforts in robot teleoperation.

Level (Master's or Ph.D.): Ph.D.

Department: Robotics Engineering

Advisor: Prof. Zhi (Jane) Li

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Steven Vandal

Poster Title (100 characters or less): Kinesin-1 motor accumulation on microtubules gliding over lipid bilayers

Abstract (1,000 characters or less):

Cytoskeletal filaments and their associated motor proteins play key roles in many cellular processes including cell division, cargo transport, and locomotion. One major type of filament, the microtubule, acts as the structural skeleton of eukaryotic cells and forms the mitotic spindle during mitosis. Kinesin motors reorganize these microtubules and walk along them hand-over-hand to transport cargo throughout the cell. Much research has been done in mechanically characterizing these proteins; however, most assays are done on glass surfaces. Motors in vivo are often embedded in the plasma membrane or lipid vesicles, across which they can diffuse, leading to behaviors that are not reproduced in many experiments. Here, we study the diffusion and accumulation onto microtubules of kinesin-1 motors on a lipid bilayer using a coarse-grained simulation. We characterize the rate of accumulation of motors onto the microtubule and compare these with results from lipid gliding assays.

Level (Master's or Ph.D.): Ph.D

Department: Physics

Advisor: Erkan Tüzel

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Rui Jiang, William Hancock, Erkan Tüzel

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Vargas Blanco, Diego

Poster Title (100 characters or less): Regulation of mRNA stability in mycobacteria as an adaptive response to stress conditions

Abstract (1,000 characters or less):

Mycobacterium tuberculosis (MTB) success as a human pathogen is in part due its ability to survive stress conditions by entering non-growing states. Particularly important is that in these low metabolism states MTB can develop antibiotic resistance.
While numerous bacteria have shown to have reduced mRNA turnover under stress, the mechanisms underlying this phenomenon remain unknown. Using M. smegmatis we found that mRNA half-lives were higher under carbon starvation and hypoxia, when compared to log phase. Interestingly, a 2-min re-aeration of hypoxia-adapted cultures led to an increased mRNA turnover, and further analysis suggested this occurs in absence of protein synthesis. Thus, we hypothesize that metabolic changes during growth cessation impact the activity of degradation proteins, increasing mRNA stability. Together, our data are consistent with a model in which mRNA stability is controlled at the level of RNase activity and/or accessibility of mRNA to the degradation machinery

Level (Master's or Ph.D.): Ph.D.

Department: Biology and Biotechnology

Advisor: Scarlet Shell

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Ying Zhou, Tim Antonelli

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Chu Wang, Habibah Ashouri Choshali, Prince Chaudhary, Brandon Werner

Poster Title (100 characters or less): MIL-STD-3059: Moving toward the future, A Data Science Approach

Abstract (1,000 characters or less):

The purpose of MIL-STD-3059 standard is to provide minimal acceptance criteria and evaluation test methods for adhesives to be used on ground vehicle platforms for high loading rate applications. With the explosive growth in data being generated and recorded, the Army hopes to leverage its data to extract knowledge or insights from the data to maximize the long-term confidence and scalability of new adhesives technology and enables AI/ML adaptation against emerging threats by providing a consistent platform for technical data. In this work, we explore experimental data using different data analysis techniques to demonstrate the correlations between experimental parameters and build trustworthy adhesive qualification web application similar to e-commerce platform.

Level: Master's

Department: Data Science

Advisors: Prof. Fatemeh Emdad, Prof. Chun Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Chao Wang

Poster Title (100 characters or less): Indoor environmental quality influences cognitive functions: A critical review

Abstract (1,000 characters or less):

Indoor environmental quality (IEQ), such as air quality, thermal comfort, acoustics and visual comfort, plays an important role in affecting occupants' cognitive functions. This study aims to conduct a quantitative literature review to reveal the links between two entities. Research results from 193 papers were reviewed regarding the association between IEQ and cognitive functions. A large variety of cognitive functions have been considered in the literature. We classified them into four basic functions, attention, memory, perception, and executive function. In addition, we applied a text-mining approach to visualize the complexity between environmental parameters and cognitive functions, which otherwise was difficult to disentangle. Generally, this review supports that poor IEQ significantly reduces cognition but with various intensities for different functions. Various cognition works in the same task usually compete with each other due to the limited neurocognitive sources.

Level (Master's or Ph.D.): Ph.D.

Department: Civil and Environmental Engineering

Advisor: Shichao Liu

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI | GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Pitchaya Wiratchotisatian

Poster Title (100 characters or less): Matching Students to Project Centers via Optimization

Abstract (1,000 characters or less):

The Global Projects Program is a hallmark of WPI, with the Interactive Qualifying Project (IQP) being one of its most distinctive elements. Due to the growth of demand in the program, there has been need to reduce the time, effort and complexity required to manually place students into project centers. In 2017 an award-winning MQP proposed an optimization-based matching mechanism that recommends student-project center matches in a manner that promises to increase overall match quality, improve satisfaction of student and project directors, and reduce time among staff and faculty in processing applications. With this work serving as a foundation, we investigate concepts from matching theory related to stability and incentive compatibility, to evaluate how they affect the match efficiency. We further consider how to create effective student cohorts at project centers. We undertake this work to explore ways to improve both the fairness and transparency of the new process.

Level (Master's or Ph.D.): Ph.D.

Department: Data Science

Advisor: Dr. Andrew C. Trapp

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Dr. Hoda Atefyekta

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Caleb M. Woodall

Poster Title (100 characters or less): Mineral Carbonation for Carbon Sequestr

Abstract (1,000 characters or less):

Mineral carbonation (MC) is a strategy for carbon capture and storage (CCS) that sequesters CO2 in a stable and practically permanent form. It involves carbonating natural or artificial alkalinity sources with CO2. MC can be performed directly, converting alkalinity sources to carbonates in one reactor, or indirectly, where the source is converted to a more reactive form before being carbonated. Direct MC has the advantage of simpler processing, while indirect MC can produce higher-purity products for upcycled use in industries like construction and paper. Difficulty arises from the wide array of feedstock traits in terms of mineralogy, particle size, and geographic location. It is more feasible to develop multiple processes for different alkalinity sources as opposed to one universal process. The Wilcox Lab at WPI focuses on enhancing MC reaction kinetics and upgrading MC products for reuse, directly affecting process economics to improve feasibility for widespread implementation.

Level (Master's or Ph.D.): Ph.D.

Department: Chemical Engineering

Advisor: Jennifer Wilcox

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Hélène Pilorge, Noah McQueen

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Michael Yereniuk

Poster Title (100 characters or less): Spatial PDE Model of Chemical Absorption

Abstract (1,000 characters or less):
We want to determine the survival probabilities of cells or organisms exposed to pollutants or toxic stimuli. An agent-based model can easily capture the essential elements of this model, but meaningful analysis is difficult. The precise definition of the discrete agent-based simulation of chemical absorption-led state changes motivates our derivation of a continuous PDE model, which describes features of the simulation. Our agent-based model initializes agents as well as a chemical concentration in the region. The agents perform random walks, absorbing a proportion of the chemicals in their paths. Our PDE approximation calculates the time-dependent probability density function (PDF) as well as the state-change mean occupancy time. To solve the PDE, we develop a stable semi-discrete operator splitting numerical method.

Level (Master's or Ph.D.): Ph.D.

Department: Mathematical Sciences

Advisor: Sarah D. Olson

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: V Siddartha Yerramilli

Poster Title (100 characters or less): Characterization of IQGAP1 binding to phosphoinsotides and PIP kinases

Abstract (1,000 characters or less):

IQ-motif-containing GTPase-activating protein 1 (IQGAP1) is a multidomain protein that scaffolds multiple signaling pathways by binding its many partners. Recent studies have suggested that IQGAP1 plays a major role in the generation of the lipid messenger PI(3,4,5)P3 by scaffolding the phosphoinositide kinases PIPKIs and PI(4)KII class I phosphatidylinositol-3-OH kinase (PI(3)K). Here, we investigate the binding of IQGAP1 to these proteins and phosphoinositides in cancer cells using state-of-art fluorescence techniques like two photon FLIM (Fluorescence lifetime imaging microscopy). Our results indicate that the IQGAP1-phosphoinositide kinase interactions play a key role in modulating the synthesis of PI(4,5)P2 and PI(3,4,5)P3 as well as coordinating cytoskeletal reorganization through scaffolding.

Level (Master's or Ph.D.): Postdoc

Department: CBC

Advisor: Arne Gericke

List co-advisors if any (separate with a comma):

Suzanne Scarlata

List co-authors if any (separate with a comma):

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Biao Yin, Zhaoyu Sun, Ying Fang

Poster Title (100 characters or less): A Visual Analytic Platform to Discover Macro Corrosions

Abstract (1,000 characters or less):

ARL relies on an extensive and costly array of indoor tests, longer term weathering at remote outdoor testing sites, and in-situation vehicle monitoring to ascertain corrosion degradation and prevention interventions. So, an advance method to reduce time and cost for development of corrosion prevention mechanism is urgently need for ARL. For this project, our team propose an easy-work environment for material science researchers to discover corrosion correlations and designing experiments effectively, and also, interactive visualizations to interpret the correlations across materials. We have built all the sub-parts of an automatic work-flow including automatic corrosion detection and rating tool, advanced data science models and interactive dashboards. We aim at providing this effective tool for all the material science researchers to uncover macro-level corrosion correlations across tests in terms of the new composed materials experimented or ready-to-be experimented.

Level: Master's

Department: Data Science

Advisors: Prof. Fatemeh Emdad, Prof. Chun-Kit Ngan, Prof. Elke A. Rundensteiner

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WPI GRADUATE STUDIES

GRIE Abstract Form

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Full Name: Ziyang Zhang

Poster Title (100 characters or less): Determine surface energy through contact angle of binary mixtures

Abstract (1,000 characters or less):

Surface free energy of solid is an important material property for surface characterization and design. Contact angle of multiple solvents coupled with theoretical models are widely used to determine surface energy quantitatively, but have the drawbacks such as high volatility, limited liquid surface tension parameters and chemical reaction between liquid and solid, etc. In this study, we found that aqueous binary mixtures such as water-dimethyl sulfoxide, water-formamide, etc. could be used as probe liquid to measure contact angle. We applied our binary-mixture approach to flat PDMS and reported that contact angle of all mixtures yield identical surface energy. Furthermore, we extended our technique to self-assembled monolayers (octadecyltrichlorosilane, hexyltrichlorosilane and ethyltrichlorosilane) functionalized silicon dioxide. Results show that water-formamide water-glycerol mixtures yield consistent surface energy with each other. Our study suggests that the advantages of mixtu

Level (Master's or Ph.D.): Ph.D.

Department: Chemical Engineering

Advisor: Prof. Michael Timko

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

Christopher R. Lambert, Wenli wei

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WPI GRADUATE STUDIES

GRIE Abstract Form

Graduate Qualifying Project: Data Science

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Team Member Names: Guocheng Yao, Jinal Jain, Mengdi Li, Xiaoyu Zheng, Zhitao Li

Poster Title (100 characters or less): Talent AI: A Job Recommendation System Via Resume Text Mining

Abstract (1,000 characters or less):

In this GQP, we developed a job recommendation system for United Technologies. The system can automatically extract skills from job descriptions using Natural Language Processing (NLP) techniques, similar skills were found by comparing cosine similarity between each n-gram skills embedding vectors. Embedding vectors were updated on pre-trained Word2Vec. Skills extracted from resumes are the searching keywords for job descriptions' extracted skills and similar skills. Searching is implemented by ElasticSearch. Our system will reduce the resource cost for hiring process in a company and significantly help hiring managers release the pressure for all the hiring processes taking place in an organization.

Level: Master's

Department: Data Science

Advisors: Dr. Fatemeh Emdad, Dr. Chun-Kit Ngan

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WPI GRADUATE STUDIES

GRIE Abstract Form

Capital letters may be used conventionally, but please do not to put all text into capital letters.

Full Name: Brian Zylich

Poster Title (100 characters or less): Identifying Polite Language in Classroom Videos

Abstract (1,000 characters or less):

The emotional and behavioral support received in the classroom is an important factor in quality of students' education. The Classroom Assessment Scoring System (CLASS) is used to evaluate teachers across many dimensions, including emotional and behavioral support. Our research investigates how a teacher's polite language use correlates with CLASS score for positive climate. First, we compile a dataset of 57 classroom videos from YouTube and crowdsource labels for four types of polite language. We show that Google Cloud Speech-to-Text performs poorly in a classroom setting. Then, we develop a specialized model that outperforms Google's model at detecting polite speech. We explore the effect of architecture advancements developed for image classification, training data quantity, data augmentation, and multitask/single-task objectives on training deep learning models for speech tasks. Finally, we evaluate how polite language detection contributes to the prediction of CLASS scores.

Level (Master's or Ph.D.): Master's

Department: Computer Science

Advisor: Jacob Whitehill

List co-advisors if any (separate with a comma):

List co-authors if any (separate with a comma):

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