NASA / OHIO SPACE GRANT CONSORTIUM

2017-2018 SCHOLAR / FELLOW STUDENT JOURNAL

Students Representing Ohio Congressional Districts

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FELLOWSHIP AND SCHOLARSHIP PROGRAM

The Ohio Space Grant Consortium (OSGC), a member of the NASA National Space Grant College and Fellowship Program, awards graduate fellowships and undergraduate scholarships to students working toward degrees in **S**cience, **T**echnology, **E**ngineering and **M**athematics **(STEM)** disciplines at OSGC- member universities. The awards are made to United States citizens, and the students are competitively selected. Since the inception of the program in 1989, over 1,215 undergraduate scholarships and 172 graduate fellowships have been awarded.

Matching funds are provided by the 25 member universities/community colleges, the Ohio Aerospace Institute (OAI), Choose Ohio First, the Nord Family Foundation, the Nordson Corporation Foundation, and private industry. Note that this year ~ $500,000 will be directed to scholarships and fellowships representing contributions from NASA, the Ohio Aerospace Institute, member universities, foundations, and industry.

By helping more students to graduate with STEM-related degrees, OSGC provides more qualified technical employees to industry. The research conducted for the Master's fellowship must be of interest to NASA. A prime aspect of the scholarship program is the undergraduate research project that the student performs under the mentorship of a faculty member. This research experience is effective in encouraging U. S. undergraduate students to attend graduate school in STEM. The Education scholarship recipients are required to attend a workshop conducted by NASA personnel where they are exposed to NASA educational materials and create a lesson plan for use in their future classrooms.

18 Affiliate Members

- The University of Akron
- Baldwin Wallace University
- Case Western Reserve University
- Cedarville University
- Central State University
- Cleveland State University
- University of Cincinnati
- University of Dayton
- Kent State University
- Marietta College
- Miami University
- Ohio Northern University
- The Ohio State University
- Ohio University
- The University of Toledo
- Wilberforce University
- Wright State University
- Youngstown State University

7 Community Colleges

- Cincinnati State Technical & Community College
- Columbus State Community College
- Cuyahoga Community College
- Lakeland Community College
- Lorain County Community College
- Owens Community College
- Sinclair Community College

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MEMBERSHIP

Management

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Mechanical Engineering
Ohio Northern University

Ms. Laura A. Stacko
Program Manager

Mr. Timothy M. Hale
Program Assistant

18 Member Institutions

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Baldwin Wallace University

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Case Western Reserve University

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Central State University

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Cleveland State University

Dr. Joseph D. Ortiz
Kent State University

Prof. Craig Rabatin
Marietta College

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The University of Toledo

Jennifer Williams Ph.D.
Wilberforce University

Dr. Mitch Wolff
Wright State University

Dr. Hazel Marie
Youngstown State University

7 Community Colleges

Professor Abigail Yee
Cincinnati State Technical and
Community College

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Columbus State Community College

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Cuyahoga Community College

Constance Edwards, D.M.A.
Lakeland Community College

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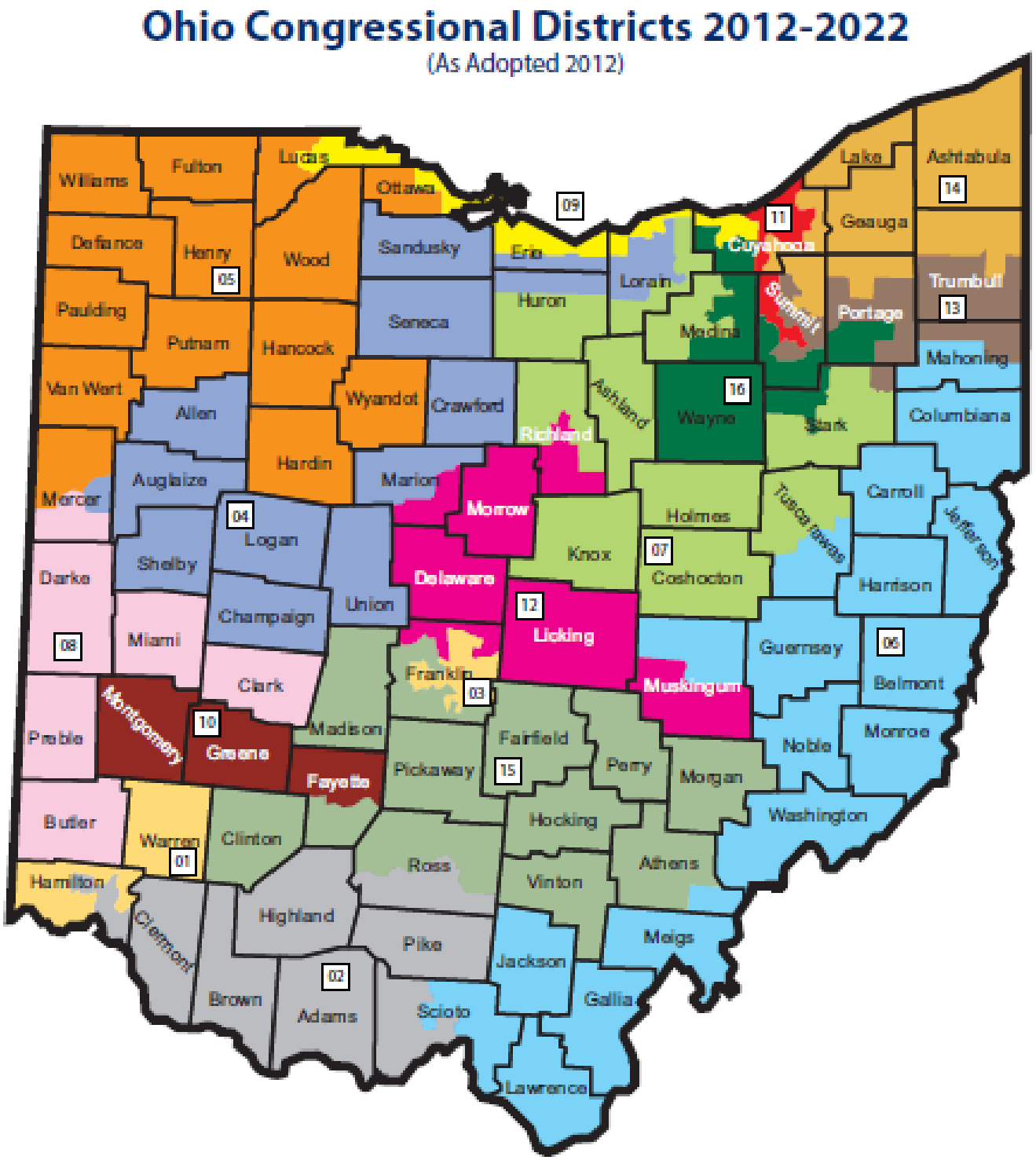
OHIO CONGRESSIONAL MAP



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FELLOWSHIPS

Jodi C. Turk

Status: Master's 1, Mechanical Engineering

Research Topic: Particle Imaging Velocimetry Analysis of Wake Induced by Real Whiskers

Advisor(s): Dr. Wei Zhang

Biography: Jodi is currently in her second year at Cleveland State University (CSU) pursuing her Master's Degree in Mechanical Engineering and plans to graduate May, 2018. She earned two Bachelor's Degrees: Mechanical Engineering and Mathematics from CSU in 2016 and she was in the Jack, Joseph, and Morton Mandel Honors College.

Growing up in LeRoy, Ohio, Jodi has had a passion for math, science, and swimming her whole life. Mechanical Engineering has allowed her to pursue the passions for math and science and CSU allowed Jodi to continue swimming while in college. At Cleveland State Jodi has been involved with numerous school activities and clubs, some of the more notable are The Society of Physics Students, Tau Beta Pi, Engineers Without Borders, and the Cleveland State Swim Team. She was an officer for The Society of Physics Students, helped with the MindSET program which is an outreach program with elementary school children run by Tau Beta Pi, and holds two school records on the Cleveland State Swim Team. She was awarded Outstanding Sophomore Mechanical Engineering Student. Jodi was part of the 2015 MARTI Summer Internship Program at NASA Glenn Research Center and the next summer she was the Logistics and Operations Manager for the Glenn Academies. She is currently the president of the NASA Academy Alumni Association.

Abstract: Biomimicry has been utilized to create innovative solutions in a vast range of applications. One such application is the design of seal-whisker-inspired flow sensors for autonomous underwater vehicles (AUVs). In dark, cramped, and unstable terrain AUVs are not able to maneuver using visual and sonar-based navigation. Hence, it is critical to use underwater flow sensors to accurately detect minute disturbances in the surroundings. Certain seal whiskers exhibit a unique undulating three-dimensional morphology that can reduce vortex induced vibrations (VIVs) if the major axis of the whisker cross-section is aligned to the inflow. This allows the seal to precisely track prey fish upstream using solely their whiskers. The current study aims to understand the effect of a real seal whisker's morphology on the vortex shedding behavior. Despite extensive studies of the wake induced by scaled whisker-like models, the vortex shedding in the wake of a real seal whisker is not well understood. A series of experiments are conducted with a high-speed Particle Imaging Velocimetry (PIV) system in a water channel to examine the vortex shedding downstream from a smooth whisker and an undulating whisker at a Reynolds number of a few hundred. Results of the vortex shedding induced by real seal whiskers can provide insights on developing high-sensitivity underwater flow sensors for AUVs and other whisker-inspired structures.

Publication(s):

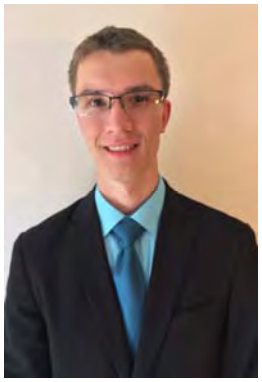
1. Turk, J., Bunjavac, J., Omilion, A., Zhang, W., Kim, J., Kim, J., Choi, W., and Lee, S., "Vortex Shedding in the Wake Induced by a Real Elephant Seal Whisker," 70th Annual Meeting of the APS Division of Fluid Dynamics, November, 2017.
2. Bunjevac, J., Turk, J., and Zhang, W., "PIV Analysis of Wake Induced by Real-scale Seal Whiskers," 12th International Symposium on Particle Image Velocimetry, June, 2017.
3. Kreeger, R., Douglass, R., Gazalla, M., Koster, Z., Turk, J., and Work, A., "Analysis and Prediction of Ice Shedding for a Full-Scale Heated Tail Rotor," 8th AIAA Atmospheric and Space Environments Conference, June, 2016.
4. Turk, J., "The Effects of Chordwise and Spanwise Heating on an Airfoil," Ohio Space Grant Consortium Symposium, April, 2016.
5. Deshpande, K., Douglass, R., Gazella, M., Koster, Z., Linton, M., Patmon, E., Turk, J., and Vanderscoff, R., "Multi-Disciplinary Research Improving De-icing, Bryogenic Power Devices, and On-blade Control of Vertical Lift Rotors," NASA Glenn Summer Internship, 2015.

Congressional District: 14th

Congressional Representative: David P. Joyce

The Ohio State University

Collin E. Mikol



Status: Master's 1, Mechanical Engineering

Research Topic: Design, Modeling, and Experimental Testing of a Variable Stiffness Structure for Shape Morphing

Advisor(s): Dr. Haijun Su

Biography: Collin Mikol is a Cleveland, Ohio, native who is currently a graduate student at The Ohio State University pursuing his Master's of Science in Mechanical Engineering. Collin also attended Ohio State for his undergraduate degree, where he was a graduate of the green engineering scholars program and also participated in honors undergraduate research. His research interests lie in the field of robotics and compliant mechanisms, and his passion is to expand this technology for robotic space applications as well as collaborative robots in industry. Collin was awarded a second place finish in engineering at the 2017 Denman Undergraduate Research Forum at Ohio State for his undergraduate research into a compliant gripping mechanism for robots for anchoring and mobility in microgravity or extreme terrain. Throughout his college career, Collin has had four summer internship experiences, two at GE Transportation and two at Swagelok. At these internships, Collin was able to achieve a practical understanding of how his research and academia interests are applicable in a manufacturing environment. Outside of school, Collin enjoys staying active by playing intramural sports and weightlifting, reading about business, and actively volunteering in his community.

Abstract: Shape morphing structures that are both actively controlled and greatly variable in stiffness offer unique solutions in aerospace applications. Current aerospace industry trends show increased interest in shape-adaptive structures capable of carrying high loads for improved aerodynamic performance and fuel efficiency. One limiting factor in present applications is the ability to actively morph structures and control stiffness using the same type of actuation system. My research focuses on developing an actively controlled, variable stiffness structure that uses a pneumatic system for both morphing and locking the structure shape. Design prototypes that use various pneumatic actuation technologies and beam designs will be iteratively tested for feasibility and reliability. Layer jamming, which utilizes varied friction between thin sheets based on pressure, will be used to control the variable stiffness. The shape morphing and layer jamming will be analyzed in a setup using a force tester to show the ability of the structure to actively morph and control its stiffness using a pneumatic control scheme. This novel research would positively impact both the aerospace and robotics fields by creating lightweight morphing structures that are flexible and easily deformed, but also stiff with high load-carrying capability.

Publication(s):

1. Mikol, C. "Compliant Gripping Mechanism for Anchoring and Mobility in Microgravity and Extreme Terrain." The Ohio State University. Department of Mechanical and Aerospace Engineering Undergraduate Thesis, 2017.

Congressional District: 14th

Congressional Representative: David P. Joyce

University of Cincinnati

Nathaniel L. Richards

Status: Master's 1, Aerospace Engineering

Research Topic: Comparison of Machine Learning Methods for Applications in Concussion Prevention and Prognosis

Advisor(s): Dr. Kelly Cohen and Dr. Adam Kiefer

Biography: Nathaniel is a first-year graduate Aerospace Engineering student at the University of Cincinnati. He completed his Bachelor's Degree early through the ACCEND program at UC. He has co-oped at three organizations: Gulfstream Aerospace, NASA Langley Research Center, and the UAV MASTER Lab at the University of Cincinnati. He has worked in the areas of rapid prototyping (3D printing), UAV navigation, and optimal control.

Nathaniel has also been involved with the UAV MASTER Lab under Dr. Cohen since the start of his undergraduate career. He has conducted research under the NSF-REU and OSGC Undergraduate STEM Scholarship programs, and he has worked with Dr. Cohen to develop and teach an undergraduate course on UAV construction and flight-testing. He has developed several Genetic Algorithms that have been applied to the Traveling Salesmen Problem, PID control tuning, and Fuzzy Logic control tuning. He is currently applying these and other machine learning methods to the medical field, collaborating with the Division of Sports Medicine at Cincinnati Children's Hospital Medical Center.

Abstract: This research looks to apply a variety of machine learning algorithms to advance the field of concussion prevention and prognosis. For prevention, it has been shown that unanticipated collisions result in larger g-forces and greater potential for injury. The TEAM Virtual Reality (VR) Lab at Cincinnati Children's Hospital has collected data from high school soccer players regarding collision frequency and g-forces. It is hypothesized that a player's oculomotor fitness, as determined by two eye gaze tracking tests, is a predictor of unanticipated collision risk.

When a patient is admitted for a head injury, they fill out several forms consisting of numerical, categorical, and linguistic descriptions of pain severity, pain location, symptoms, and other relevant details – a total of 59 input variables. Cincinnati Children's Hospital has created a database with these input variables and how long it took for the patients to return to unrestricted physical activity. It is hypothesized that these inputs can be used to predict the number of days until unrestricted physical activity.

Publication(s): None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

SCHOLARSHIPS

Baldwin Wallace

Tayla R. Brooks

Status: Senior, Biology

Research Topic: Investigating the Role of Pseudomonas Quinolone Signal Molecule in *Pseudomonas aeruginosa* Associated Keratitis

Advisor(s): Dr. Michael Kovach

Biography: I grew up in Cleveland, Ohio, and went to a Garrett Morgan Cleveland School of Science, a small high school in the area. I am one of fourteen children and one of four of my siblings that attend Baldwin Wallace University. I am currently a Senior Biology major and International Studies minor expected to graduate May, 2018. I have always had a strong interest in science and problem solving. I realized my freshman year that I wanted to work in research after graduation. I have taken classes across many science disciplines before I discovered my love for microbiology and plant biology. I have been a lab assistant in different labs including botany, genetics, and microbiology. Working in these labs has only reiterate my interest in research. I have conducted research with Dr. Michael Kovach over the past year on Bacterial Keratitis. After graduation I plan on applying to graduate school programs in Microbiology and Plant Pathology. I am currently looking at a career in either Microbiology or Plant Biology with a focus in Genetic Engineering.

Abstract: Nearly 30 million individuals in the U.S. wear contact lenses. Of those people, 40-90% of them do not properly clean them, which can cause a serious eye infection known as Bacterial Keratitis. The organism that causes this infection is *Pseudomonas aeruginosa. P. aeruginosa* is a gram negative opportunistic pathogen. The mechanism by which this bacterium is able to be successful in reference to colonization has not been extensively studied; therefore, the current medical treatments are limited. In a recent study that compared the proteomic profile of two pseudomonas strains found that a significant amount of proteins varied between the two strains of P. aeruginosa. Among those proteins found, members of the quinolone signaling (PQS) system PqsB, C, and D were also detected in the clinical strain. Under stressful conditions, the quinolone signaling system has been shown to be produced by *P. aeruginosa.* Quorum sensing (QS) enables bacteria to restrict the expression of specific genes to the high cell densities at which the resulting phenotypes will be most beneficial. This system controls cell density. The purpose of this study is to find out how Quorum Sensing plays a role in the colonization of *Pseudomonas aeruginosa* in Bacteria Keratitis. This will allow for the development of better treatment option for individuals with bacterial keratitis.

Publication(s): None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Baldwin Wallace

Kyle S. Pellegrin

Status: Senior, Physics

Research Topic: Validation of Variable Star Photometry using the Burrell Telescope

Advisor(s): Peter Hoekje

Biography: Kyle Pellegrin is a Senior at Baldwin Wallace University, and will graduate with a Bachelor of Science Degree with a major in Physics in May, 2018. On campus, Kyle works as a Physics Workshop Assistant and grader for Astronomy courses, as well as conducting astronomical research at the University's Observatory. During Summer, 2017, he participated in a National Science Foundation Research Experiences for Undergraduates program at Ohio Wesleyan University. During the program Kyle worked on a team studying the starspots on the star LO Pegasi, and created a model of the stellar surface via computational modeling techniques. Kyle hopes to continue his education into graduate school, where he plans on pursuing a Ph.D. in Astronomy.

Abstract: This research project aims to prepare the Burrell Memorial Observatory telescope for use in studying variable stars with the intent of submitting collected data to the American Association of Variable Star Observers (AAVSO). This will begin by quantifying the characteristics of the telescope and CCD camera system, as well as developing procedures for successful observations. A well-known variable star will then be studied by utilizing the technique of differential photometry, in order to ensure the results acquired are in agreement with the known variations of the star. After successful completion of these tasks, the observatory will then be ready to select a section of the AAVSO to work with, and begin acquiring data on current target variable stars for submission to the AAVSO.

Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Baldwin Wallace

Joel R. Kavaras

Status: Junior, Mathematics

Research Topic: Mathematical Modeling of the Spread of Beech Leaf Disease

Advisor(s): Dr. Aaron Montgomery and Dr. Kathryn Flinn

Biography: Joel Kavaras grew up in Independence, Ohio, where he fostered a love of the outdoors and a curiosity for exploring the science behind nature's wonders. Whether it was reading field guides or watching science documentaries, he always had a passion for learning more about the planet. In high school, Joel began his current job working as a naturalist with Cleveland Metroparks during summer and winter breaks. He is currently working on a field guide to local land snails for Cleveland Metroparks. As a Junior at Baldwin Wallace University, Joel studies Mathematics along with minors in Biology and Physics, hoping to combine these fields for a career in mathematical biology.

Abstract: Beech Leaf Disease (BLD), after first appearing in Lake County in 2012, now affects American beech *(Fagus grandifolia)* populations across northeast Ohio, northwest Pennsylvania, southwest New York, and possibly parts of West Virginia and Ontario. So far, a causal agent remains unknown, while tree mortality (especially in saplings) and the thinning of canopies in larger trees across affected areas make the disease a growing concern each year. This research project will be focused on mapping the diseased trees graphically to analyze its spread across a geographic area over time. Using the tools of graph theory as a framework, there will be potential to identify patterns in the data revealing how the disease spreads, which could further our understanding of BLD and shed light on how to slow its spread.

Publication(s): None yet.

Congressional District: 14th

Congressional Representative: David Joyce

CASE
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve

Clarissa A. Goldsmith

Status: Junior, Mechanical Engineering

Research Topic: Cyber Physical Farming Robot for Organic Farm Weed Control

Advisor(s): Roger D. Quinn, Ph.D.

Biography: Clarissa Goldsmith is a Junior at Case Western Reserve University, pursuing her Bachelor's and Master's Degrees in Mechanical Engineering through the BS/MS dual degree program. Born and raised in Worthington, Ohio, she attended Worthington Kilbourne High School where she fostered her passion for robots and design by competing in her school's Science Olympiad team. At Case Western, she has worked in the Biologically Inspired Robotics Lab since the middle of her sophomore year, designing a variety of insect inspired robots. Outside of the lab, Clarissa is the secretary of CWRUbotix, the robotics club at CWRU, where she competes as a member of the club's NASA Robotic Mining Competition design team, and is also a member of the Case Concert Choir.

Abstract: For countless farmers, weeding poses a significant and laborious task throughout the growing season. The labor involved with manual weeding is prohibitively expensive to many, and those willing to provide such labor are becoming increasingly scarce. In addition, the cost of herbicides, the evolving chemical resistance of weeds, and environmental concerns necessitate an elimination of the use of chemicals. Autonomous robots stand to reduce cost and labor and increase efficiency in the dull and laborious weeding process, as they could be capable of extensive durations in fields for weeding and could adapt to drastically changing operating conditions, which would overall greatly increase farm productivity. This project sought to capitalize on this new opportunity through the development of a legged autonomous robot for precision weeding on farms, known as AgroBot, specifically the development of a single leg actuation system for prototyping purposes.

Publication(s): None yet.

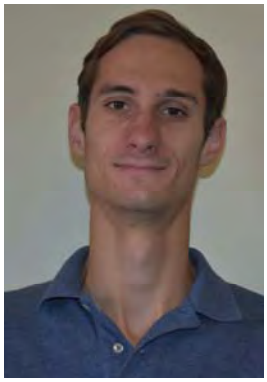
Congressional District: 12th

Congressional Representative: Currently Vacant

CASE
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve

David B. Prigg



Status: Junior, Mechanical Engineering

Research Topic: Robo-Moth: Flapping Wing Micro Aerial Vehicle

Advisor(s): Roger D. Quinn, Ph.D. and Kenneth C. Moses

Biography: David Prigg grew up in Elmhurst, Illinois. He developed an early passion for engineering tinkering and building things such as go-karts, rockets and robots. Now pursuing a Bachelor's and Master's Degrees in Mechanical Engineering through the BS/MS Dual Degree Program at Case Western Reserve University. He will graduate in 2019. Prior to Case, David became an Eagle scout of Troop 17 and was a captain of the men's track team at York Community High School. At Case, David participates in Varsity track and field and has competed in all UAA conferences. He participated in the Battle of the Rocket competition, video payload team as a part of Case Rocket Team. and undergraduate research with Dr. Roger Quinn's Biologically inspired robotics team. David has future plans to apply his studies in the sustainable energy industry.

Abstract: Creating small moth-inspired drones will be useful for search and rescue missions where larger vehicles don't have access. In order to provide comparable lift performance to real moths, artificial wings are crucial. Using carbon fiber, a manual method of printing out a template is used with a venation pattern laid on top. Using Matlab, a more accurate method can be devised. High resolution scans of wings are used to calculate the flexural stiffness along the wing. Using material properties, the scan can be transformed into a comparable artificial wing layout. The final product will be an artificial wing template that when made, will have the same behavior as real wings. The software will also compare the manufactured wing to the template and report a match value.
This process can be used for other biological scenarios when trying to mimic nature. Making similar manual measurements is time consuming and tedious. Digitization using image analysis can speed up, improve precision, and increase repeatability for many measurements, including flexural stiffness along a wing.

Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

CASE
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve

Matthias S. Weisfeld

Status: Senior, Mechanical Engineering

Research Topic: Flying Wing Micro-Air Vehicle Moth Project

Advisor(s): Dr. Roger D. Quinn

Biography: Matthias is a student in the Bachelor's/Master's program at Case Western Reserve University (CWRU), studying Mechanical and Aerospace Engineering. He is currently a Junior and will be graduating in 2019. He has a strong interest in robotics and aviation. Matthias works as an undergraduate research assistant at the CWRU Biorobotics Laboratory, aiding in the construction and design of a robotic moth, closely resembling the Manduca Sexta Hawkmoth. In addition to his research, Matthias is also an active member of the Phi Kappa Tau Fraternity and the Design, Build, Fly and Humanitarian Corps clubs.

Abstract: The Flying Wing Micro-Air Vehicle Moth Project (FWMAV Moth Project) seeks to replicate the flying characteristics of a real life Manduca Sexta Hawkmoth. These FWMAVs could be used for a quite large number of applications. This particular portion of the project focuses on the production and analysis of the wings, including both the forewing and hindwings, with a heavy focus on the forewings.

In order to create a robotic moth that adequately simulates the conditions of a real Manduca Sexta, the wings must have a similar mass and flexural characteristics. Likewise, it must have a similar ratio of venation structure to membrane structure, in this case made of unidirectional carbon fiber and Icarex fabric, respectively.

These materials are carefully cut to the appropriate shape and length, then placed into a mold, that fits the experimentally determined curve of the Manduca Sexta wing. This is then baked in a vacuum bag to form the finished wing.

Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Cedarville University

Sarah C. Rouse

Status: Senior, Geology

Research Topic: Characterization of Sand Grains of the Tensleep Sandstone (Pennsylvanian-Permian), Wyoming, USA

Advisor(s): Dr. John Whitmore

Biography: Sarah Rouse grew up near Atlanta, Georgia, where she developed her love of the outdoors in general and rocks in particular. She discovered Cedarville University and met her advisor at a high school summer camp, which introduced her to the academic world of geology. Currently finishing her final year at Cedarville, she is enthusiastic about furthering her education in geology. In addition to active involvement in her department, Sarah also participates in Cedarville's Honors organization and enjoys exploring the remarkably varied landscape of Ohio.

Abstract: The Tensleep Sandstone of Wyoming has been the focus of much research as a major oil reservoir. Few previous studies, however, have provided a detailed quantitative description of the Tensleep's characteristics. This project aims to analyze grain size, sorting, composition, and porosity of samples from four Tensleep outcrops, primarily through the study of thin sections and also through examination of hand samples. The results may then be compared to the similar Coconino Sandstone of Arizona in order to understand the relationship between the petrographic and depositional natures of these widespread sandstones.

Publication(s):

1. Rouse, Sarah C. "Characterization of massive vs. laminated texture of the Coconino Sandstone (Permian), Arizona from the study of thin sections." OSGC Student Research Symposium, 31 Mar 2017. Poster presentation.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Cedarville University

Michaela M. Crouch

Status: Junior, Mechanical Engineering

Research Topic: Three-Dimensional Surface Analysis for Validation of Electrochemical and Numerical Estimates of Fretting Corrosion

Advisor(s): Dr. Timothy Norman

Biography: Michaela Crouch is a Junior pursuing a degree in Mechanical Engineering at Cedarville University with minors in Math and Biblical Studies. In high school, Michaela participated in her school's engineering program, which is where her passion for the field began to form. While at Cedarville, she has held positions as a math tutor and a grader for the engineering department. Outside of her studies, Michaela enjoys spending time with her husband, being outdoors, and doing anything creative.

Abstract: Fretting corrosion is a significant factor in the increased failure rates of metal-on-metal hip implants. These implants consist of a metal femoral head and metal stem, and fretting wear occurs at their interface. When the implants are functioning in the body, fretting wear is accelerated due to the corrosive environment.

This work builds on previous research done to investigate the effect of angular mismatch and surface roughness on fretting wear. Finite element analysis was done to determine theoretical volumetric wear. Electrochemical analysis was also done while subjecting specimens to cyclical loading and was consistent with the finite element results. This research project plans to validate the previous finite element and electrochemical estimates using three dimensional analysis of the taper-trunnion surface.

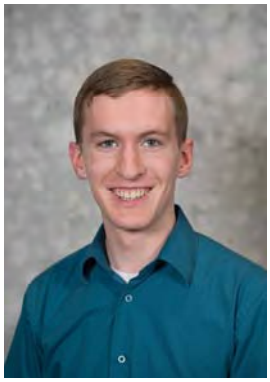
Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Cedarville University

Daniel J. Stank



Status: Junior, Biology

Research Topic: Continued Study of the Mechanism by which MicroRNA-146a Upregulates Phagocytosis in Sjögren's Syndrome

Advisor(s): Dr. Kaleb Pauley

Biography: Daniel is a Senior at Cedarville University and will graduate in May, 2018, with a B.A. in Biology. In his free time, Daniel enjoys playing piano and learning German. He is interested in scientific research because he enjoys the thrill of discovery. He is most interested in Immunology because it is a fascinating, growing and promising field. Over the past four semesters he has been researching Sjögren's Syndrome. Despite the tedious, repetitive nature of research, his interest in research has continued to grow. Daniel plans to enroll in a PhD. program in immunology. His ultimate goal is to be the principal investigator on a project related to autoimmune diseases.

Abstract: Sjögren's syndrome is an autoimmune disease that affects the salivary glands and other secretary glands. This leads to symptoms including dry mouth, dry eyes, and other GI tract issues. In previous studies, Pauley et al conclusively linked upregulation of MiR-146a to an increase in phagocytosis of apoptotic E. coli. bacteria cells. Our studies have shown that upregulation of MiR-146a is also linked to phagocytosis of apoptotic human Jurkat cells.
We sought to elucidate the pathway by which miR-146a leads to an upregulation in phagocytosis by knocking down possible elements in the pathway such as TRAF-6. Our experiments showed that knocking down TRAF-6 had no effect on phagocytosis. We then continued searching for elements in the pathway by knocking down Metadherin (MTDH) which is involved in cytoskeletal remodeling. We proposed that MTDH may play a role in MiR-146a induced phagocytosis by promoting cytoskeletal remodeling.

Publication(s):

1. Upregulation of phagocytosis my miR-146a. 2017. Manuscript in progress.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Central State University

Michael C. Curtice

Status: Senior, Manufacturing Engineering

Research Topic: Automated All-Sky Acquisition Project

Advisor(s): Dr. Mahmoud Abdallah, Dr. Augustus Morris, Jr., and Gail Vaucher

Biography: Michael Curtice is from Jamestown, Ohio, is a graduating senior at Central State University majoring in Manufacturing Engineering. After he graduates he will go to work in the near future he will like to pursue his Master's in Renewable Energy.

Abstract: The US Army Research Laboratory (ARL) seeks to provide a decisive edge for the land forces. One area ARL is focused on is Energy. Currently on the battlefield soldiers use diesel powered generators as a source of power. Manually transporting the fuel to the generators is dangerous. If you are a soldier in the convoy you are at high risk of being attacked by the enemy. To help reduce potential casualties, ARL is working on integrating renewable energy with non-renewable energy generators. These generators that the soldiers will use are mobile hybrid micro-grids. These generators have two means of producing power and have the ability to produce enough power for a forward operating base (FOB). ARL started a research project called Atmospheric Renewable Energy Case Study; to help with the advancement of creating the hybrid micro-grids. I have worked with ARL on the Atmospheric Renewable Energy Case Study #2. The purpose of the study was to study the atmospheric impact on the photovoltaic (PV) panel, take photo images of the sky and apply them for machine learning cloud assessment and to quantitatively describe the ARE2 PV power train.

The power and solar radiation data were recorded and documented daily. The data were plotted on a times series graph that showed the power and solar radiation for the previous day. With the graphs, the power generated by the power train can be observed and compared with the weather conditions of a certain day. Weather reports for the area were also documented daily with this information the cloud conditions can verify the decrease in power at certain parts of the day. The data collected was compared with data collected from the National Research Energy Laboratories. The results ARE2 obtained were confirmed to be reasonable. Images of the sky were manually taken every hour until the close of business using a simulated whole sky imager (s-WSI). The images were later be digitized and will be used for machine learning. The images corresponded with the weather summaries. With these sources of information, the power train output could be analyzed. When the power data graph would show a drop in the power output, the weather reports and images would prove the cloudy conditions.

The photo collection process can be improved by automating it. This way an individual will not need to conduct photo observations at certain points of the day. The next phase of this research, called the "Automated All-Sky Acquisition Project" (AAAP), will automate the process. A PV panel, batteries, charge controller load and simulated whole sky imager will be required. The PV panel will provide power. The batteries will store or discharge power and the load will absorb power. The charge controller will regulate the power between the three elements to provide even power distribution. The s-WSI will be attached to the PV panel and will be programmed to conduct photo observations at certain intervals from a 24-hour period.

Publication(s):

1. Gail Vaucher, Michael Curtice, Jenna Forrester, Renea Young, Clayton Walker and Sean D'Arcy, Atmospheric Renewable Energy Research, Volume 4: Atmospheric Renewable Energy Field Study #2 (ARE2). January 10, 2018.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Central State University

Lynnae S. Frisco

Status: Junior, Manufacturing Engineering

Research Topic: Blaze Clothing, Heated Clothing

Advisor(s): Augustus Morris, Jr., Ph.D., P.E. and Morris Girgis, Ph.D.

Biography: Lynnae Frisco is from Wilmington, Ohio and is currently a student enrolled in the Manufacturing Engineering Program at Central State University. Lynnae first enrolled at Central State in the Fall of 2014 after graduating from Wilmington High School and Laurel Oaks: Great Oaks. Since high school she has taken her academics seriously and has continued to do so into her college years. In the Summer of 2017 she earned her first internship. Her internship allowed her to participate in research to help create safety equipment for sports out of natural materials. Another part of her responsibilities for her internship was to help teachers in the Dayton area create a lesson plan that includes STEM education into our public schools.

Currently, Lynnae is a robotics counselor in the Verizon Learning Program for minority males. She meets with them every 1st and 3rd Saturday to enrich their lives with more STEM classes such as robotics, 3-D printing, drones and professional development. Lynnae plans to continue her education at Central State until graduation day which is May. 2019. Once she graduates she wants to pursue a career in either programming or design which are her passion in her field.

Abstract: Every year throughout the U.S., there are a tremendous amount of reports of people freezing to death. We could drastically reduce that number throughout the world with Blaze Clothing by installing heating systems similar to those in your car or truck seats. Heated clothing has been created already but for some reason has not become that popular. We plan to modify the clothing to make it more affordable and accessible around the world. A variety of people can benefit from Blaze Clothing for many purposes ranging from work clothes to casual wear, or even to astronauts or space travelers. The main purpose of Blaze Clothing is to ensure warmth, reduce the number of freezing deaths, assist those who suffer from anemia, and for the comfort of those who don't enjoy the cold weather.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Central State University

Kylon J. Payne

Status: Senior, Manufacturing Engineering

Research Topic: Blaze Clothing, Heated Clothing

Advisor(s): Augustus Morris, Jr., Ph.D., P.E. and Morris Girgis, Ph.D.

Biography: Kylon Payne, who is a Senior at Central State University and will graduate in May 2019 with a B.S. in Manufacturing Engineering, was born and raised in St. Paul, Minnesota, where he attended Tartan Senior High School. Growing up Kylon played various instruments including the guitar, piano, and trumpet. He also played a number of sports including baseball, football, and basketball. Kylon has always had an interest in Mathematics since he started attending school; it was always his favorite subject.

Since attending Central State University, Kylon has become more involved with many different student organizations on campus. One the organizations he is most proud of joining is Alpha Phi Alpha Fraternity Inc., Delta Xi Chapter, where he currently serves as the Chapter President for the 2017-2018 Academic School Year. Kylon is also proud of receiving the opportunity of Summer Internship in the summer of 2016. He conducted research with two of his peers from Central State University, and was able to learn and observe many unique things and the NASA Glenn Research Center located in Cleveland, Ohio. In the summer of 2017, Kylon was given the privilege of a summer internship, Research Experience for Undergraduates (REU) funded by the National Science Foundation (NSF), where his research mainly focused on the improvement of the navigation of Unmanned Aerial Vehicles (UAVs).

Abstract: Every year throughout the U.S., there are a tremendous amount of reports of people freezing to death. We could drastically reduce that number throughout the world with Blaze Clothing by installing heating systems similar to those in your car or truck seats. Heated clothing has been created already but for some reason has not become that popular. We plan to modify the clothing to make it more affordable and accessible around the world. A variety of people can benefit from Blaze Clothing for many purposes ranging from work clothes to casual wear, or even to astronauts or space travelers. The main purpose of Blaze Clothing is to ensure warmth, reduce the number of freezing deaths, assist those who suffer from anemia, and for the comfort of those who don't enjoy the cold weather.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Cleveland State University

Cleveland State

Kristen N. Fulmer

Status: Senior, Mechancal Engineering

Research Topic: Electric Propulsion for Commercial Aircrafts

Advisor(s): Dr. Wei Zhang

Biography: Currently, I am enrolled at Cleveland State's undergrad program for Mechanical Engineering. I am set to graduate this year in May. While at Cleveland State I have taken on several different opportunities that became available to me through the college. I interned at a material science startup company in Austria for three months, where I joined on to the simulations team developing test data for printed circuit boards. I also joined the AIAA team participating with small design projects. Additionally, I was awarded the Parker Hannifin Scholar award which has allowed me the opportunity of internships within Parker's multiple divisions. These opportunities opened doors to possibilities of advancing my career in aerospace. My passion is flying and aerospace, so in my free time I take flying lessons working towards my private pilot's license.

Abstract: My proposed research is for electric propulsion for commercial aircrafts. Electric propulsion technology for manned flight capable of phasing out existing internal combustion engines will result in cleaner energy usage for aviation structures. This will take a projection of at least 15 years. Currently, electric propulsion systems use power from gas turbine engines to electrically operate fans that have been placed into the rudder of a commercial airplane. The electric system is operating from two additional motors which will provide power and feedback for occurrences of failure. My research is a yearlong project that is performed in conjunction with the exiting propulsion team at NASA Plum Brook Station in Sandusky, Ohio. Together we run testing on a full-size scale of the electrical system that would power and operate a Boeing 747.

Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Uchechukwu N. Obiako

Status: Senior, Chemical Engineering

Research Topic: Low-Temperature Catalytic Gasification of Particulate Waste for In-Situ Resource Utilization

Advisor(s): Dr. Jorge E. Gatica

Biography: Uchechukwu Obiako was born and raised in Anambra, Nigeria, but had the terrific opportunity to move to Cleveland, Ohio, in 2011. She has always had a love for science since the age of 10 and over the years developed her passion for it and decided to pursue a degree in chemical engineering because of its vast and challenging curriculum. She is currently a Senior studying at the prestigious Washkewicz College of Engineering. She is also a member of the Jack, Joseph and Morton Mandel Honors College and McNair Scholars Program. As a member of the cooperative program, she has had the opportunity to participate in multiple experiences including internships and undergraduate research. She completed internships at De Nora Tech, SABIC and Corning; she also completed undergraduate research at Vanderbilt University and Cleveland State University. Currently, she holds the position of vice president for the student chapter of AIChE and teaching assistant for a freshman level engineering design course. After graduation, she intends to work for Corning and eventually obtain a Master's Degree in Materials Engineering. Outside of school, she enjoys volunteering, traveling and watching movies & television shows.

Abstract: Waste management has proven to be a challenge in aerospace and municipal areas, and catalytic gasification is one key solution to tackle this challenge. Waste types include plastic, paper, food scraps, human waste, etc. Catalytic gasification promotes thermal degradation of waste substrates at low temperatures to produce synthetic gas. A laboratory scale procedure has been developed to study and characterize the production of syngas from several waste substrates including polyethylene, cellulose and nylon. Catalytic gasification of cellulose, however, has proven to present several additional design challenges and thus requires two complementary routes of in-depth research and analysis. In this project, computational fluid dynamics (CFD) will serve as a powerful tool for characterization and optimization. An essential stage in ensuring a successful scale-up and design for this project requires characterizing mixing, particle dynamics, and transport phenomena associated with the degradation (gasification) of cellulosic substrates which is the main goal of this project.

Publication(s): None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Cleveland State University

Cleveland State

Mina G. Kamel

Status: Junior, Computer Science

Research Topic: Robotic Mouse in Maze

Advisor(s): Ms. Rose Begalla

Biography: My name is Mina Kamel. I live in Parma, Ohio. I am 25 years old.

I am currently attending school at Cleveland State University for computer science major.

This is my third year, and I am anticipating to graduate in May, 2019. I spend most of my time between learning from school and also, learn from my own research. I am currently doing a research on Robotic Mouse in Maze.

Abstract: With the recent demand of our service members to perform operations in both urban and underground environments, there has become a large need for robots displaying different forms of artificial intelligence. One such example of AI is with a machine being able to navigate through an area by itself, able to retain both where it has been, and where it must go to return to its original location. A real-world example of this is in dealing with underground caves. In this type of operational environment, current robotic assets require the use of radio frequency transmissions, dealing with an operator having a remote with which he can drive the robot through a tunnel and monitor its location via a video camera mounted upon the top of the robot. Due to the environment in a cave and the limitations of RF capabilities, the operator must maintain a close distance to the robot itself. In doing so, the operator is still vulnerable to many dangers such as explosions or cave-ins. With the use of an AI type robot, we will be able to navigate through dangerous situations while keeping a safe distance.

Publication(s): None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Kent State University

Hannah L. Schlaerth

Status: Senior, Geology

Research Topic: Remote Sensing of Local Water Quality Affecting Coral Reef Health, U.S. Virgin Islands

Advisor(s): Dr. Joseph D. Ortiz

Biography: Hannah Schlaerth is an undergraduate student at Kent State University studying Geology with a concentration in Environmental Geology. Hannah has experience in geologic mapping, igneous petrology, geochemistry, and remote sensing. On campus, she is an active member of women's advocacy groups and works as a peer mentor at Student Support Services, specializing in tutoring first-generation college students and students with special needs. Hannah hopes to continue her advocacy efforts through a future career as an environmental engineer.

Abstract: Nearly a quarter of ocean species are constrained to coral reefs, making them important resources to island economies in terms of tourism and fishing. Increases in development and changes in land use have created an influx of sediment and nutrients entering the coastal waters of the U.S. Virgin Islands (USVI), causing detrimental effects on water quality. As a consequence, coral reefs have started to degrade. We employ remote sensing as a method of water quality monitoring, which offers a spatial advantage and cost effective alternative over traditional water quality monitoring. This study integrates NASA Landsat data with field spectroscopy in order to determine bio-optical properties and to quantify changes in water quality parameters that effect coral reef health in the USVI. Surface reflectance imagery was collected for clear days from January 1985 through August 2017. The images were systematically analyzed by taking the derivative of the measured visible/near infrared spectra and then using Varimax-rotated Principal Component Analysis (VPCA) decomposition to identify color producing agents (CPAs) in the water column. VPCA loadings were standardized and results were matched to libraries of reflectance derivative spectra for known pigment and mineral standards. Research campaigns were conducted to provide in-situ surface reflectance data for comparison with the VPCA-decomposed imagery. A spectroradiometer (ASD Fieldspec HH2) was used to measure surface reflectance from 350-1075 nm and data were averaged to 10 nm resolution. Preliminary results show changes in the spatial distribution of CPAs over time, which may suggest changes in coastal water quality. The detection and analysis of water quality parameters is a necessity in current and future remediation efforts and VPCA decomposition will likely prove beneficial as an inexpensive method of near real time water quality monitoring.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Kent State University

Alexander Margetis

Status: Senior, Applied Mathematics

Research Topic: Mathematical Analysis of Beltrami Flows & Construction of a Weak Solution to the Variational Problem in the Modern Framework of Sobolev Spaces

Advisor(s): Dr. Benjamin Jaye

Biography: I was born in Walnut Creek, California. I am a Senior Applied Mathematics (Financial Mathematics) major and minoring in Finance at Kent State University and I am graduating in May, 2018. I have been a member of Kent State's Honors College for my three fourths of my college career and I am a Choose Ohio First and STEM scholar and a recipient of several Math Department scholarships. I am a member of the National Society of Leadership and Success. I have always had a passion for science since a young age and I wish to further my education in the field of quantitative analysis outside of Kent State University. In my free time I enjoy playing chess, going out with friends and traveling the world.

Abstract: A Beltrami flow in three-dimensional space is an incompressible (divergence free) vector field that is everywhere parallel to its curl. That is, curl (V)= αV for some function α. These flows arise naturally in many physical problems. In astrophysics and in plasma fusion Beltrami fields are known as force-free fields. They describe the equilibrium of perfectly conducting pressure-less plasma in the presence of a strong magnetic field. In fluid mechanics, Beltrami flows arise as steady states of the 3D Euler equations. The main focus of this honors thesis is a thorough mathematical analysis of Beltrami flows. Methods for the construction of Beltrami flows will be developed. It will be shown that this can be done relatively explicitly via classical separation of variables methods in the case when one is solving the equation in a ball. The second component of the thesis will analyze the structure of Beltrami flows.

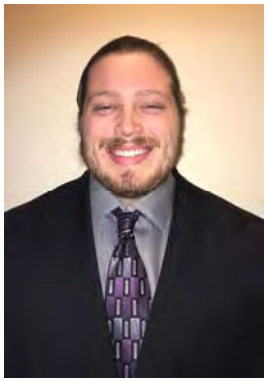
Publication(s): None yet.

Congressional District: 14th

Congressional Representative: David P. Joyce

Kent State University

Robert R. Wilson



Status: Junior, Aerospace Engineering

Research Topic: Subsonic Wind Tunnel Development

Advisor(s): Dr. David Stringer

Biography: During my youth, I found interests in the fields of Robotics and Aerospace. My interest in robotics and engineering were then solidified with programs such as Project Lead The Way, and Gateway To Technology offered in Ohio schools. After Sophomore year of high school, I pursued a private pilot license which exposed me to the world of Aerospace. I decided to combine these passions and pursue Aerospace Engineering Technology at Kent State University.

At Kent State, I found a love for physics and math. This along with other factors aided me to change my major to aerospace engineering. During my sophomore year I wanted to find ways to become more involved with the rapidly expanding program at Kent State. I started working in Dr. Stringer's Aerospace lab, and participated in the Summer Undergraduate Research Experience (SURE) during the summer. Moving forward I intend on pursuing graduate school in the fields of Aeronautics or Astronautics.

Abstract: A wind tunnel is an instrument used to measure aerodynamic forces and pressures applied to an object at a certain airspeed. The wind tunnel at Kent State University serves as a sufficient academic tool for classroom work. But as the aerospace program rapidly expands, a new and improved wind tunnel is needed for academic, public and private use. This project serves to determine factors needed for design and development of a larger wind tunnel for the university.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

Marietta College

Charles E. Drennen, Jr.

Status: Senior, Petroleum Engineering

Research Topic: Testing a Novel Minerology Crossplot Hypothesis

Advisor(s): Professors Ben W. Ebenhack and Craig Rabatin

Biography: Charles Drennen is a Senior at Marietta College studying Petroleum Engineering. He graduated from Howland High School in Warren, Ohio, in 2014, where he developed a love of math and science. Charles has interned for Alliance Petroleum Corporation for the last two years, and currently works there as a joint interest billing accounting intern. During the Fall, 2017, semester, he worked as a production method consultant intern. He also interned as a JIB accountant and a field technician for Alliance Petroleum within the last two summers. He is a member of the Marietta student chapters of the Society of Petroleum Engineers and the American Association of Drilling Engineers. He is also an active member of the Beta Rho chapter of Alpha Tau Omega, America's Leadership Development Fraternity. Charles will graduate with a B.S. in Petroleum Engineering in May, 2018, to pursue a career as an oil and gas professional.

Abstract: Within petroleum formation evaluation, graphs known as crossplots are used to show relationships between reservoir parameters and display different formation attributes. The effective porosity vs bulk density crossplot was developed by Professor Ben Ebenhack during his time working in the oil and gas industry. This crossplot provides a more definitive rock density for the formation; therefore, indicating a more accurate measure of formation minerology than is currently available through crossplot analysis. The effective porosity vs. bulk density crossplot is theoretical, and does not exist in any industry literature. With current knowledge of the plot, it is not viable when the data is heavily skewed by clay, gas, or heavy mineral effects. We possess a large Fortran 77 program from Professor Ebenhack's industry work, and we believe this includes robust corrective formulas making the effective porosity vs. bulk density plot viable under all practical circumstances. Locating these formulas within the code will allow for the creation of a crossplot program featuring the theoretical crossplot in Mircosoft Excel. Once fully realized, the effective porosity vs. bulk density crossplot will add another tool for petroleum engineers and logging specialists to analyze petroleum-producing formations.

Publication(s):

1. Drennan, Charles E., *Development of Formation Evaluation Program to Test Lithology Crossplot Hypothesis.* NASA / Ohio Space Grant Consortium 2016-2017 Scholar/ Fellow Student Journal, pages 92-93.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Marietta College

DerekAllen L. Krieg

Status: Junior, Petroleum Engineering

Research Topic: Electric Generation Potential in the Upstream and Midstream Oil & Gas Industry

Advisor(s): Professors Ben W. Ebenhack and Craig Rabatin

Biography: As a Junior Petroleum Engineering student at Marietta College, I am pursuing a minor in Energy Systems Engineering and an Engineering Leadership Certificate from the McDonough Center for Business and Leadership. I am driven by my passion for the energy sector, along with my constant desire to see and experience new things. I love learning and deeply value hands-on field experience. On campus, I am President of Energy Business Alliance which is a simulated oil and gas company intended to help students take their education beyond the classroom by working on industry-relevant projects. Additionally, I helped coordinate the college's first ever Oil & Gas Technical Exhibition which was noted as "one of Ohio's most successful oil and gas events to date" by Energy in Depth. I am also chairman for the 2018 McDonough Leadership Conference which is the only undergraduate leadership conference in the United States. As the owner of my own photography company, I often find myself documenting my experiences and new adventures that I take through photography. I am also deeply interested in traveling and enjoy ice skating in my free time.

Abstract: With our world becoming ever more so dependent on electricity and energy, why not take advantage of every opportunity we have to produce electricity in ways that are clean, economical, and renewable? Natural gas already provides an ever-growing portion of our nation's power demands and has cut carbon emissions, but I intend to research the potential for electricity to be produced just by the mere production and transportation of hydrocarbons.

Areas of research will include multiple potential generation points on the production facility and during the transportation of hydrocarbons. For example, one opportunity on the production site might be to turn a turbine in the flow line from the well to the production equipment (especially on highly pressured wells that require a pressure cut). I believe that there are also many other similar possibilities within the midstream (transportation) sector such as running the production through a heat exchanger to produce ice.

Publication(s): None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

Marietta College

Reannah N. Rymarz

Status: Junior, Petroleum Engineering

Research Topic: Investigating Storage Systems for Alternative Sources of Energy

Advisor(s): Professor Craig Rabatin

Biography: Reannah Rymarz is a Junior at Marietta College pursuing a Bachelor of Science Degree in Petroleum Engineering. Reannah graduated from North Harford High School in Pylesville, Maryland, in 2015. She chose to pursue petroleum engineering after discovering her love of geology as well as the incorporation of challenging calculations and problem solving. Reannah works on campus at Marietta College at the Career Center and as a geology lab assistant. She also is an active member of Energy Business Alliance, a club on campus that simulates an oil and gas company focused on making venture capital decisions in the energy systems market. Additionally, Reannah will serve as the Vice President of Society of Woman Engineers in the 2018-2019 school year. In May 2017, Reannah worked as a field engineering intern for Chesapeake Energy in the Anadarko basin in Weatherford, Oklahoma, where she learned about drilling and production methods of the upstream sector.

Abstract: Over the past 10 years alternative energy research has made leaps and bounds in production as well as accessibility. Solar panels especially have become more attainable to consumers as they can be found in neighborhoods all over the country. Though the push for greener energy is justified, it is difficult to accumulate this energy for large consumption. Once energy is produced it is difficult to store in an efficient, but also environmentally friendly way. Batteries are the main storage system for alternative energies which, though effective, are not as environmentally conscious as the energy producing counterpart. Alternatives do exist, but are not ready for commercial use. To progress alternative energies forward into larger scale accessibility efficiency of storage systems must surpass that of the battery.

This study will provide insight to the types of storage systems for alternative energy that are currently available or in development. An overview of each type of storage system will be conducted including mechanics, cost, implementation, and the systems ability to store energy. Accessibility will also be investigated as the system is simpler to judge once it is used on a consumer level. Each type of storage system will be compared to the currently used storage system type, batteries. A conclusion of strengths and weaknesses of each type of storage system will be determined.

Publication(s): None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

Miami University

Alex J. Mazursky

Status: Senior, Mechanical Engineering

Research Topic: Design and Simulation of a Miniature Haptic Actuator based on Electrorheological Fluid

Advisor(s): Dr. Jeong-Hoi Koo

Biography: Alex Mazursky is a Senior Mechanical Engineering student with an Energy co-major from Buffalo Grove, Illinois. He attends Miami University, where he is actively engaged in undergraduate research, Tau Beta Pi, Eco Reps, the honors program and Alpha Epsilon Pi. In the summer and winter of 2015, he interned at HBK Engineering as a utilities land surveyor. In the Summer of 2016, he interned with Bruner Corporation as an energy engineering intern. This past summer, he completed his senior capstone project abroad at the Korea Advanced Institute of Science and Technology in Daejeon, South Korea. The project focused on the design of applications for a vibrotactile tablet for use in kiosk robots. Alex has begun working toward his Master's Degree at Miami and plans to return to Korea this summer to focus on research.

Abstract: Smart materials have adjustable material properties in the presence of an external stimulus. In this study, electrorheological (ER) fluid, a smart fluid with a viscosity dependent upon the magnitude of applied electric field, is utilized in a haptic actuator, capable of providing touch-based feedback to a user. For a device to provide complete haptic feedback, two key components must be present: tactile feedback and kinesthetic feedback. Tactile feedback consists of the sensations felt at the surface of one's skin and just underneath it. One such sensation is vibration, observed during vibrotactile feedback. Kinesthetic feedback is felt in one's joint and muscle nerves and provides information about position and movement. Thus, both sensations need to be present in order to fully understand an object through touch. Most devices today use small motors to provide touch-based feedback. However, these motors are only capable of providing vibrational feedback and not kinesthetic feedback.

This project aims to create a miniature button capable of providing both vibrational and kinesthetic feedback by manipulating the behavior of the ER fluid with an electric field input. The button's performance has been evaluated under different electric field magnitudes and frequencies. This project also aims to produce and validate a computer model of the actuator. This research contributes to advancing smart material technology in haptic applications, such as mobile devices, virtual reality and robotic control.

Publication(s):

1. Alex Mazursky, Jeong-Hoi Koo, Tae-Heon Yang, "Experimental evaluation of a miniature haptic actuator based on electrorheological fluids", submitted to SPIE Active and Passive Smart Structures and Integrated Systems XII, March 4 -8, 2018, at Denver, Colorado, United States.

Congressional District: 8th

Congressional Representative: Warren Davidson

Miami University

Benjamin D. Shaffer

Status: Senior, Computer Engineering

Research Topic: Isolated DC-DC Converter with Bidirectional Current for Interfacing the Voltage Busses of the Dragon Capsule and ISS

Advisor(s): Dr. Mark J. Scott

Biography: Benjamin Shaffer is currently a Senior Computer Engineering student at Miami University in Oxford, Ohio, and plans to attend graduate school to pursue a PhD in Electrical and Computer Engineering. Benjamin graduated from Ross High School in Ross, Ohio, in 2014. His wide range of interests leads to participation in the FIRST Robotics Competition in high school. This experience, coupled with childhood fascination with computers and electronics, inspired his decision to enroll in Computer Engineering at Miami. While at Miami, he discovered a passion for microelectronics and power electronics, resulting in several power electronics research projects under a faculty mentor. His previous projects involved testing a commercially available transistor to observe various transient effects, and prototyping newly authored power conversion topologies (publications 1 & 2). His current research project serves as his Senior Design project, requiring a rigorous application of his entire undergraduate education. Following graduation, he plans to attend graduate school to earn a PhD in Electrical and Computer Engineering, while studying high power density power supplies and high-altitude aircraft electrical systems.

Abstract: With spaceflight becoming more frequent, and long term operational reliability of spaceflight devices ever more important, the challenges of designing robust electrical power supplies to support satellites and crew capsules are at the forefront of research and innovation. This case study of the ISS-Dragon interface considers the specific power conversion requirements of the interface as design parameters for a prototype of an isolated, bidirectional current, DC-DC converter topology. The topology was previously chosen based on theoretical advantages over similar topologies given the operating environment. The efficiency of the prototype will be measured at varying loads to determine its suitability for the target application.

Publication(s):

1. B. Shaffer, H. Hassan, M. Scott, S. Hasan, G. Town, and Y. Siwakoti, “A Common-Ground Single-Phase Five-Level Transformerless Boost Inverter for Photovoltaic Applications,” presented at the IEEE Applied Power Electronics Conf., San Antonio, TX, 2018, Paper 1699.
2. S. Hasan, G. Town, B. Shaffer, H. Hassan, M. Scott, and Y. Siwakoti, “Common-Ground Transformerless Inverter for Solar Photovoltaic Module,” presented at the IEEE Applied Power Electronics Conf., San Antonio, TX, 2018, Paper 2028.

Congressional District: 8th

Congressional Representative: Warren Davidson

Miami University

Ann M. Rumsey

Status: Junior, Manufacturing Engineering & Engineering Management

Research Topic: Micromachining of Glass for Microfluidic Applications

Advisor(s): Muhammad Jahan

Biography: Annie Rumsey is a Junior at Miami University double majoring in Manufacturing Engineering and Engineering Management and minoring in Paper Science and Engineering. She is from Fort Wayne, Indiana, and graduated from Homestead High School. Annie began research with Dr. Jahan in the Fall of 2016 and has completed research on micromachining of various materials, including glass, aluminum, and titanium. Over the past 18 months, she has co-authored two publications on these topics. Annie's interest lies in biomedical devices and their applications as they relate to mechanics, machining, and materials. She spent the last summer in the Bay Area as an engineering intern for Channel Medsystems. While there, she aided in development of a cryo-ablation device by designing test fixtures and completing software verifications for FDA approval. Annie is currently working for Ethicon, a division of Johnson and Johnson, as a Research and Development Engineer. Outside of the classroom, Annie is a member of Engineers without Borders, the Honors Student Advisory Board, and serves as the Membership Education Vice President of Alpha Delta Pi at Miami University.

Abstract: The development of microfluidics heavily relies on the optimization of machining techniques and choice of substrate material. This project focuses on the micromachining, more specifically micro milling of polycarbonate glass for micro fluidic applications. The amorphous structure, chemical and thermal stability, optical transparency, and electrical insulation of glass make it an obvious material choice for the related applications. Emphasis will be placed on evaluating the relationship between machine tool diameter and critical depth of cut. Focus will also be on optimizing the machining parameters that are related to the overall machining performance based on these variables. Experiments will be conducted to observe the effects of varying the tool diameter and depths of cut and conclusions will be drawn. Each polycarbonate glass slide will be assigned a tool diameter and different depths of cut will performed. The results of the milling experiments will then be analyzed for trends and relationships between the two variables as well as other machining parameters including speed and feed. Conclusions from the micromilling tests will aid in determining the optimal machining parameters for glass materials for microfluidic applications.

Publication(s): None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Ohio Northern University

Katie S. Cooperrider

Status: Senior, Mechanical Engineering

Research Topic: Biomechanical Study of Gravitational Assists

Advisor(s): Jed E. Marquart, Ph.D., P. E.

Biography: My name is Katie Cooperrider, and I am a Senior studying Mechanical Engineering at Ohio Northern University (ONU). During my time at ONU, I have had the opportunity to be involved with several organizations including Habitat for Humanity, Society for Women Engineers, Mortar Board, and ONU's College of Engineering Deans Team. I have also experienced leadership roles during my years in the engineering sorority Phi Sigma Rho and the engineering honor fraternity Tau Beta Pi. Along with my studies in engineering and involvement in extracurricular activities, I have participated in the arts with an accompanying minor in Dance.

In the last five years of my collegiate career, I have had the opportunity to complete three summer internships as well as a year-long co-op experience. During each of these experiences, I was able to participate in multiple team and individual projects that allowed me to develop my engineering skills and determine how I wanted to direct my career.

Following my graduation from Ohio Northern University, I will be beginning my career at Rovisys in Aurora, Ohio, as a Systems Engineer I.

Abstract: The research being conducted on biomechanics of gravitational assists, the researcher will be mathematically observing the impacts of gravitational forces on space travel. In order to do this, the physics and mathematics involved with gravitational assists will be observed with assists around the moon, the Earth, and Mars. This will be conducted for an averaged-sized unmanned aircraft in order to determine how far a spacecraft can travel without the limitations of gravitational impacts on astronauts. Similar calculations will then be completed knowing the limits of force due to gravity that can be safely experienced by humans onboard. A comparison between the results of the two will be done in order to determine how much space travel is being hindered due to gravitational limitations.

Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Ohio Northern University

Daniel D. Musci

Status: Senior, Electrical Engineering

Research Topic: Raspberry Pi Quadcopter Design

Advisor(s): Jed E. Marquart, Ph.D., P. E.

Biography: Dan Musci is a Senior at Ohio Northern University (ONU) studying Electrical Engineering with a minor in Computer Science. Dan was introduced into the intricacies of the aerospace field his freshmen year at ONU when he participated in the SAE Aero Design Competition. Since then his interest in the field has only grown, and this led him to continue work with the Aero Design Group at ONU and pursue research within the field. Dan has also worked as a Systems Engineer at Crown Equipment Corporation during the summer of 2016. Through this position he gained experience working with powerful prototyping platforms, such as Raspberry Pi and Arduino. He also is currently co-oping as a Substation Engineer at American Electric Power. He also keeps himself busy on campus through his work as both a Resident Assistant and Secretary of the Joint Engineering Council. After graduation he plans to either pursue an entry-level engineering position in industry, or higher education through graduate programs.

Abstract: A big topic of interest in the modern Aerospace field is the application and design of drones. As drones become more sophisticated, their applications will only continue to grow, however there are not many platforms that exist for building and customizing personal drones. The subject of this paper seeks to bring together the promising field of drone technology with the “DIY” maker movement through the design and implementation of a simple Raspberry Pi-based quadcopter. This platform can be easily customized, as Raspberry Pi is built to interact with many software libraries, IC’s, and hardware sets, and thus it creates an avenue for the maker movement to influence drone technology.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

Ohio Northern University

Kyle W. Strahm

Status: Junior, Mechanical Engineering

Research Topic: Verification of Ideal Gas Law

Advisor(s): Jed E. Marquart, Ph.D., P. E.

Biography: I grew up in Bluffton, Ohio, and graduated from Bluffton High School in 2015. Currently, I am a Senior at Ohio Northern University, where I am majoring in Mechanical Engineering. In the Summer of 2016, I interned for Cooper Tire, where I created a test procedure, operated, and verified the results against known known tire compounds for a tire abrasion tester designed by a capstone project. During the fall of 2016, I monitored strain gages attached to concrete samples with embedded carbon nanotubes that were exposed to freezing and thawing cycles as well as heating and cooling cycles. The following summer, I began working on the school's open circuit wind tunnel, which involved removing signal noise from the data acquisition system. Outside of classes, I am involved with the SAE Aero competition team.

Abstract: The ideal gas law is a relationship used to model the behavior of ideal gases in various circumstances. An ideal gas is defined as point masses moving at a constant speed in a random, but straight-lined motion. The objective of this project is to verify the accuracy and how well the ideal gas law relates to a real world scenario. To achieve the objective, the operation of an air compressor was analyzed, and compared with theory using the ideal gas law. Instrumentation was fitted to an air compressor and analysis software was incorporated to monitor and track the operation of the compressor. The reciprocating piston air compressor was fitted with the required pressure transducer(s), thermocouple(s), and an optical encoder to track the position of the rotating shaft. The pressure transducer and thermocouple were connected in line to the piston, and monitored the internal pressure and temperature in real time, relative to shaft rotation. The optical encoder was coupled to the input shaft that attached to the connecting rod of the piston.

Data from the sensors was monitored starting from 0 psig in the tank to allow for a full operating cycle of the piston. From the collected data the pressure, temperature, and shaft position were plotted, and compared with the ideal gas law.

This experiment demonstrated the usefulness of hardware and software inclusion on a real process for monitoring and validation purposes. It is essential that all equipment in aerospace applications be working properly, and this type of health monitoring is necessary to assure that operation.

Publication(s): None yet.

Congressional District: 5th

Congressional Representative: Robert E. Latta

The Ohio State University

Nicole L. Whiting

Status: Senior, Aerospace Engineering

Research Topic: Dynamic Stall Control over a Rotorcraft Airfoil using NS-DBD Plasma Actuators

Advisor(s): Dr. Mo Samimy

Biography: Nicole Whiting is a Senior at The Ohio State University studying Aerospace Engineering. At Ohio State she is the President of Sigma Gamma Tau, the Aerospace Engineering Honor Society, where she mentors underclassmen and plans social activities. Nicole has interned at NASA Glenn Research Center in the Engine Combustion Branch the past few summers. During her time there she developed a passion for research and began undergraduate research at Ohio State. Following her Bachelor's Degree she will pursue a Master's Degree.

Abstract: Dynamic stall occurs in applications where airfoils are rapidly changing angle of attack, like rotorcrafts or wind turbines. When the change is fast enough, flow over a pitching airfoil remains attached past the static stall angle. This results in the formation of a dynamic stall vortex on the leading edge, once the vortex sheds and the flow separates, unsteady aerodynamic loads are produced. These loads can lead to fatigue and eventually structural failure, making it essential to mitigate the effects of dynamic stall. Nanosecond Dielectric Barrier Discharge (NS-DBD) actuators have shown promise at delaying or mitigating static stall. This experimental study will evaluate the effectiveness of NS-DBD plasma actuators at controlling unsteady flow separation over a NACA 0012 airfoil, which is commonly used on rotorcrafts. Detailed unsteady surface pressure and flow velocity and turbulence measurements will be carried out to assess the effect of control.

Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

The Ohio State University

Matthew N. McCannon

Status: Junior, Aeronautical and Astronautical Engineering

Research Topic: Control of Dynamic Stall over an Airfoil Using NS-DBD Plasma Actuators

Advisor(s): Dr. Mo Samimy

Biography: I was born in Washington D.C., and I was the second child of what would be a total of five. Neither of my parents went to college, and they didn't exactly instill the importance of it in me while growing up. So naturally when I graduated high school I had zero intention of going to college. In fact I only knew one thing, I wasn't going. Five years had passed and in that time I went through some hard and trying times and learned a lot about life. The biggest revelation I had during those five years was how important college really is. I was tired of living paycheck to paycheck and I was ready to get my life together. So I moved away from all of my friends and family in order to live somewhere I could live on my own and go to college. I was living in Maryland and that wasn't possible there. I landed in Dayton Ohio.

In Ohio, I obtained a job at Target where I worked full time to put myself through school at Sinclair Community College. It took me 5 years to obtain by Associate's Degree, which I got in May, 2015, graduating with a 3.93 GPA. That's when I transferred to The Ohio State University where I have maintained a 3.79 GPA. In my time here I have completed 2 internships, one of which was in Manufacturing Engineering and the other was as a Design Engineer, and I've been involved in the research of Dynamic Stall with Dr. Mo Samimy. Following graduation I plan to start my career in the field while simultaneously pursuing a Master's Degree in Aerospace Engineering.

Abstract: Active and passive flow control devises have been researched and proven to delay separation or even reattach separated flow. The big challenge is to find a practical flow control device that can be used at high speed cruise conditions, while minimizing complexity of the system, and adding minimal weight to the structure.

Research is being conducted at The Ohio state University's Aerospace Research Center (ARC) to understand the flow physics of Dynamic Stall and how it can be controlled using nano-second pulse driven dielectric barrier discharge plasma actuators (NS-DBDs). NS-DBDs are being used as an active flow control technique that manipulates the natural instabilities in the flow. First round testing concluded that although the flight conditions dictate the necessary actuation frequency to maximize the benefits of the NS-DBDs, it has been observed to break up the shear layer and reduce separation at all actuation frequencies. For second round testing modifications to the experimental setup will be implemented in order to reduce error in measurement. The goal for this experiment remains unchanged; understand the flow physics and learn how to control the flow.

Publication(s): None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Ohio University

Ryan C. Lucas

Status: Senior, Mechanical Engineering

Research Topic: Feasibility of Quadrotors as Haptic Interfaces

Advisor(s): Dr. Wilhelm and Dr. Robert Williams, II

Biography: Ryan Lucas is a Senior Mechanical Engineering undergraduate at Ohio University Russ College of Engineering and Technology. Ryan was homeschooled by his parents in Athens, Ohio, and his Dad is a Physics professor at Ohio University Department of Physics and Astronomy. Ryan's career aspirations toward engineering started when he developed a fascination for robotics. Ryan was a two time summer at Argonne National Laboratory (ANL) with their Nuclear Engineering division doing engineering research and development with automated fuel handling systems. In addition to his work in nuclear engineering Ryan has also coauthored a peer reviewed journal article on a novel robotic parallel mechanism for the International Journal of Engineering and Robot Technology.

In addition to his research, Ryan has also led multiple engineering outreach events through the Ohio University Robotics Club. His most significant outreach was for Ohio Universities STEAM manufacturing summer camp (Science Technology Engineering Art and Math) where he wrote and taught the microcontroller curriculum for middle and high school students. He has also run multiple technology outreach events towards Russ College's Engineering students such as TechFest and RoboFest.

After Ryan finishes his degree at Ohio University he plans to get a Ph.D. in Mechanical Engineering and do research in robot dynamics and control. In particular his interests lie within walking and aerial robot dynamics and control.

Abstract: Haptic interfaces used today are typically non-mobile and have limited work spaces. One potential solution to this limitation is to use quadrotors a method of real time haptic feedback. This would give the user far more mobility than a typical haptic interface. However, one of the problems with this method is that quadrotors have a tendency to become unstable when subjected to external forces. The scope of this research is to create an experimental setup that subjects a quadrotor to a controlled impulse response in the form of an impact during flight. The resulting position and attitude response of the quadrotor will be collected using a motion capture system. After a significant number of data sets are collected the response of the system will be analyzed qualitatively and quantitatively. The data collected from this experiment will be used to determine the feasibility of using quadrotors as a haptic interface. If the results indicate that quadrotors are currently infeasible as haptic interfaces, further research will determine if a controller can be designed that will improve the systems usability as a haptic interface.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Ohio University

Yonry R. Zhu

Status: Senior, Engineering Physics and Mechanical Engineering

Research Topic: Evaluation of Decay Functions for Vector Field-Based Obstacle Avoidance

Advisor(s): Dr. Jay Wilhelm

Biography: Yonry Zhu is a Senior at Ohio University double majoring in Engineering Physics and Mechanical Engineering. His initial research focused on thin film deposition techniques, culminating in the design and construction of a pulsed laser deposition system. Other previous work focused on applying and modeling low temperature plasmas. These applications included treatment of cervical cancer cells, synthesis of boron nitride nanoparticles, and enhancement of a rotating detonation engine. Currently, he is working on developing vector field-based obstacle avoidance algorithms. He intends to pursue a graduate degree in aerospace engineering.

Outside of engineering, Yonry enjoys drumming and playing soccer. He was elected president of the Rho Beta chapter of Theta Tau engineering fraternity. Currently, he is in the process of founding a student branch of the American Institute of Aeronautics and Astronautics at Ohio University. He is invested in his community and has participated in several university-sponsored STEM outreach programs and community service events.

Abstract: Repulsive vector fields, when incorporated with guidance vector fields, may be used for obstacle avoidance in autonomous unmanned vehicles. It is currently unclear if there is a superior functional form for the magnitude of the repulsive field. The present work seeks to evaluate and characterize several types of these decay functions. Various obstacle avoidance scenarios will be simulated and the effects of the different decay functions on transit time, transit distance, and tracking error will be investigated. The effects of different parameters of each decay function on these metrics will also be investigated.

Publication(s):

1. Zhu, Y. Anand, V., Jodele, J., Knight, E., Gutmark, E. J., and Burnette, D., “Plasma-assisted Rotating Detonation Combustor Operation,” 53rd AIAA/SAE/ASEE Joint Propulsion Conference, 2017.

Congressional District: 15th

Congressional Representative: Steve Stivers

The University of Akron

Andrea L. Felicelli

Status: Senior, Mechanical Engineering

Research Topic: Low Cost Design of Vat-Free 3D Printer Using Liquid Bridge Structure

Advisor(s): Jae Won Choi, Ph.D.

Biography: Andrea Felicelli was born in Tucson, Arizona, and has lived in a variety of places including Argentina, where her family is from, as well as Massachusetts, Mississippi, and Ohio. She was inspired to pursue engineering by her father Sergio, also a mechanical engineer, as she grew up seeing his work and passion for what he did. She attended Starkville High School in Starkville, Mississippi, for 3 years and graduated cum laude from Hudson High School in Hudson, Ohio. She has been involved in additive manufacturing research at The University of Akron since her sophomore year, and has developed interests in 3D printing, manufacturing, and material science. She plans to pursue a Master's Degree after completion of her Bachelor's Degree in 2019.

Abstract: The goals of this project are to design, construct, and automate a low-cost 3D printer that addresses several limitations that are typical of traditional stereolithography. Stereolithography typically uses a light source, generally a laser, to cure photopolymers into a desired shape within a vat. When a vat is used, it can result in over-curing of the material, lack of depth control in layers, and generally increase material costs due to material adhering to the walls of the vat. The design used in this project uses liquid bridges formed between two substrate plates due to surface-tension forces. This design is expected to have the improvements of high-resolution layer formation, as well as cost savings in both the printer itself, and material usage. The objectives of this project are to further understanding of the liquid bridge model in applications in 3D printing processes, and complete and test the design and automation of a 3D printer using these structures.

Publication(s): None yet.

Congressional District: 14th

Congressional Representative: David Joyce

The University of Akron

DeGrafth A. Palmore

Status: Senior, Electrical Engineering

Research Topic: Radio Real-time Locating Systems

Advisor(s): Dr. Nathan Ida

Biography: Throughout my years as an undergraduate, I have been conducting thorough research. From freshman year to junior year, I served under Dr. Arjuna in the Advanced Signal Processing Circuit Lab, researching Cognitive radio and signal processing. I have learned how to use applications such as MATLAB, Simulink and Computer Simulation Technology (CST) Microwave Studio. I have simulated and manufactured antennas, hybrid antennas, and antenna arrays. I also have experience in the field from working at United Technologies Corporation (UTC) in the aerospace industry and Eaton Corporation in the lighting industry.

I wanted to take what I have learned to become a beacon of change for my community, so I founded the Black Organization for STEM Students (B.O.S.S.). Our mission is to guide young minority students to STEM fields through a connection between the university and community. We work on several projects, building bridges, wooden cars, electric motors, and roller coasters, while strengthening the students' soft skills through interaction and discussions. Another organization of which I am a board member is the Black Excellence Commission (B.E.C.). I serve as the Community Outreach Chair. In addition to this, I am an Ambassador for Increasing Diversity in Engineering Academics (IDEAs) Program, a member of the Dean's Team, and a Choose Ohio First STEM Tutor and Mentor.

Upon graduating with my Ph.D., I intend to become a Professor in Electrical Engineering and Electromagnetic Applications. My goal is to conduct ground-breaking research while helping produce some of the brightest and most knowledgeable students. I realize there is not a lot of diversity for education and researching at the collegiate level; I aim to change that. I want to encourage diversity and mentor others like me. I am very enthusiastic in what I undertake. Whether it's working with children, community outreach, tutoring, finding out new things through experiments, or training in my field, I do it with a drive that is incomparable. Getting a Doctoral Degree is an essential advancement toward a goal that invokes lifelong learning and positivity impacting others.

Abstract: To be able to sense and detect the motion and location of an object. The goal of this research is to use antenna at different frequencies and motion an object in the near field. This motion should create a change in frequency and amplitude of the antenna. These variables should be able to not only analyze the change in position, but the rate in witch it moved in the field.

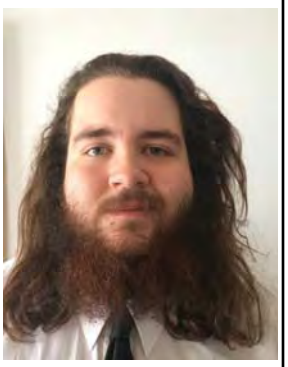
Publication(s): None yet.

Congressional District: 14th

Congressional Representative: David P. Joyce

The University of Akron

Robert P. Thoerner



Status: Senior, Biomedical Engineering

Research Topic: Effect of Particulate Debris in Microgravity on Bone Resorption

Advisor(s): Dr. Marnie M. Saunders

Biography: Currently, I am enrolled at The University of Akron were I will graduate in May with a Bachelor's of Science in Biomedical Engineering - Biomechanics Track. During my time at the university I have been fortunate enough to work on many undergraduate research projects as well as participating in The University of Akron chapter of Biomedical Engineering Society. In addition I had the honor to help develop instructional videos on the use of SolidWorks, a 3D modeling Computer Aided Design program, for use within the department to help teach fellow students the program. A paper is currently being published showing the effects of the videos on the students' abilities to use the program. In addition to this project I am currently working on a publication for the Journal of Visual Education (JOVE) on the design and fabrication of a uniaxial loading machine for material testing.

Abstract: When a human bone is exposed to micro gravity, resorption ensues naturally due to the decrease in load on the osteocytes located within the bone matrix. The opposite can be seen in athletes where both the muscle and bone increase in mass to accommodate the increase in forces on their bodies. Testing of these cells traditionally requires a large loading machine able to apply ample load in order to stimulate these variances. When working in an adverse environment certain machines are deemed unusable due to spacial constraints or limited portability. A portable 3D printed machine is being developed that will overcome both of these constraints. The 3D printed machine will feature comparability with in house developed labs on a chip. Labs on a chip are self-contained systems that are designed to simulate an area of the human body, in our case a bone system. This loading machine will allow for the sample to be loaded without altering the delicate system within the chip. The machine will allow for ease of loading and unloading of samples for extended periods of time. The machine will be designed with a computer aided design program and have finite element analyses done and then ultimately trial testing compared to known machines. It is expected to meet the engineering specifications and perform comparably to existing machines.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

The University of Toledo

Heidi E. Kuchta

Status: Senior, Astrophysics and Geology

Research Topic: An Optical, Near-IR, and X-ray Study of the Orion South Cluster

Advisor(s): Dr. Tom Megeath

Biography: Heidi Kuchta is a fourth-year undergraduate student studying Astrophysics and Geology at The University of Toledo. A love of science is what drives her to learn more and explore. Heidi has been working on this project for over three years. She is involved in the Society of Physics Students, outreach, and works as a tutor at the Ritter Planetarium. Once she finishes her undergraduate degree, Heidi plans to get a Master's Degree in teaching. With this, she hopes to get a job working at a planetarium; to teach the next generation about earth and space, and cultivate a love for the sciences.

Abstract: We present a study of the Orion South Young Cluster, a cluster at southern edge of the Orion A molecular cloud and at a distance of 428 parsecs. We combine Discovery Channel Telescope I-band (8000 nm) imaging, Kitt Peak National Observatory, KPNO, 4 meter H (1.6 micron) and Ks (2.1 micron)-band data, Spitzer Space Telescope 3.6-24 micron data, and XMM satellite X-ray data. The X-ray data detects young stars with active coronae while the Spitzer data can be used to identify dusty circumstellar disk around the young stars. We use these data to identify the member stars of this cluster. We find that only six out of the 40 X-ray sources have circumstellar disks implying a disk fraction of 15%. In contrast, about 50% of the X-ray emitting stars in the 2 Myr old Orion Nebula Cluster have disks (this cluster is on the other end of the Orion A molecular cloud). The low disk fraction suggests that Orion South is older than the Orion A cluster, with an age of 4-5 Myr. To examine the ages independently, we construct an HR diagram for Orion South using our photometry and existing spectra in the literature. Strangely, a comparison of these data with theoretical pre-main sequence tracks shows a cluster with an age similar to that of the Orion Nebula Cluster. Future work will focus on understanding this discrepancy as well as obtaining spectra for the faint members of the cluster with the NITHS spectrograph.

Publication(s): None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

The University of Toledo

Tyrone Jacobs, Jr.

Status: Senior, Electrical Engineering

Research Topic: Investigation into Application of Corrosion Sensors to Dehumidification Systems for Suspension Bridge Main Cables

Advisor(s): Douglas K. Nims, Ph.D., P.E.

Biography: Tyrone has always enjoyed computers and technology as a kid, and, through his interest, he made the decision to eventually pursue an engineering degree. To be exact, it led him to pursue a Bachelor of Science Degree in Electrical Engineering at The University of Toledo. He has had previous internships in various electrical engineering and information technology roles at companies like Eaton Corporation and The Boeing Company. He is also a well-known student leader and has been involved in organizations such as: The National Society of Black Engineers, The University of Toledo Student Government, Student African American Brotherhood, Brothers on the Rise, and much more. In addition to his many campus activities and organizational involvement and research of corrosion sensors on suspension bridge main cables, he enjoys graphic design, sports, video games, and reading.

After graduation, Tyrone intends to work in the field for a few years before pursuing a Master's of Business Administration at a high-profile business school. He then intends to work on becoming an E.I.T. (Engineer in Training) and thereafter achieving his P.E. (Professional Engineer) licensure.

Abstract: This study will involve corrosion sensing on a suspension bridge main cables. Acoustic and linear polarization resistance (LPR) corrosion sensors will be examined. The primary approach is through laboratory studies. Initial experiments will be focused on understanding corrosion and applications of the sensors. Then experiments will carried out samples of wire similar to that used in the Anthony Wayne Bridge in Toledo, OH. The Anthony Wayne Bridge is of specific interest because it is over 80 years old and the corrosion must be arrested for the bridge to remain in service. The end goal is to generally gain a better understanding of how to use corrosion sensors to monitor cable aging and understand how the bridge cables react to dehumidification and varying environmental conditions.

Publication(s): None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

The University of Toledo

Anthony O. Smoktonowicz

Status: Senior, Electronics Engineering Technology

Research Topic: Flexible Wing Technology for Drone Applications

Advisor(s): Lesley M. Berhan, Ph.D.

Biography: The inspiration to develop a system to monitor methane detection in closed landfills was first attempted in 2013. The robotic prototype was built from LEGO parts and an Arduino Uno microcontroller. The terrestrial prototype has been built and rebuilt since that initial day in 2013. The restrictions to the prototype, being an earthbound robot, have been shifted to be an aerial drone.

Since transferring from Owens community College to The University of Toledo in 2016, the courses and instructors to progress my education have motivated this project forward in its design. The use of flexible wing technology was a choice; quadcopter technology is quite successful and widely used.

Abstract: The conversion from terrestrial to an autonomous flying drone with flexible wings created new challenges in the form of aerodynamics, collision detection, and coordinate location. Aerodynamics has presented more complications in the form of material stress and material durability. The mechanics of “flapping wings” has presented such exciting challenges in the form of vorticity calculations and wing stress. The features of lift, and thrust alone presented mathematics and engineering problems that afford new learning experiences. The second feature is the power systems; the size of the proposed mini aerial vehicle (MAV) involves size issues that conventional battery power does not accommodate. The third feature is the motor action, traditional 5 volt to 24 volt motors are larger than the proposed prototype size, thus adding considerable weight to the prototype. The power consumption of the motors also adds an undesirable element for prolonged usage. Locomotion is the initial issue that is being addressed at this time. While still in the early stages, this project will continue to develop as the university education progresses.

Publication(s): None yet.

Congressional District: 5th

Congressional Representative: Robert E. Latta

University of Cincinnati

Colin W. McConnell

Status: Senior, Chemical Engineering

Research Topic: Carbon Nanotube-Copper Composite Sheet for EMI Shielding of Aerospace Structures

Advisor(s): Dr. Vesselin Shanov and Dr. Kelly Cohen

Biography: Colin McConnell is currently a fifth-year Chemical Engineering student at the University of Cincinnati (UC) who is additionally working towards an M.S. in Materials Science as a member of the ACCEND (ACCelerated ENgineering Degree) Program. He has served as the Treasurer of the Botany Club as well as a Project Chairman for the UC chapter of Engineers Without Borders. He first began working at UC's Nanoworld Lab during the Spring Semester of 2015 as a research assistant. He has worked on several projects involving carbon nanotube (CNT) based composite materials. In addition to the OSGC project, he is now currently investigating CNT-based gas sensors for his thesis. After graduation, Colin seeks to join a Ph.D. program focusing on nanomaterials and their interaction with biological systems.

Abstract: Electromagnetic interference (EMI) has the potential to greatly impair the operation of aerospace systems and electronics. The goal of this study was to combine the high frequency shielding capabilities of carbon nanotubes (CNTs) with the lower frequency shielding capabilities of copper. CNT-copper composites were fabricated and evaluated for use as an effective, light-weight, durable, easily manufactured material for EMI shielding at a wide range of frequencies. Spinnable CNT arrays were wrapped to form a sheet which was then electroplated with copper using a copper sulfate solution. Parameters of the composite fabrication process were adjusted to achieve optimal properties. A variety of frequencies were used to characterize the shielding effectiveness of the CNT/copper composite. Other properties such as electrical resistance and tensile strength were also evaluated.

Publication(s):

1. Malik, Rachit, Colin McConnell, Noe T. Alvarez, Mark Haase, Seyram Gbordzoe, and Vesselin Shanov. "Rapid, in situ plasma functionalization of carbon nanotubes for improved CNT/epoxy composites." RSC Advances 6, no. 110 (2016): 108840-108850.
2. Zhang, Lu, Derek DeArmond, Noe T. Alvarez, Rachit Malik, Nicholas Oslin, Colin McConnell, Paa Kwasi Adusei, Yu-Yun Hsieh, and Vesselin Shanov. "Flexible Micro-Supercapacitor Based on Graphene with 3D Structure." small 13, no. 10 (2017).
3. Malik, Rachit, Lu Zhang, Colin McConnell, Michael Schott, Yu-Yun Hsieh, Ryan Noga, Noe T. Alvarez, and Vesselin Shanov. "Three-dimensional, free-standing polyaniline/carbon nanotube composite-based electrode for high-performance supercapacitors." Carbon 116 (2017): 579-590.

Congressional District: 2nd

Congressional Representative: Brad R. Wenstrup

University of Cincinnati

Liberty M. Shockley

Status: Junior, Mechanical Engineering

Research Topic: Development of High-Altitude Microjet Engines

Advisor(s): Dr. Shaaban Abdallah

Biography: Liberty will graduate with a Bachelor of Science in Aerospace Engineering at the University of Cincinnati (UC) and will commission in the United States Air Force in April, 2018. She will be stationed at Schriever Air Force Base, Colorado, serving as an Astronautical Engineer. She hopes to attend the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio, to pursue her graduate studies. Her love of airplanes and engineering started when she was very young, her father is an engineer in the Air Force, which presented opportunities to travel and learn more than normal children do. This is something she is extremely thankful for, especially because it fostered her own love of adventure. One of Liberty's biggest personal achievements recently is spending time volunteering teaching English in Pokhara, Nepal, a place she has fallen in love with.

Liberty has been working with Dr. Abdallah for just over a year on a multitude of research projects in the area of propulsions, learning more about academia, and developing her professional skills. During Spring of 2017, Liberty worked as an intern at NASA Goddard Space Flight Center in Greenbelt, Maryland. She accompanied a team of astrophysicists on a sub-orbital balloon experiment studying the polarization of the cosmic microwave background called PIPER. In Fall of 2015, also at Goddard, she aided in the development of an attitude determination algorithm using information from an Astrometric Alignment Sensor. During this time, she continued her research on Path Planning Algorithms, distance working with the SIERRA Team at UC. Aside from technical work, she had the opportunity to spend Summer of 2017 in Varanasi, India on Project GO, a scholarship for ROTC cadets to study a critical language. She enjoyed learning Hindi and pulling together her personal and professional interests during the program.

Abstract: A small UAS with a modular microjet engine that can function at high-altitudes would be essential to future SAR and ISR missions, both in the civilian and military world. These capabilities are being explored because the current attainable flight times of small UAVs greatly hinder potential missions, and high-altitude UAV research is almost nonexistent. Batteries are heavy, take a long time to recharge or exchange, so especially for military applications, this is a problem because there is not long-range capability or quick sortie turnaround. The main components explored are fuel type and structural design. The use of solid-to-gas burning fuel is being explored, specifically with GAP. By using solid fuel, and finding a unique type and gradient that can extend the burn time by slowing the burn rate would improve the capabilities of UAVs. Developing this concept would involve remodeling the combustor to remove liquid fuel lines and injectors and including a solid fuel package that could be easily accessed and exchanged. Different types of fuel will be acquired and tested in a controlled environment, using different ratios of carbon to measure burn rate. A test stand will also be designed and built to test effectiveness of the chosen fuel.

Publication(s):

1. Shockley, Liberty M., Development of Navigation and Path Planning Algorithms for UAVs for SAR Ops, OSGC Annual Symposium Journal, 2015-2016, pages 238-239.

Congressional District: 10th

Congressional Representative: Michael R. Turner

University of Cincinnati

Austin M. Wessels

Status: Junior, Aerospace Engineering

Research Topic: Variable Pitch Quadcopter Flight Control with STM32 Flight Controller

Advisor(s): Dr. Kelly Cohen and Dr. Manish Kumar

Biography: I am currently a Junior in Aerospace Engineering at the University of Cincinnati. While in high school, I started flying model airplanes and helicopters as a hobby. Anyone who has flown remote control vehicle knows crashing is part of learning. The important lesson to learn is to rebuild and fly again. I was able to learn basic concepts of lift, thrust, balance, and control. After a year in this model aviation hobby, I had to choose an area of study for my college career. Aerospace Engineering was a natural choice. I wanted to learn how such a simple shape as an airfoil had such an amazing effect as to lift my plane into the sky. While at the University of Cincinnati I am learning the fundamentals and theory behind the flight of these aerial vehicles.
More recently, I have been co-oping in the UAV Master lab under Dr. Cohen. I have worked to integrate ADS-B technology on small unmanned aerial systems. Also, I have had the opportunity to teach an undergraduate course on the construction and flight testing of small unmanned aerial vehicles.

Abstract: As small unmanned aerial systems (SUAS) have become more popular in the past few years, the desire for more maneuverable SUAS has grown. Traditional quadcopters use four separate motors to control the three rotational axes, roll, pitch, and yaw, and the one translational axis, altitude. The flight controller changes the rpm of each motor to achieve stable flight. The variable pitch multirotor has a single motor powering all four rotors and a servo motor for each rotor to control the pitch of the blades. There are a few variable pitch quadcopters on the market currently; I will focus on the Stingray 500. One advantage of a variable pitch system is the ability to use a different power source such as an internal combustion engine. This would allow increased efficiency and longer flight time. The variable pitch multirotor is also more maneuverable given that the rotors are able to produce negative thrust. This allows to vehicle to maneuver upright as well as inverted. These flight characteristics can be achieved with slight modifications to readily available flight controllers already on the market, such as the Naze32 or FrSky F3FC. The Stingray 500 with this customized flight controller will be a stable yet maneuverable SUAS

Publication(s): None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

University of Dayton

Matthew A. Mircovich

Status: Senior, Physics

Research Topic: Fabrication of Periodically Poled Lithium Niobate Waveguides for Single Photon Conversion

Advisor(s): Imad Agha

Biography: Matthew Mircovich is a Senior at the University of Dayton pursing his B.S. in Physics. He will graduate in May, 2017. His research interests lie in the field of nonlinear optics. He began working with nonlinear optics the summer after his sophomore year. He received funding from the German Government for a summer internship at the University of Jena, where he worked on supercontinuum generation in micro-structured fibers. Outside of the lab, he is the student member at large for the Ohio section of the American Physical Society, and stays active with hiking and yoga. Matthew would like to pursue a Ph.D. in Physics and contribute to society through research in optics and getting kids interested in science.

Abstract: Lithium niobate (LN) is a nonlinear crystalline material in which second order nonlinear processes can occur. By applying a strong electrical field to the crystal, domain reversal (reversal of the optical axis) of the crystal can be achieved. Domain reversal enhances the nonlinear optical interactions. Periodically Poled Lithium Niobate (PPLN) has a high degree of effective nonlinearity due to the increased interaction length, made possible through phase-matching. Fabrication starts with a wafer of congruent LN that is diced into the appropriate size. The wafer is periodically patterned with photoresist, then placed inside a conductive electrolyte solution and held at a constant temperature. A 3-5 kV pulse is applied through the electrolyte, causing a domain reversal where the photoresist is absent, leading to periodic poling. The fabricated PPLN will be used for frequency upconversion, downconversion, as well as basic building blocks for optical parametric oscillators.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

University of Dayton

Kayla M. Pariser

Status: Senior, Mechanical Engineering

Research Topic: Influence of Reverse Shoulder Implant Positioning on Patient-Specific Muscle Forces: A Simulation Study

Advisor(s): Dr. Allison Kinney

Biography: Kayla Pariser is a Senior at the University of Dayton (UD) and will graduate in May, 2018, with a Bachelor of Mechanical Engineering and a minor in Human Movement Biomechanics. Kayla joined the Computational Biomechanics Lab in the spring of 2015. She has participated in Berry Summer Thesis Institute sponsored by the University Honors Program and the Summer Undergraduate Research Experience Program sponsored by the School of Engineering. She presented her research at the Dayton Engineering Sciences Symposium and at the American Society of Biomechanics conference. Outside of the classroom, Kayla is a member of the engineering honors society Tau Beta Pi, the UD chapter of the Biomedical Engineering Society, the Flyer Pep Band, and the Pride of Dayton Marching Band.

Abstract: Reverse total shoulder arthroplasty (RTSA) is a surgical intervention for patients with severe rotator cuff muscle tears and arthritis. RTSA objectives are to reduce pain and improve arm function by increasing shoulder joint stability and range of motion. The shoulder joint is a ball- and-socket joint with a shallow socket. This bony structure provides little stability. Consequently, stability of the shoulder joint is provided by shoulder muscles, typically the rotator cuff muscles. When rotator cuff muscle tears are severe and cannot be repaired, the RTSA enables the deltoid muscle to become the shoulder's primary stabilizer. RTSA implant positioning affects the length of the deltoid muscle moment arm which determines the amount of deltoid muscle force required to produce the torque about the shoulder for it to function. The overall goal of this research is to optimize RTSA implant placement and deltoid muscle forces for fifteen RTSA patients. As a first step, a parameter sensitivity study was performed to investigate the influence of muscle model parameters on muscle force predictions. A patient-specific shoulder joint model and an optimization framework were used to predict the shoulder muscle forces.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

University of Dayton

Asa E. E. Palmer

Status: Junior, Mechanical Engineering

Research Topic: Effect of a Curved Boundary Layer Fence on the Wingtip Vortex

Advisor(s): Dr. Sidaard Gunasekaran

Biography: Asa is from Cincinnati, Ohio, and currently in his third year at the University of Dayton. There, he is an active member of the Minority Leaders Program (MLP) which assists in materials research for the Air Force Research Laboratory. In his time with MLP, Asa has learned several useful skills involving the fabrication and testing of carbon composites. Last Spring, Asa took a semester off to work a co-op position for GE Aviation at their headquarters in Evendale, OH. He plans to return to the Company in the summer and anticipates working in the aerospace field upon graduating in December of 2019.

Abstract: Wingtip vortices are the byproduct of pressure difference between the upper and lower surfaces of an aircraft wing. The air from the high pressure region on the bottom surface of the wing curls towards the low pressure region on the upper surface at the wingtip causing a spiraling vortex. These vortices induce downwash which in turn creates induced drag. Since every lift-generating wing causes these vortices, induced drag is inevitable. Passive control devices such as end plates, winglets, and wingtip sails are currently being employed in full scale airplanes to reduce the strength of wingtip vortices.

This research explores the use of a curved boundary layer fence on an AR 4 NACA 0012 wing to affect the span-wise flow which is hypothesized to reduce the strength of the wingtip vortex resulting in lower induced drag. Force based experiments were conducted in the University of Dayton Low Speed Wind Tunnel to determine the changes in aerodynamic lift with and without the boundary layer fence. Sensitivity study was also performed by changing the location of the boundary layer fence along the span of the wing. Cross-stream Particle Image Velocimetry (PIV) was also conducted to determine the changes in the properties of the wingtip vortex with and without the boundary layer fence.

Publication(s): None yet.

Congressional District: 2nd

Congressional Representative: Brad R. Wenstrup

Wilberforce University

Maxime Maisonnet

Status: Senior, Computer Science

Research Topic: Comparative Studies of Biometrics Authentication Systems

Advisor(s): Deok Hee Nam, Ph. D.

Biography: Maxime Maisonnet was born in Gonaïves, Haiti, in 1992. He moved to the United States in 1999. He graduated from Atlantic High School in Delray Beach, Florida, in 2011, and enrolled at Florida Memorial University in 2011, where he received a basketball scholarship, only to later transfer to Florida Atlantic University for the better opportunity to chase his dream to prepare for the NBA. In 2015, he received another scholarship from the university basketball team from Wilberforce University, where he now pursues his Bachelor's Degree in Computer Science as a Senior. Currently, Max is working on a research topic related to the intelligent control of the autonomous vehicles by applying computational intelligent techniques. This will enable unmanned vehicles like unmanned mobile robots to explore unknown areas such as those considered hazardous for human exposure.

Abstract: Recently, automatic identification to verify an individual's identity based on the analysis of someone's biological traits, or to measure and evaluate physical or behavioral characteristics of living organisms automatically, is getting more focused and broadly known as biometric technologies. In general, people can be identified by the observed or recognized features of the characteristics of a human body such as facial traits, voice, way of walking gait, signature, and etc. Hence, the ways of the automatic identification are ideal to recognize others since these observed characteristics of the individuals are unique for each person. In addition, with the fast increasing of the cybercrimes or electronic crimes associated with the wide popularity of IT applications, computational systems of biometric technologies are of increased importance. Examples include dealing with the commercial transactions through online banking services, mailboxes, daily transactions, or other activities since the users inherently perform their daily activities using the computers. Simultaneously, these computational systems of biometric technologies can contain or deliver the sensitive information of their clients that may be publicly shared within the public internet environment. Due to the frequent usages of the sensitive personal information, the security risks are getting more raised by the illegal accesses or hacking by intruders or unauthorized users. The proposed project will explore and examine what types of the biometric authentication techniques are used in today's world and those examined techniques will be compared to provide the better information of the concepts of biometric techniques and their issues by identifying the relationships between different methods or techniques including the advantages and the disadvantages of each method for the biometric authentication systems. Finally, the project will also briefly describe about the future development of the biometric authentication systems.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wilberforce University

Alexander M. Robinson

Status: Senior, Electrical Engineering

Research Topic: Eigen Energy Calculations of a Quantum Dot Material for Infrared Generation

Advisor(s): Nkorni Katte, Ph. D.

Biography: Alexander Robinson is originally from Flint, Michigan, and is a Senior at Wilberforce University, where he is majoring in Electrical and Computer Engineering. His interest in confronting fundamental scientific problems and important societal challenges began during the Spring Semester of 2013 when he had the opportunity to visit the Ohio State Department of Mechanical and Aerospace Engineering. He used team-building, creativity and critical thinking skills, while he learned a mix of practical theory and applied knowledge in engineering practice. Even though this is a slightly different from his major field, he was inspired by this experience. Alexander aspires to pursue a career in engineering development and start his own company. He is also the President of Kappa Alpha Psi Fraternity Inc., on the Wilberforce University campus. When he is not in the classroom or studying, he is likewise working in the community.

Abstract: Our research seeks to explore novel techniques of generating long wave infrared (LWIR) and terahertz radiation (THz) with the use of carefully designed quantum dot materials. This material should demonstrate strong nonlinear response of second order. It is of primary interest in the initial calculations presented in this paper to calculate Eigen-energies of electronic transport of spherical Erbium Arsenide (ErAs) quantum dots embedded in a Gallium Arsenide (GaAs) matrix. This calculation is performed using a finite element method codes available in COMSOL multiphysics software. The result of these calculations will guide the design of later experiments to demonstrate difference frequency generation (DFG) with this material, and a possible laser.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wilberforce University

Brittney A. N. Gibbs

Status: Junior, Biology

Research Topic: Dielectric Properties to Study the Effect of RF Waves on Body Tissue: A Comprehensive Review

Advisor(s): Nkorni Katte, Ph.D. and Jennifer N. Williams, Ph.D.

Biography: Brittney Gibbs was born on June 7, 1997 in Bethesda, Maryland. After spending a short time there, her family relocated to the South to Atlanta, Georgia, where Ms. Gibbs spent her childhood. In high school she played basketball and eventually she graduated from Tri-Cities High School, near East Point, Georgia, in 2015. She was later awarded a scholarship to attend Wilberforce University. Brittney is an active student on campus, serving as the President of Optimist Club and the Vice President of C.L.E.F. Society of Distinguished Artists. Brittney also enjoys art and helping other students on campus in her spare time. Last year Ms. Gibbs presented her summer research experience work conducted with the James Cancer Center, at the National NOBCChE Meeting in Minneapolis, Minnesota, and continues to enjoy working in the lab. Now, as she continues pursuing her Bachelor of Science as a Junior at Wilberforce University in Biology, Brittney is currently expanding her research experience as an Ohio Space Grant Consortium scholar with a collaborative project between the Biology and Electrical Engineering Departments at Wilberforce University.

Abstract: The increase of cellular phone usage has drastically increased since its conception almost 45 years ago. The evolution of cellular phone devices, in the past decade, has raised serious health concerns over the level of radiofrequency waves these devices emit. The signals being sent and received through electromagnetic waves fall between the radio waves and microwave regions of the electromagnetic spectrum and are also known by the term radio frequency (RF). and 10-2; 10+3) and the frequency of cellular device can be linked to serious health issues (such as *cancer and tumors).* This study seeks to address many of the health concerns raised from the specific interaction of electromagnetic waves that are absorbed near the pelvic region, possibly interfering with the vitality of sex cells and especially male reproduction organs. The study focuses on the correlation between the frequency of cellular phone use and the measurement of Specific Absorption Rates (SAR), or the amount of radiation absorbed per mass of tissue within a specific time. In this poster we discuss the impact RF wave energy emitted from cellular phones has on human biological tissue. We also evaluate the changes in temperature associated with high frequencies as it correlated to tissue damage. The use of COSMOL software and the finite element method (FEM) technique are also analyzed to show the propagation of RF waves through human tissue.

Publication(s): None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Wright State University

Miles A. Burrage

Status: Senior, Electrical Engineering

Research Topic: Small-Scale Autonomous Hexapod Stair-Climbing Robot

Advisor(s): Dr. Luther Palmer

Biography: Miles Burrage was born in Dayton, Ohio, and attended Northmont High School. He is a Senior at Wright State University pursuing a Bachelor of Science in Electrical Engineering and a minor in Mathematics. He chose Wright State for its prime location near the Wright-Patterson Air Force Base and the Air Force Research Lab. Miles plans on pursuing a Master's of Science in Electrical Engineering in the future.

Abstract: During this project, Miles is building a small-scale autonomous hexapod stair-climbing robot. This robot is a six-legged machine that will perform tasks or behaviors with minor supervisory input from an operator. The general goal of this research is create a robot that can climb onto stairs and over large obstacles.

Section 4.2 of the 2015 NASA Technology Roadmap calls for autonomous systems that can achieve "mobility across terrains with challenging topologies and challenging regolith properties for bodies with substantial gravity." This project seeks to address this need, as well as solutions for robot navigation. Stairs represent a similar challenge to robotic systems as uneven terrain such as rubble and rocks that could be found on other planets and/or moons. Although this project seeks only to walk up stairs, the platform, algorithm and tools developed in this work can be extended in the future to more complex gaits and modes of locomotion.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wright State University

Alexandrea C. Oliver

Status: Senior, Computer Science

Research Topic: Caregiver Behavior Analysis Using Game Technology

Advisor(s): Tanvi Banerjee, Ph.D. and Jennifer Hughes, Ph.D.

Biography: Alexandrea attends Wright State University where she is the secretary for the Association for Computing Machinery (ACM), vice-chair of the Hackathon committee, a member of Women in Computing, the Personal Development Chair of the Alpha-Zeta chapter of Phi Sigma Rho, and a College of Computer Engineering and Computer Science (CECS) Peer Mentor. She was born and raised in Dayton, Ohio, and was a part of the Engineering Technology Course in High School. She also took courses at Sinclair Community College for robotics, CAD, and manufacturing. In the past, Alexandrea has held internships with the Wright-Patterson Air Force Base through the Wright Scholar program where she worked with modeling and simulation as well as video game research and design. In the future, Alexandrea wishes to aid in the development of video games and technology that hold a focus on education, rehabilitation, training, and entertainment.

Abstract: The proposed research focuses on developing a mobile application for Android systems that will detect changes in behavior and activity patterns of those who are primary caregivers for dementia patients. In particular, this application will be used to detect fluctuation in the behavior and cognitive task performance of the caregivers as a measure of caregiver stress. By detecting these changes in behavior, the goal is to analyze the effects of caregiving as a means to evaluate caregiver burnout. A usability study will be conducted for this application to find the optimal design factors and features that benefit the user for daily and continued use.

The purpose of this research project is to develop a revised and expanded version of the application based on the results of a prior small-scale usability study, and then conduct a more in-depth and in-situ usability study of the revised application for an extended longitudinal use with primary caregivers of dementia patients. This data will be used to update the continuing design and development of the application.

The application; currently a word scramble game, will be designed and programmed using Android Studio. Additionally, the original application includes a daily caregiver stress assessment scale. Future additions to the application will include the addition of a medication reminder functionality, expanding the stress survey, providing information on local resources for caregiving support, and developing a reward system by providing informational titbits to reward consistent and continuous usage of the application.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wright State University

Rachel E. Evans

Status: Junior, Mechanical Engineering

Research Topic: The Effect of Scan Strategy on Porosity in Additive Manufacturing

Advisor(s): Dr. Joy Gockel

Biography: Rachel is a third-year mechanical engineering student. She grew up in Urbana, Ohio, and attended Graham Local Schools. Rachel is a member of Tau Beta Pi and Wright State University's Honors Program. In her free time, Rachel volunteers as a 4-H advisor and enjoys cake decorating, cooking, and gardening.

Abstract: There are many factors to consider when manufacturing any type of product. One such consideration is the structural defects in the material that make up the desired product's composition, which can be very detrimental to its performance and efficiency. In additive manufacturing, structural defects can be caused by a number of factors; however, this project will focus on porosity that is caused by the scanning pattern of the laser. A heat transfer solution code will be used to investigate the effects of the different scanning strategies. This research project will explore how the process of production may be revised to reduce material defects.

Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Youngstown STATE UNIVERSITY

Youngstown State

James D. Harding

Status: Senior, Chemical Engineering

Research Topic: D=Development of a Shape Memory Smart Structure Via 3D Printing

Advisor(s): Dr. Pedro Cortes

Biography: My name is James Harding, and I am currently a Senior studying Chemical Engineering at Youngstown State University (YSU). I am from Hubbard, Ohio, and graduated as Valedictorian from Hubbard High School. In my senior year at Hubbard, I was captain of the High School Academic team that placed fifth in the NAQT Small School Nationals which I consider a highlight of my precollege experience. In addition, I was able to take advantage of the college courses offered through Youngstown State University in Calculus 1 & 2 as well as General Chemistry 1 & 2. I found these courses to be fascinating and challenging while passing with straight A's. It was then that I determined my future career to be a Chemical Engineer.

As a Senior at YSU, I have been able to concentrate on excelling in the classes in my major and with the assistance of several of my professors; I have been given valuable advice. In addition, I have been fortunate to develop a mentorship relationship with Dr. Cortes. While I look forward to experiencing my first co-op, internship or work experience in my field; I am excited to use the skills and knowledge that I have obtained through my coursework and outside assignments to apply to this research project in the relatively new area of 3D printing. I look forward to the possibility that my work in this field will impact real world applications.

Outside of the classroom I continue to volunteer in community soup kitchens and pass out supplies at local food banks. I am the treasurer of the American Institute of Chemical Engineers YSU chapter. I enjoy gaming with my friends, fishing with my family and spending quality time with my black Lab, Lucky.

Abstract: Current technological advances in the area of smart materials have impulse the development of morphing components to fulfill the multifunctional requirements of fully adaptive structures. Although considerable progress has been achieved in the area of intelligent materials, there is still a lack of integral properties able to act accordingly to a predetermined training to modify structural configurations. Thus, the integration of a shape memory alloy (SMA) into a 3D printed shape memory polymer (SMP) opens new opportunities in the area of morphing structures for upcoming responsive needs in the aerospace sector under unique designs. This research program proposes to investigate the mechanical and morphing properties of a 3D printed shape memory composite (SMC). Indeed, it is widely known that whereas shape memory alloys are capable of acting as effective actuators, shape memory polymers are potential candidates to generate structural rigidity in their glassy state. Hence, the adaptive composite structure here proposed will take advantage of the rigidity imparted by the SMP and the high recovery stresses of the SMA as well as the degree of freedom on manufacturing convoluted designs through the 3D printing process. The main goal of this study is to develop a multi-functional shape memory composite endowed with shape memory effect (SME) via additive manufacturing. Through the innovative synthesis of shape memory alloys into 3D printed shape memory polymers, an original breed of adaptive engineering materials will be attained.

Publication(s): None yet.

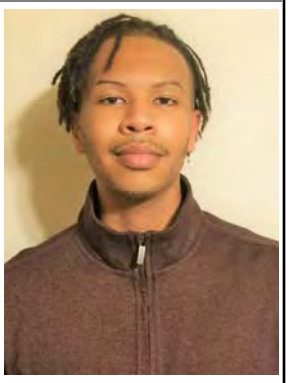
Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Youngstown STATE UNIVERSITY

Youngstown State

DeOnte M. Layton



Status: Senior, Mechanical Engineering

Research Topic: Reduction of Tractor-Trailer Base Drag by a Corrugated Boattail

Advisor(s): Dr. Kevin Disotell

Biography: DeOnte Layton is currently a Senior enrolled at Youngstown State University, pursuing a Bachelor's Degree in Mechanical Engineering. Although a Senior in terms of credit hours due to his brief time as an Art major, he is now a Junior in the Mechanical Engineering Department and has already attained an Associate Degree in the study of Mathematics. After attaining his Bachelor's Degree, he hopes to successfully pursue and attain a Master's Degree in Mechanical Engineering and possibly branch of into the field of Bioengineering.

Abstract: One of the aerodynamic flaws of semi-trucks is the box-shape of the trailer. Although efficient for storage of the supplies and goods being transported due to its rectangular area being maximized, the bluff-body shape is associated with a large, turbulent wake at its rear base that dominates the motion-retarding drag force on the vehicle. This reduction of profile drag for transport systems is a key target of the NASA strategic thrust to develop aerodynamic technologies for ultra-efficient commercial vehicles. A partial solution to this problem is the concept of a boattail, which is an add-on that is secured at the end of the trailer on all four sides. The goal of a boattail is to reduce the width of the wake that forms downstream of the trailer. This wake is due to the flow of air detaching from the aft edges of the trailer, leaving a low-pressure zone acting on its base (rear face).

The purpose of the proposed research is to explore a new trailer boattail design to tailor the structure of the wake for achieving drag reduction. A corrugated boattail, in which spanwise-periodic grooves or indentations are present on boattail surface to act as vortex generators, will be studied to assess its capability for increasing base pressure. A vortex (rotational flow motion) is sought to be trapped in the indentations, which can interact with the air flowing over adjacent curved surfaces to assist in turning the flow and delay detachment from the surface. Such an approach is aimed at creating a virtual streamlined- shape for the trailer body solely through exploiting flow interactions. Data will be collected on the effectiveness of the new boattail design by using smoke-wire visualization and surface pressure measurements for a baseline case and for the boattail cases.

Publication(s): None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

COMMUNITY

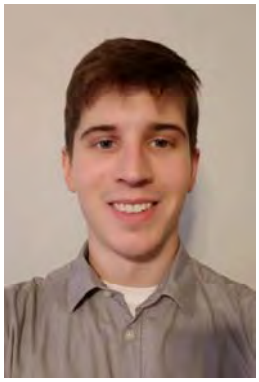
COLLEGE

SCHOLARSHIPS

Cincinnati State

Cincinnati State

Zachary D. Reser



Status: Sophomore, Mechanical Engineering Technologies

Research Topic: Mini-excavator Modification

Advisor(s): Professor Abigail Yee

Biography: I am currently attending my final semester at Cincinnati State, to obtain An Associate Degree in Mechanical Engineering Technology with a focus on design. I found interest in Mechanical Engineering while working as a technician in the medical implant department of a testing lab. The design, fabrication, and modification of test frames stood out to me as the most fulfilling part of my work and convinced me to start pursuing an engineering degree.

Abstract: Multi-use hiking and biking trails are becoming more popular over time and the demand for these trails on both public and private land is increasing. Based on input from local trail builders in the Cincinnati area, a need for modifications of mini-excavators was discovered. Trail builders could increase their trail-building efficiency by taking a vibration plate compactor, or tamper, deep into the trails. However, mini-excavators do not have enough auxiliary power to use tampers as attachments, and standalone tampers are too heavy to push to the site. This research focuses on commonly used mini-excavators to determine the most feasible way to equip a mini-excavator with a tamper.

Publication(s): None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

Isis Simone Tubbs

Status: Sophomore, Pre-Engineering

Research Topic: Exploring Transverse Myelitis

Advisor(s): George Armstrong and Abigail Yee

Biography: Hello! My name is Isis Tubbs. I was born and raised in Cincinnati, Ohio. I grew up in the Mount Healthy area and attended Mount Healthy High School. Throughout high school I enjoyed playing sports like basketball and soccer. I graduated in 2008. Upon graduation I decided to attend Cincinnati State Technical and Community College. I was looking for a challenge, something that would spark my interest and decided to declare Pre-Engineering as my major. Cincinnati State is preparing me for when I transfer to a four year university to ultimately receive my Bachelor's Degree in Biomedical Engineering. My interest in Biomedical Engineering came from my mother's health issues with paralysis. My passion is to further my knowledge in Biomedical Engineering and be a part of solutions for medical problems.

Abstract: Transverse myelitis is a neurological disorder caused by inflammation of the spinal cord. Attacks of inflammation can damage or destroy myelin; the fatty insulating substance that covers nerve cell fibers. Transverse myelitis is a relatively rare disease, and so there are no well-defined randomized trials of treatment for the disease. Some people are effected and paralyzed for life and others may regain feeling in certain parts of the body or regain feeling entirely. Experts don't know the exact cause of transverse myelitis. There is no effective cure that currently exist for this disease. Individuals who remain paralyzed or continue to experience significant muscle weakness may require seating and wheeled mobility equipment to live as independently as possible. Some possible things along with rehabilitation to help improve mobility for people who are unable to walk due to this illness.

Publication(s): None yet.

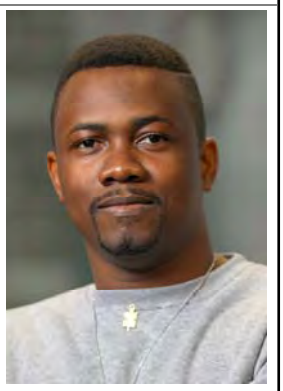
Congressional District: 8th

Congressional Representative: Warren Davidson

COLUMBUS STATE COMMUNITY COLLEGE

Columbus State CC

Fiovi E. Agbodjan



Status: Sophomore, Electro-Mechanical Engineering Technology

Research Topic: Innovative Technologies Used in the Treatment of WEEE (Waste Electrical and Electronic Equipment)

Advisor(s): Professor Jeffery M. Woodson

Biography: Fiovi Agbodjan is a student in Electro–Mechanical Engineering Technology at Columbus State Community College who currently works as an Industrial Maintenance Technician in a recycling company in Columbus.

He is a bilingual student who obtained his high school diploma in a foreign country, Togo. He is fluent in French and has worked as sports journalist. He's a member of Phi Theta Kappa Organization. Fiovi Agbodjan is passionate of soccer, and he lives in Columbus, Ohio.

Abstract: This research will present the most recent technologies available in Europe, North America and Japan for the treatment of some WEEE (CRT, household appliances and Printed Circuit Board) in order to recycle their materials. This study will emphasize on the industrialization of processes of dismantling, calibration and sorting of the components of the apparatuses. In particular, it shows that optical sorting, technologies of plastics separation, and automatic sorting of glasses from cathode ray tubes are now industrialized, in the countries with strong lawful requirements.

E-waste contains precious and special metals, including gold, silver, palladium and platinum, as well as potentially toxic substances such as lead, mercury, cadmium and beryllium. Moreover, recycling of electronics allows for precious and special metals to be recovered, reduces the environmental impact associated with electronic manufacturing from raw materials, and ensures that hazardous and toxic substances are handled.

Publication(s): None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Columbus State CC

Christian E. Lambiase

Status: Sophomore, Mechanical Engineering Technology

Research Topic: Differences in the Physical Characteristics of Steel After Heat Treatment

Advisor(s): Professor Jeffery M. Woodson

Biography: For most of my professional life I have worked in Information Technology (IT), holding several positions such as: junior database analyst, help desk, entry level and intermediate level electronics repair technician, and quality control on a PC repair line. Over the years I have found that IT was not my passion and chose to return to school. After a few semesters I settled on Mechanical Engineering Technology and am approximately halfway to earning my Associate's Degree. My long-term goal is to continue my education and earn my Bachelor's Degree in Mechanical Engineering.

Abstract: Over the course of human history the role steel has played in the development our civilization and culture is difficult to fathom. Despite this steel has landed in a state of ubiquity and is not given much, if any, thought from the common masses. Even fewer know the staggering number of changes in material properties that can be achieved with steel by only changing the time and temperature of cooling it from forging temperature.

The goal of this study is to observe and document the physical changes in plain carbon steel as it undergoes various forms of heat treatment and to then compare the results to changes that are known to occur under the different types of treatment.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

COLUMBUS STATE COMMUNITY COLLEGE

Columbus State CC

Katherine M. Rucker

Status: Sophomore, Construction Management

Research Topic: Augmented Reality in Construction Coordination

Advisor(s): Dean Bortz, MA, CSI, CDT

Biography: I am born and raised in Columbus, Ohio. I graduated from Grove City High School and opted to attend the South Western Career Academy for Welding during my Junior and Senior year. I currently am a Union Sheet Metal Worker in Local 24 and will become a Journeywoman in April, 2018. In addition to becoming a Journeywoman, I am attending Columbus State Community College. I'm working towards Associate Degree's in both Sheet Metal and Construction Management. I have a deep passion for education and learning and hope to continue pursuing my passion in the form of a Bachelor's of Science Applied Management.

Abstract: Technology is the driving force behind most paradigm shifts. Such is the case for many aspects of construction. Construction coordination is known for being an in depth process of comparing 2D prints, 3D modeling, and physical construction to meet the requests of the Owner. Common BIM, Building Information Modeling, practices have aided blueprints by bringing the 2D into 3D format, but Augmented Reality has kicked it up a notch.

With Augmented Reality (AR), the capability of seeing what the Architect and Engineer have designed is put into perspective. Imagine looking through a lens on the purposed construction site and being able to see a 3D digital image of the new building on the landscape in front of you. AR creates that ability to put the digital design into the spatial capacity of the planned site. Being able to walk the site both literally and virtually, aides in construction coordination by being able to see exactly what the finished product will look like down to the nitty gritty details. Alterations and coordination clashes can be spotted and prevented before they become costly corrections. The design team can interact with the different areas of the building to insure complete client satisfaction.

Publication(s): None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Cuyahoga CC

Ola J. Ali

Status: Sophomore, Civil Engineering

Research Topic: Environmental Contamination

Advisor(s): Christopher Huhnke

Biography: My name is Ola Ali. I am currently a Sophomore at Cuyahoga Community College Pursuing an Associate Science Degree and studying Civil Engineering. Working toward a Master's in Civil Engineering. After completing the transfer courses at Cuyahoga Community College, I am transferring to Cleveland State University to complete my degree in Civil Engineering. I have been recently accepted at Case Western Reserve University to take eight credit hours this spring for free. I hope to be doing well at case and Tri C. I am member of the honor society at Cuyahoga Community College; which led me to the Ohio Space Grant Consortium. My passion for building and bridges led me to be in engineering field. My main goal now is to get into a Co-Op Internship in Civil Engineering while going to school.

Abstract: Exposures to environmental contamination continue to be a significant source of well-being risk across the globe; however, the probabilities are higher in developing nations, where neediness, the absence of interest in present-day innovation and feeble ecological enactment join to cause high contamination levels. The relationship between natural contamination and well-being result are, be that as it may, complex and frequently inadequately described. Levels of introduction, for instance, are frequently unverifiable or obscure because of the absence of point by point observing and inescapable varieties inside any populace gathering. Exposures may happen through a scope of pathways and presentation forms. Singular contaminations might be ensnared in an extensive variety of well being impacts, though a couple of illnesses are explicitly owing to single toxins. Long inactivity times, the impacts of aggregate exposures, and various exposures to various toxins which may act synergistically all make challenges in disentangling the relationship between natural contamination and well being. By and by, as of late, a few endeavors have been made to survey the worldwide weight of ailment because of natural contamination, either as far as mortality or handicap balanced life years. A degree of aggregate illness burden might be ascribed to contamination, yet significantly more in creating nations. Risky water, poor sanitation, and poor cleanliness are believed to be the significant wellsprings of introduction, alongside indoor air contamination.

Publication(s): None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Cuyahoga CC

Debin B. Brady

Status: Sophomore, Programming and Development

Research Topic: Internet Censorship and Freedom of Speech

Advisor(s): Kathleen Tamerlano

Biography: I am an Ohio native, and a Sophomore at Cuyahoga Community College (TRI-C). In the Spring, 2017, semester, I decided to return to school. I have always been interested in learning how to program computer software and decided to change my major to Programming and Development. I thoroughly enjoy the problem solving piece. In addition to attending school I hold full time employment at The Cleveland Clinic for 17 years.

Abstract: Utilization of the Internet worldwide steadily becomes more and more part of our daily lives, whether it's for the latest news, to be entertained, communication, or work related. I've chosen to research Internet Censorship. Many believe that we should be able to access whatever we want when we want via the Internet. While others believe that allowing access to certain types of information could potentially be dangerous. One of the major challenges with Internet Censorship is who gets to determine what's censored versus what should be available for all to view. There are many questions that should be raised prior to determining if certain types of information should be censored. I believe this is a great topic, because we all use the internet and are impacted by what we see on the Internet.

Publication(s): None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Cuyahoga CC

Hanin M. Hamid

Status: Sophomore, Pre-Engineering

Research Topic: Dry Cleaning Chemicals

Advisor(s): Christopher Huhnke

Biography: My name is Hanin Hamid. I'm a current student at Cuyahoga Community College, and will be seeking a Bachelor's Degree in Chemical Engineering at Cleveland State University. I have always been a girl who wants to understand the reason behind anything that surrounds her. I remember being in third grade and always questioned what makes a cup of cold water to become warm if we leave it for a little bit of time, and hot cup of tea becomes cooler? My parents answered that the reason was because of the air surrounding it, but that answer was not satisfying enough for me until I have studied chemistry and understood how the molecules move from certain pursuer to another.

Chemistry has always been a passion for me as I have always wanted to understand what makes things up and how it always explains that every single thing in the universe is made up of certain atoms. Indeed, that was the reason I have chosen chemical Engineering as a future career that will help me to understand chemistry and makes me help others by researching and designing a better alternative as our world have always been a constant developing.

Abstract: I have chosen a topic that also got my attention to do my research on; which is a product called perchloroethylene or tetrachloroethylene, Dry Cleaners use this chemical to clean clothes without having clothes wet. I'm currently working on this research as this product discarding and use was subjected to be regulated by the EPA due to the risk of cancer that it can be caused to humans and causes pollution to the environment when discarded after use.

In conclusion, I would like to thank you for giving me this opportunity and allowing me to participate in this research project as it helps me to improve my knowledge and skill in my future career. It's my pleasure to be one of the students who have the privilege to participate in this.

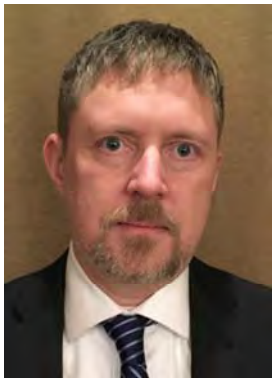
Publication(s): None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Lorain County CC

John D. Bukovac



Status: Sophomore, MicroElectricalMechanical Systems (MEMS)

Research Topic: Flexible Wearable Transmissive Pulse Oximeter Sensor

Advisor(s): Johnny Vanderford

Biography: John Bukovac is currently attending Lorain County Community College (LCCC) working towards his Associate Degree majoring in MEMS (MicroElectroMechanical Systems). Previously, John attended Oberlin Senior High School in Oberlin, Ohio, and both LCCC and Kent State University. John is also a practicing Licensed Massage Therapist (LMT) in the State of Ohio, receiving his license in 2011. He worked as an electrician for 17 years with the IBEW out of the Cleveland and Lorain locals. In 2015 he was diagnosed with diabetes and needed a career change. He was directed towards the MEMS program at LCCC by his cousin, who was in the program at the time, and he has found the program to be very interesting, challenging, and rewarding. His plans are to remain at LCCC after completion of his associates degree with aspirations to complete his Bachelor's in MEMS, while working in the Center for Microelectronic Sensor Fabrication and Hybrid Board Assembly as the lab technician, working towards taking over as the Lab director in the future. John is an avid bowler, a collector of English porcelain, enjoys cooking, spending time with friends, and enjoys the outdoors as much as he can.

Abstract: Pulse oximetry is a non-invasive, continuous measurement of blood oxygenation, using light and photocells to measure the oxygen percentage and pulse rate of patients. This saves lives by speeding up the process of measuring blood gas in patients, which in-turn lowers the death rate from hypoxemia significantly. This is especially the case for infants who are at a higher risk of hypoxemia, in particular immediately after birth. There are many methods of which to apply pulse oximetry to a biomedical device, one of the most popular being flexible electronic technology otherwise known as wearable devices. Flexible electronics is the use of pliable plastic substrates to build circuits using materials such as polyimide, PEEK, or Mylar plastic on which electronic components are attached to complete the designed circuit. The goal of this project is to build a low-cost flexible pulse oximeter circuit to help reduce the cases of infant mortality due to hypoxemia. The use of printable inks, thick film pastes, MEMS devices, and flexible substrates will be used to manufacture miniaturized flexible circuits. The process of design, assembly, and testing of the flexible pulse oximeter will be described in detail in this report.

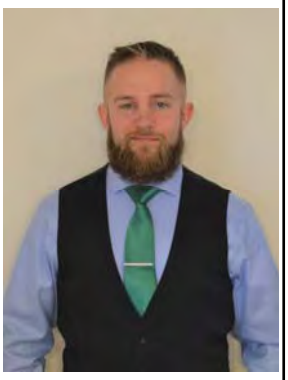
Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Lorain County CC

Evan W. Kolodey



Status: Sophomore, Chemical Engineering

Research Topic: Identifying Metal Contaminants in a Water Supply

Advisor(s): Dr. Celestia Lau

Biography: Evan Kolodey is a student working on an Associate of Science Degree at Lorain County Community College (LCCC) in Elyria, Ohio. He was born and raised in LaGrange, Ohio, where he attended and graduated from Keystone High School in 2009. Evan enlisted in the United States Marine Corps as a 0651 Cyber Network Operator (Information Technology) and was stationed in Camp Pendleton, California, from May 2011, until September 2013. Upon being selected for and graduating Marine Corps Embassy Security Guard School in 2013, Evan served three, one-year tours guarding the U.S. Embassy in Bangkok, Thailand; the U.S. Consulate in Erbil, Iraq; and the U.S. Consulate in Shenyang, China. He received an honorable discharge on December 17, 2016.

Evan began his journey at LCCC after eight years of academic atrophy, which resulted in his need to take "Beginning Algebra" classes. His High School GPA reflected a work ethic of someone with no drive or discipline, and he claims the Marine Corps changed that in him. Once realizing that being "bad at math" wasn't a matter of genetics, but instead effort, Evan embraced the math and science grind and chose to pursue Chemical Engineering. His goal is to maintain his 4.0 GPA from three semesters thus far to complete his Associate of Science Degree and transfer to a 4-year school that will best fit his career goals.

While keeping an open mind about career paths, Evan is currently researching Process/Chemical Engineering opportunities with NASA, as well as private companies they contract with such as SpaceX, Blue Origin, Boeing, and the like.

Abstract: A multi-building facility has drinking fountains spread throughout that are used by its occupants on a daily basis. However, most of the people seeking hydration choose bottled water over the tap water because of the metallic taste in most of the fountains. Within my research, I plan on investigating the pH of the water, as well as levels of metal contamination usually associated with metallic taste in water (Cu, Fe, Mn, and Zn.) I will be using the school's atomic absorption spectrometer to measure the levels of chemical elements utilizing the absorption of optical radiation by these free atoms in their gaseous state. I hope to discover trends of certain pH / metal contamination in specific areas to help the facility narrow down the source(s) of the water problem.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

Ryan A. Reffner

Status: Sophomore, Chemistry

Research Topic: Process Optimization for Infusion of Bourbon into Barbeque Smoker Bricx

Advisor(s): Dr. Regan L. Silvestri

Biography: Ryan Reffner is an undergraduate student at Lorain County Community College majoring in Chemistry, and is currently conducting research under Dr. Regan Silvestri and Dr. Leanna Ergin. In addition to his academic pursuits, Ryan is a dedicated science and mathematics tutor at the college, helping his fellow students however he can. In his spare time, Ryan enjoys playing his guitar and sailing, assuming Lake Erie isn't frozen over.

Abstract: For thousands of years, humans have used the process of smoking to preserve and enhance the flavoring of different foods, such as meat, cheese, vegetables, and even drinks such as tea and whiskey. This process has traditionally involved wood, which is burned in an enclosed area where airflow is controlled. The combination of heat and smoke cooks the food products and also infuses them with the various chemical compounds in the wood imparting new flavors.

At our industry partner Cleveland Whiskey, wood smoker chips are created from the oak and other unconventional woods used to flavor their various specialty bourbons. Our work at Lorain County Community College is currently to study this process and optimize the parameters. Specifically, our work is to optimize the process variables for the maximum infusion of Bourbon into barbeque smoker wood chips or Bricx.

Publication(s): None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

EDUCATION

SCHOLARSHIPS

Cedarville University

Kaleb A. Irey

Status: Soph., Adolescent to Young Adult Education (AYA), Mathematics

Project Title: Shapes of Great Proportions

Advisor(s): Dr. Robert Chasnov

Biography: My name is Kaleb Irey. I am a Junior pursuing a BA Degree in Adolescent to Young Adult Education (AYA) Mathematics Education from Cedarville University. All my life, people told me I was one of the "math kids" in my school. I liked math, and I liked being good at it, but I always thought it strange how other students were not considered "math kids." Where I enjoyed math, many did not, and I had the honor of helping them with difficulties outside of class. I found a sense of pride in helping someone understand something previously foreign to them, and thought that if I could help someone become a "math kid" who was not previously, I could do anything. Thus, I believed the tutoring I was doing for my peers to be rewarding, why not pursue a career in it?

After graduation, I intend to find a teaching job where I can get real experience running classrooms, rather than tutoring peers, while finishing a Master's Degree in Education. Once I have that degree under my belt, I will hope to find a school district to buckle down in and stay for a large chunk of my career. Through doing so, I hope to build meaningful relationships with students, their families, and the community surrounding them. After all, I have found that the job is more about student growth than any content I can teach them.

Abstract: This lesson explores similar shapes, proportions associated with them, and their use in the real world. There is a segment on project-based learning, as well as group discussion leading to individual reflection. Students will know be able to identify similar shapes in real-world applications, invent meaningful proportions that describe the relationship of those shapes, and answer questions about the examples given using those proportions. Students approaching this lesson ought to know how to perform simple numerical operations, use measurement tools like a meterstick, accurately set up and use a proportion to solve for an unknown variable, and use basic kinematic equations (i.e., velocity equals distance divided by time). The lesson will begin with a brief review of what similar shapes are, then moves into group work where groups will receive an experiment model that is useful to estimate the diameter of the sun. They will identify the presence of similarity and proportions, then actually the use the experimental model to estimate the sun's diameter. Then, students will discuss possibilities to get better results, recording their thoughts along the way. The lesson will finish with individual work aimed to let the students practice identifying other similar shapes and proportions needed to study orbits around the Earth.

Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Central State University

DeVante M. Jackson

Status: Senior, Adolescent to Young Adult Education (AYA), Mathematics

Project Title: How Do Space Heroes Stay Alive?

Advisor(s): Dr. Rajeev Swami

Biography: I am currently a Junior attending Central State University, pursuing a Bachelor's Degree in Math Education. If I were to choose one word to describe me, it would be growth. Growth because in life we never stop learning. As a child I always wanted to work in law enforcement. I felt that in-order to change the world you needed to catch all of the "bad guys" but, later in life I grew to understand that this is not always the case. If the suspect never understands that what he or she did is wrong than it will occur again. This enlightenment made me feel that I was born to make a larger impact on the world. In order to change the world I needed a more influential position. I decided to teach after reading a Nelson Mandela quote. He stated that "Education is the most powerful weapon which you can use to save the world" and at that moment teaching imprinted on my life.

As a Junior on the Dean's list attending the #1 HBCU in the Nation, I still have a lot more growing to do. I am currently coaching a Dance and Cheer team in Columbus, a third year University Cheerleader, a proud member of the OEA, CDF Freedom Schools SLI, and a Security Officer. All of these positions can be extremely influential to children. In order to save the world we must first educate our children because they are the next generation. This is why I decided to major in education.

Abstract: In this lesson plan, we will be tackling space food and nutrition. With each student being different, this lesson will be interactive, informational, and adaptive. It will consist of a basic introduction, open floor discussion, hands-on activity, and social awareness activity. These will all be approached in a unique manner. We will also be breaking down space food and nutrition in two different ways. First scientifically and then mathematically. This will increase the lessons chances of being effective. For example; in-order to speak in the open floor discussion, the student must first try a piece of dried fruit. Playing with the sense will hopefully serve as a catalyst to many ideas or talking points. There will also be 3 energizers in your back pocket to keep the scholars involved.

Publication(s): None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Alexandra A. Flanigan

Status: Post Bacc., Adolescent to Young Adult Education (AYA), Int. Science

Project Title: Studying Snow and Ice Changes

Advisor(s): Dr. Kristine Lynn Still

Biography: My name is Alexandra Flanigan and I'm a post-baccalaureate student attending Cleveland State University (CSU) for my teaching license in Integrated Science for grades 7-12. I received my Bachelor's Degree from Baldwin Wallace University in Biology with a Psychology minor. I spent a year in graduate school pursuing a career research when I realized that teaching was my true passion. I made the decision to dedicate my life to education.

In May I will be finished with my program and will become a licensed teacher in the State of Ohio. I hope to find a teaching position in the Cleveland area. My program at CSU focuses on education in urban areas, and that's where I am hoping to stay. My goal is to bring the STEM field into urban communities and strengthen math, science, and reading skills within our Cleveland communities.

Abstract: This lesson will use data collected by NASA to compare snow and ice amounts over the span of ten years. Students will be collecting, plotting, and analyzing data to determine trends and patterns. They will access their data from the MY NASA DATA Live Access Server. They will need to collect monthly averages for two different years in city they live in, compile the data in a spreadsheet, and making a line graph for each year. Students will also create a difference plot to compare and contrast the yearly data. By the end of the lesson, students will be able to understand how calculations can be performed on data expressed as maps, such as averaging or subtracting. They will also be able to observe changes in snow and ice over a 10-year period and draw conclusions about trends indicated by the observations. Students will work in teams and prepare a presentation that they could pitch to environmental policy makers in regard to global climate change.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

Kent State University

Jacob T. Dunwiddie

Status: Junior, Early Childhood Education

Project Title: Responsive Science, Technology, Engineering, and Mathematics Teaching Utilizing the 5E Inquiry Cycle

Advisor(s): Bridget Mulvey, Ph.D. and Joseph Ortiz, Ph.D.

Biography: Jacob Dunwiddie is a Senior Early Childhood Education major at Kent State University. During his undergraduate studies, Jacob has completed five semesters of field work and student teaching in various schools and grade levels ranging from preschool to third grade. His passion for responsive and inquiry based teaching is rooted in relevant educational and cognitive learning theorists like Dewey, Vygotsky, and Piaget. While completing his studies he has particularly been drawn to S.T.E.M and S.T.E.A.M work with children. Some of his past experiences include environmentalism, conservationism, gardening, physics, STEM camp and engineering with young children. All of which were based on the children's interests to deepen their understanding about those topics.

Abstract: This project examines how early childhood educators can plan inquiry based STEM lessons through the use of the 5E learning cycle with Kindergartners. Lessons planned examine how teachers can enact meaningful lessons based on the interests of young children that foster accurate scientific inquiry and understanding. Evidence of this teaching is highlighted through lessons I completed and samples of student work. Throughout my time as a field student and student teacher I was overseeing the curriculum planning for the STEM area in the classroom, with guidance from my mentor teachers this past school year. During the course of several months I document photos, observations, and lessons of STEM work with young children and how their interests changes with lessons that support them. I seek to show how teachers can use the 5E cycles can respond to the natural S.T.E.M. and S.T.E.A.M. inquiries with young children.

Publication(s):

1. Dunwiddie, Jacob T., "Exploring the Development and Implementation of 5E Learning Cycles with Elementary Students". (In Process).

Congressional District: 7th

Congressional Representative: Bob Gibbs

MIAMI UNIVERSITY

Miami University

Meghan G. Mulligan

Status: Soph., Adolescent to Young Adult Education (AYA), Science

Project Title: Coral Reefs: Measuring the Health of “Canaries” of the Sea

Advisor(s): Dr. Ann MacKenzie

Biography: I am a Junior at Miami University double majoring in Biology and Adolescent to Young Adult Life Science and Chemistry Education. I grew up in Middletown, Ohio, and attended Bishop Fenwick High School. The strong sense of community and support I felt in high school, and the presence of many educator role models, including my grandmother, inspired me to pursue a career in education. As an educator, I hope to help my students be eager to discover the world around them, and to be fervent inquirers.

At Miami University, I have participated in the Miami University Marching Band, and Miami University’s chapter of the National Science Teacher Association. I had the opportunity to work as a Teaching Assistant at Miami University’s Middletown campus over this past summer term. I have enjoyed being involved in Chemistry Education research under the guidance of my Chemistry professor, Dr. Yezierski. In the future, I look forward to integrating what I’ve learned through these activities into my classroom.

Abstract: This lesson plan is designed for a 9-12 grade life science classroom for students to investigate ecosystems and the effect of the environment on living organisms, specifically by considering coral reefs. In the beginning of the lesson, students become engaged and access their prior knowledge of coral reefs so that misconceptions can be addressed. Students will be introduced to resources from NASA, including information from the Coral Reef Airborne Laboratory (CORAL), to investigate studies of coral reefs and their response to environmental change. Students will be given the opportunity to consider the effect of environmental change on coral ecosystems through different viewpoints before developing a product to bring awareness to the importance of coral reefs and the challenges coral reefs face. Students will be encouraged to continue research using NASA resources while developing these products.

Publication(s): None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

MIAMI UNIVERSITY

Miami University

Kaycie R. Riley

Status: Junior, Adolescent to Young Adult (AYA), Mathematics

Project Title: Building a Better Model: The Solar System

Advisor(s): Todd Edwards

Biography: My name is Kaycie Riley. I am a Junior in the Integrated Mathematics Education program at Miami University. I began my education at Miami in the Engineering Department, but realized that my passion was in mathematics rather than science, and I switched during my freshman year. I have always enjoyed mathematics, and have been inspired by several of my teachers and professors.

I intend to teach in Ohio and study to get my Master of Arts in Teaching Mathematics from Miami within the first five years after I receive my Bachelor's, and would then like to continue on towards my Doctorate in STEM education. My main areas of focus within mathematics are algebra and accessibility.

Abstract: This project reinforces the circle theorems of geometry, inequalities and their constraints, and writing equations with two or more variables in an introductory geometry course. Students engage in the construction of a scaled replica of the solar system over a week-long period. Through a series of scaffolded experiences, students develop more complex models than typically explored in the high school curriculum. Students employ a cross-disciplinary approach in their model building---integrating science and mathematics with technology--- as they collect and analyze data from NASA websites; build mathematical equations from distance data; and construct digital models using DESMOS, a freely available online calculation and visualization tool. The model construction brings content alive for students and serves as an alternative assessment of their understanding, actively engaging learners in ways that are difficult---nay impossible--- with traditional, paper-and-pencil tests.

Students begin their work with https://solarsystem.nasa.gov/ as they gather information about objects within the solar system and compare planet data. As students progress through the lesson, they process and enter scaled data into DESMOS to build a digital model. This work is non-trivial and addresses a variety of Common Core State Standards for Mathematics (CCSSM). For instance, students manipulate circle equations to model planets, use scaled distances to position circle centers, and shade using inequalities. Knowledge of inequalities and similarity is a prerequisite for this work. At the end of the project, students write up their process and reasoning in detail, compare solar systems while discussing problems and errors they encountered along the way, as well as possible project extensions and areas for future research.

Publication(s): None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Ohio Northern University

Kenton C. D. Jarvis

Status: Junior, Mathematics/Engineering

Project Title: Newtons Ride

Advisor(s): Dr. Todd France

Biography: My name is Kenton Jarvis. I am a Junior Engineering Education major with Computer Science and Mathematics minors at Ohio Northern University. When I was in high school, I wanted to be an engineer. Then I had the opportunity to tutor other students at my high school. Once I experienced the rewards of tutoring, I knew I wanted to be a STEM educator. I had a physics teacher who always encouraged me to push beyond "my best effort." I want to be that kind of teacher for my students.

After graduation, I want to work full time at an engineering firm in order to build a professional reputation and a base of real world knowledge that I can draw upon in teaching my students. While working at the engineering firm I hope to pursue a master's degree in computer science, followed by a doctorate in engineering education or mechanical engineering, I have not decided. My ultimate goal is to be a college teacher. I prefer to use the term teacher instead of professor. I think of professors as people who use lecture based teaching methods, while I think of myself teaching with a more hands on approach. Teachers use all their available resources to help their students master the content. I hope to be a teacher to whom my students can come to and feel supported.

Abstract: This lesson will be a introduction to Newton's 3 laws of motion and a activity exploring the laws. This lesson is originally designed for block scheduling, but can be easily adjusted to support one hour classes instead. As a class the teacher will introduce each law of motion individually and give a brief description. After each explanation the teacher will ask students to demonstrate the law with their Newton car. By the end of the lesson students will be able to both describe and display each of Newton's 3 laws of motion.

Publication(s): None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Ohio Northern University

Rachel E. Sauder

Status: Senior, Adolescent to Young Adult (AYA), Integrated Science

Project Title: Photosynthesis in Space: An Interdisciplinary Exploration

Advisor(s): Dr. Todd France

Biography: At Ohio Northern University, I am a Biology major with a Chemistry minor studying AYA Integrated Science Education. My inspiration for being a science teacher comes from the Science Olympiad program and a fabulous AP Biology teacher in high school. On campus, I am involved in SAE Aero Design, Phi Sigma Rho, Kappa Delta Pi, and Campus Scouts.

After graduation in May, 2019, I hope to teach high school Biology or Earth Science; after school I would like to coach a Science Olympiad team, to give students opportunities to explore science beyond the curriculum. In the not too distant future, I will pursue a Master's Degree in Biology, which will qualify me to teach CCP (College Credit Plus) courses at the high school level, furthering student opportunities in the sciences.

Abstract: My project explores growing effects of space conditions, and is intended for a tenth or eleventh grade biology class. The project synthesizes principles of engineering and experimental design with content in biology and physics, giving students autonomy over their learning, and emphasizing interdisciplinary work in science early in their academic career. After receiving background knowledge on the inner workings of photosynthesis, students will then design an experiment manipulating at least one variable to mirror growing conditions in a space environment. Students will have to research their proposed experiment, with emphasis on NASA materials. After researching and understanding the underlying principles, the experiments will be carried out using a fast growing plant such as peas. Throughout this process, additional whole class lessons will develop to address common questions, topics, or interests.

While the plants grow, academic instruction will continue through the curriculum. Students will measure growing progress over at least four weeks while manipulating their chosen variable, to understand how it impacts plant growth. The unit will culminate in a student presentation of information and results.

Publication(s): None yet.

Congressional District: 14th

Congressional Representative: David P. Joyce

Ohio Northern University

Matthew W. Walker

Status: Sophomore, Adolescent to Young Adult (AYA), Math/Engineering

Project Title: Water Filtration Design Challenge

Advisor(s): Dr. Jed E. Marquart, P.E. and Dr. Todd France

Biography: Matt Walker is an undergraduate student at Ohio Northern University in Ada, Ohio. He is heavily involved in multiple campus organizations such as club hockey, Phi Mu Alpha Sinfonia Fraternity, and the band program.

He is also involved in many leadership positions such as being the president of the Innovators of Northern (ION). ION is a student developed group devoted to making an impact and change on a student's campus. Matt has been project lead through this organization on projects like room renovations, MakerSpace design brainstorms, and MakerSpace implementation.

Matt has conducted educational research and a paper is currently being finished with Matt as a co-author. The research is focused on standards-based grading for collegiate level engineering.

Abstract: The water filtration design challenge is an activity designed for student's middle school and up. The purpose of the project is to introduce students to basic scientific properties of natural water purification techniques while also teaching them the importance of the design process and using mistakes to better the original idea. The length of this activity can vary. It can last 2-3 days of class or simply and hour, depending on what the instructor decides to include or omit.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

The Ohio State University

Abigail M. Fuhrmann

Status: Senior, Middle Childhood Education, Mathematics/Science

Project Title: Solar System Exploration 5th Grade Science Lesson Plan

Advisor(s): Kim Zaccaro and Laura Lyght

Biography: I am a Senior at The Ohio State University majoring in Middle Childhood Education with a specialization in Mathematics and Science. My family owns an apple orchard in Wheelersburg, Ohio, where I helped grow great tasting local fruits and vegetables for our community. We also raise and show meat goats to be actively involved in the Scioto County and Ohio 4-H Program. I graduated from Minford High school in 2014, classified as the Superintendents Top 10, and was 1 out of 2 students to attend The Ohio State University.

My passion for teaching began in the second grade and was fostered by my teachers throughout middle school. I had a "play-school" with my younger siblings and I took every opportunity I could to teach others. The 4-H Program in my county and at the state level provided multiple opportunities to teach others, plan events, and guide other 4-H'ers with their projects to learn life skills. I have had various placements with schools in Columbus, Ohio and have found my fit with 4th-9th graders. My love for science and mathematics has continued to grow over the years and I always seek out new opportunities to learn and grow within these fields. I enjoy attending and volunteering at science camps, STEM workshops, and hands-on field trips.

Abstract: This lesson connects 5th grade Ohio Content Standards with NASA resources to provides a rich and engaging 21st-Century learning opportunity. The class will watch a short video clip from NASA for a general introduction to the planets orbiting the sun and their characteristics. After the digital engagement, students will complete a 3-2-1 with a class discussion following to check students prior understanding. The students will be creating a model of the solar system using facts from multiple print or digital sources. The model will include paper, string, printed images of planets, and will be done in groups of 3-4 students. Content engagement will be through Solar System Stations that include print sources such as magazines, textbooks, non-fiction books, and digital engagement sources such as NASA video clips or websites on a Chromebook. Students will engage in student-led collaborative learning at each station and will improve their group work as well. If desired, gifted students can be station leaders and help guide students at that station.

During the stations the teacher will walk around and ask guiding questions, and make sure the tasks are being divided for students in the group. The station represents one celestial body, and at each station they must learn the name of the planet, distance away from the sun, size, composition, and orbit of the celestial body represented, using the resources. They will have a handout to guide and record their findings. After they have been through all 10 stations (8 planets, sun, 1 general comet), they will create the model of the solar system with the string, images, and facts they collected at each station. If the lesson is split between 2 or 3 days, conclude one day with a parking lot on the chalk board called "Sticky Conclusions" where each students puts a fact on a post-it-note and adds it to the drawing of the celestial bodies on the chalk board.

Publication(s): None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

The Ohio State University

Elizabeth K. Han

Status: Senior, Middle Childhood Education, Mathematics/Science

Project Title: Moon Movements

Advisor(s): Dave Andereck

Biography: My name is Elizabeth Han, and I am studying Middle Childhood Education at The Ohio State University (OSU). Math and Science have been my two favorite subject areas for as long as I can remember. Not only has my time at OSU equipped me to be an excellent up-and-coming educator of these content areas, it has also trained me in student-centered learning and culturally responsive pedagogy. Currently a senior, I plan to teach after graduating this spring. I am particularly passionate about equitable education, and hope to be a support and resource for young adolescents in inner city public schools.

Abstract: Students will learn about moon phases and their relationship with positions of Sun, Earth, and Moon through an inquiry-based lesson. In groups, students will work with various-sized balls that represent Sun, Earth, and Moon to act out position and movement of each body. Students, applying and building on prior understanding of the behavior of light, will arrive at the fact that the half of the moon's surface that faces the sun is the portion that reflects light and is visible to our eyes. Students who represent the moon will color half of their ball black to represent that half which is not reflecting sunlight therefore not visible from Earth. Then students who represent the earth can share what they observe of the moon—the different moon phases based on position of Sun, Earth, and Moon. This activity for understanding why the moon appears to us in different phases will lead into the activity of sketching phases, and finally, creating a moon phase model out of Oreo cookies.

Publication(s): None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

The Ohio State University

Kristen E. Pierce

Status: Post Bacc., Middle Childhood Education, Mathematics

Project Title: Incorporating STEM into ELA: Humans on Mars?

Advisor(s): Sean R. Thompson

Biography: I grew up in Pickerington, Ohio, where I graduated from Pickerington Central High School in 2013. While I have always loved learning and education, I did not recognize my passion for teaching until my sophomore year of college, when I started tutoring math. I started coaching a junior high softball team about year later and really enjoyed working with middle-schoolers. Thus, I started pursuing a middle childhood teaching license.

I graduated from The Ohio State University in May 2017 with a Bachelor of Science Degree in Human Development and Family Science and I am currently a graduate student at the same university pursuing a Master's Degree in Middle Childhood (4-9) Education concentrating in Mathematics and English Language Arts. For my student teaching experience, I am in a year long placement at a Columbus City middle school in an eighth grade English Language Arts classroom. Upon graduation in May 2018, I would like to teach in a seventh or eighth grade mathematics classroom somewhere in Central Ohio and help all students learn through collaboration and differentiation. I believe that all students can learn with the right support and using technology and incorporating 21st-century learning skills (critical thinking, communication, collaboration, and creativity) will be crucial for my future students' successes.

Outside of the classroom, I enjoy training for and competing in triathlons. I have competed in three sprint distance triathlons and one Olympic distance. I was going to participate in the Ohio Ironman 70.3 in 2016 but was unable to compete due to a concussion. I plan on completing a half Ironman one day. I also enjoy reading, sewing, and studying the Bible. I love to spend time hanging out with my family, friends, and pets.

Abstract: The goal of these lesson plans is to incorporate STEM education into an English classroom by having students create a multimedia educational project, following Ohio's Common Core Standards, in which the they will learn about informational texts and speech and listening skills. The topic of the project will be centered around NASA's space exploration plan to send humans to Mars. The objective is to have students come up with an essential question about Mars and visiting Mars. Through research, students will develop a multimedia presentation that includes a writing assignment that answers their essential question. Students will be introduced to NASA materials to help answer the essential question and introduced to several types of technologies to present information.

Publication(s): None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Ohio University

Keilee L. Guthrie

Status: Junior, Early Childhood Education

Project Title: Astronauts Eat What?!

Advisor(s): Dr. Shawn Ostermann

Biography: My name is Keilee Guthrie, and I am currently a Senior at Ohio University and beginning my first of two semesters of student teaching. I was given the opportunity to substitute teach for two years following my first Bachelor's Degree and while working towards my Master's Degree. While student teaching, I found that I had a passion for teaching and seeing children succeed inside and outside of the classroom, so I went back to Ohio University to receive my Early Childhood Education Degree. My education at Ohio University has given me the opportunity to spend my days in the various and diverse classrooms, teaching and learning from students between the ages of pre-school to third grade. Outside of teaching, I enjoy being outdoors and playing sports as well as spending time with family and friends.

After graduating, I plan to work in a school around the Columbus, Ohio, area. While I have a passion to teach all children, I have developed relationship with the kindergarten age throughout my years of teaching and that would be my ultimate. I plan to continue my education by working towards an administer license in the future. I look forward to the opportunity to coaching various sports as well. I hope to be one of those teachers that my students look at as a role model but as well as someone they feel comfortable and supported by.

Abstract: This research project-based lesson plan will allow students to explore what astronauts eat for training to become an astronaut. It will also explore what astronaut eat in a day and throughout their time while being in space and why they must eat such food. This lesson plan is geared to third grade since it is a research based project but could be modified for other grades. The goal of the lesson is for students to learn that astronauts must eat healthy and based off their needs to be the best they can at their job. The students will be given the information from the teacher based on what astronauts eat prior to space and while in space and the students will research someone else to compare and contrast eating habits over the course of a week. I will encourage students to research other jobs, their favorite super heroes, or some of their other favorite individuals to learn what they must eat to see what the differences and similarities exist. The students will write a paper and create a poster to be shared among the class.

Publication(s): None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

The University of Toledo

Brittany A. Layden

Status: Senior, Adolescent to Young Adult (AYA), Science

Project Title: The Science of Snowflakes

Advisor(s): Dr. Mark Templin

Biography: I am from Plymouth, Michigan, and graduated in 2014 from Father Gabriel Richard High School in Ann Arbor. I am currently a Junior at The University of Toledo pursuing a Bachelor's Degree in Adolescent to Young Adult (AYA) Education for Life Sciences with minors in Earth, Space and Environmental Sciences.

My love for science began at a young age when I had some incredible science teachers at my grade school, All Saints Catholic School in Canton, Michigan. My love for science grew as I got older and I began to feel passionate about having a career in the sciences while studying and living in the United Kingdom my eighth and ninth grade years.

Along with my studies, I am involved in many areas on my campus. I am a member of Alpha Xi Delta Sorority, Kappa Delta Pi Honors Education Fraternity, the Catholic Student Association, and Christian Leadership Program. I am the Vice President of the Women's Club Lacrosse team, Publicity Director for Walk for Water Toledo, the Director of Chase STEM Academy After School College Preparation Program and I am an intern for the Center of Religious Understanding.

My goal after graduation is to teach science to middle school students and then eventually begin teaching at the high school level.

Abstract: In this lesson, students will learn what snowflakes are, how they form, and how they are affected when variables, such as temperature and moisture, change. With each topic the students will brainstorm about a series of questions relating to snowflakes, complete an activity based off those questions, then have the opportunity to demonstrate what they learned. For example, lesson two begins with asking the students what snowflakes are and how they form. They will then explore the water cycle and discover how snowflakes form and what they are made of. To finish, the students will analyze data from graphs provided by NASA that displayed cloud top temperature and precipitation on a global scale for a given year and use that knowledge to create their prediction of what a snowflake would look like on a given date in a specific area of the world. They will use all this information to understand the role that diverse variables play in our planet's climate system.

Publication(s): None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Wright State University

Shantelle M. Binfet

Status: Senior, Early Childhood Education

Project Title: Food's Next Great Frontier

Advisor(s): Romena M. Garrett Holbert, Ph.D., NBCT

Biography: I am a Senior at Wright State University. I grew up in Bellefontaine, Ohio, and went to Bellefontaine High School. I am studying Early Childhood Education and plan on continuing my education with a Masters in Educational Leadership upon graduating in Spring, 2018. Throughout my collegiate career, I have been a head resident assistant, vice president of the Residential Community Association, Early Childhood program ambassador, and represented Wright State University as a delegate at CAACURH/NACURH.

During my time in my field placements, I have noticed that science is not as much of a focus in the lower grade levels, but it ultimately goes hand in hand with many of the other subjects that students are taught. My goal as a teacher is to bring more of a focus and passion to science in my own classroom. I want my students to be able to learn, observe, and explore science topics to their fullest potential, so that they can see how science impacts every aspect of their daily lives.

Abstract: This multi-day unit called, "Food's Next Great Frontier," explores principals of space food and nutrition and includes NASA materials. Students will learn the differences between eating food on Earth and in space through a blind taste test of food on Earth versus food taken to space. Students will have the opportunity to taste test each type of food and compare them whilst choosing which ones they like best. Then, students will be prompted as to why they think the space food looked different than the food they eat on Earth. Students will watch NASA videos of astronauts eating food in space and learn why it must be freeze dried or dehydrated due to storage space and lack of gravity. After they have begun to understand why space food is different from Earth food and the process it must go through before it can leave for space, they will participate in an activity where the students will create their own "space pudding." This hands-on activity will help students visualize the rehydration process that food goes through once an astronaut wants to eat it in space. The unit will be wrapped up by having students draw a picture of the kind of food they would want NASA to make for them if they were going on a space mission and why. Students will draw an additional picture of what their food choice would look like if it were freeze dried or dehydrated like the rest of the space food we taste tested and looked at in class.

Publication(s): None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Wright State University

Hayley R. Crider

Status: Junior, Early Childhood Education

Project Title: Life on Mars

Advisor(s): Romena M. Garrett Holbert, Ph.D., NBCT

Biography: I am a Junior at Wright State University. I grew up in Dayton, Ohio, and went to Kettering Fairmont High School. My freshman year of college I went away to school at Lee University in Cleveland, Tennessee. After one year away I decided to come home. I am studying Early Childhood Education and plan on getting endorsed in STEM and reading. My passion for teaching came from some of the great teachers I had in elementary school. I saw the love and compassion they had for kids and I always remember looking up to them and wanting to be just like them. My goal as a teacher is to make learning fun so that every day my students and myself look forward to coming to school. I also want to be a positive role model for kids because this day in age a lot of kids don't have someone to look up to.

Abstract: My multi-day unit is called, "Life on Mars". In my educational project students will learn about life on Mars through a series of four lessons.

The first lesson covers information on learning about life on Mars. Students will watch an educational video and then use information they learned in that video to make four-door foldable with facts about different things on Mars, such as water, weather, gravity, etc.

In the second lesson students will use their creative writing skills and knowledge from the previous lesson and write their own story about their day on Mars. This will be a fun and creative prompt that students will enjoy writing about. They will also draw a picture of their day to be displayed with their story.

The third lesson, students will begin to learn about rovers; how they work, but more specifically the rovers currently on Mars. They will watch a video where a man who actually drives the rovers for NASA talks about the process and all the things they can do. Students will brainstorm ideas about what tools rovers have. This will be useful for the next lesson.

After learning about the function of a rover, in the fourth lesson students will build their own rover. This brings out the STEM qualities students need to practice. They will be problem solving and working together to create a rover out of a shoe box and other materials. They will also calculate the speed of their rovers going down a ramp on a worksheet attached to the lesson.

Publication(s): None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner