NASA / OHIO SPACE GRANT CONSORTIUM

2016-2017 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 1,150 undergraduate scholarships and 168 graduate fellowships have been awarded.

Matching funds are provided by the 26 member universities, the Ohio Aerospace Institute (OAI), Choose Ohio First, the Nord Family Foundation, the Nordson Corporation Foundation, and private industry. Note that this year approximately $400,000 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. At the Doctoral level, students have a government co-advisor in addition to their faculty mentor, and perform research at one of the following Ohio federal laboratories: NASA Glenn Research Center or the Air Force Research Laboratory at Wright-Patterson Air Force Base. The research conducted for the Master's and Doctoral degrees 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.

16 Affiliate Members

- Air Force Institute of Technology
- The University of Akron
- Case Western Reserve University
- Cedarville University
- Central State University
- Cleveland State University
- University of Cincinnati
- University of Dayton
- Kent State University
- Miami University
- Ohio Northern University
- The Ohio State University
- Ohio University
- The University of Toledo
- Wilberforce University
- Wright State University

2 Participating Universities

- Marietta College
- Youngstown State University

8 Community Colleges

- Cincinnati State Technical & Community College
- Columbus State Community College
- Cuyahoga Community College
- Lakeland Community College
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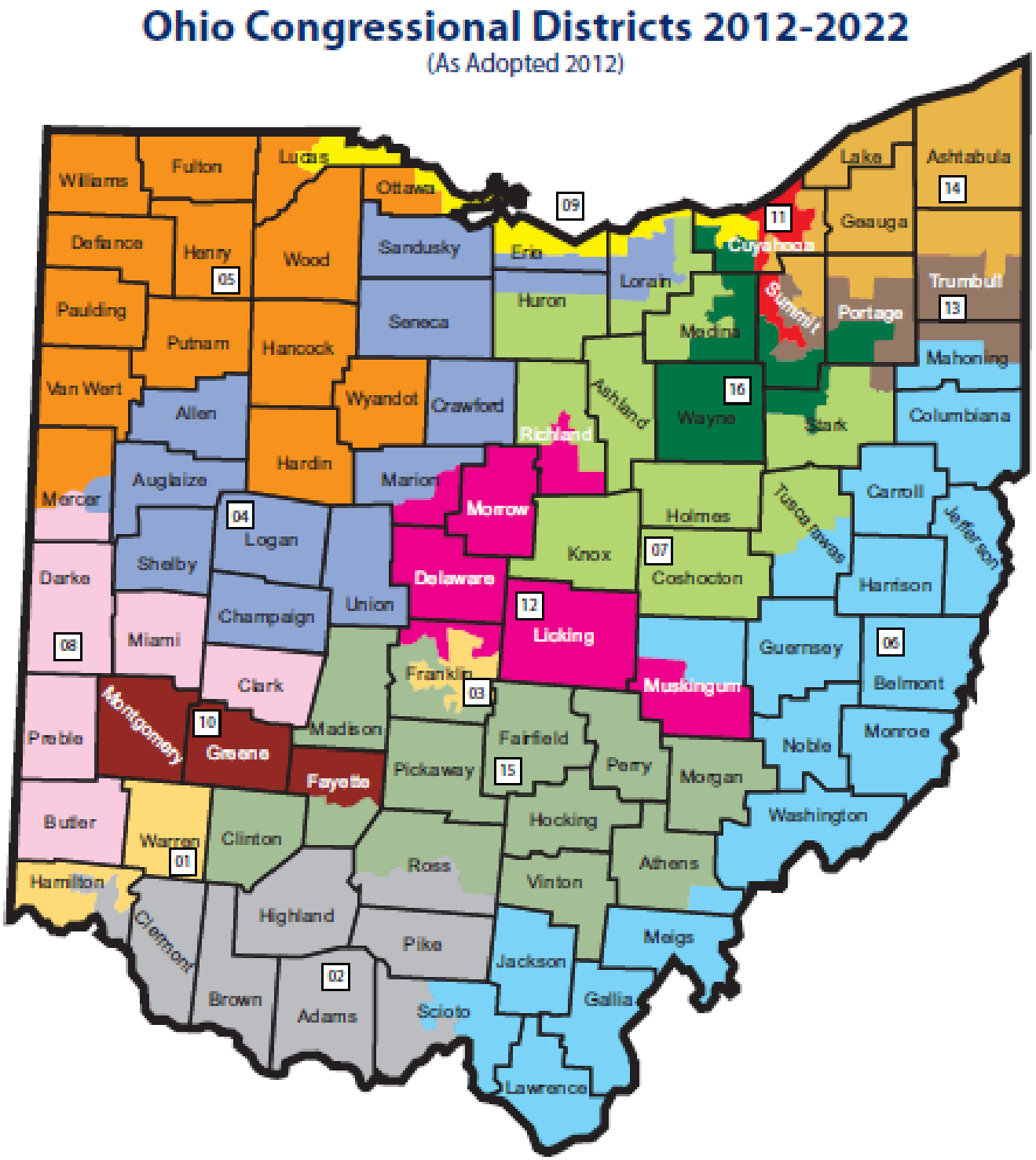
OHIO CONGRESSIONAL MAP



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FELLOWSHIPS

Daniel G. Gerges

Status: Master's 2, Mechanical Engineering

Research Topic: Design and Integration of a Thrust Stand for Green Propellant Testing

Advisor(s): Dr. Mounir Ibrahim and Lynn Arrington

Biography: Daniel Gerges is a Graduate Mechanical Engineering Student at Cleveland State University. From a young age, he has been fascinated by the aerospace field and has had a strong interest in contributing to the field. Through various opportunities provided by the NASA Glenn Research Center (GRC), the Ohio Aerospace Institute and The Ohio Space Grant Consortium, Dan has been able to work in the aerospace field both directly and through support roles. Daniel is a two-time summer intern at NASA GRC, contributing to polymer research for use in deep space exploration systems as well as participating in the quality and mission assurance department, earlier in his college career. In addition to these roles, Dan has been able to work for the Department of Defense as a quality engineer, ensuring that the American Service Branches are provided with high quality and affordable equipment. Later During his senior year of undergraduate studies, Daniel applied his skills in the Private sector as an Engineering and Supply Chain Manager at Rockwell Automation. As a graduate student Daniel returned to NASA Glenn Research Center as a contractor, serving in the materials research branch. Most recently, Daniel is currently a Civil Servant at NASA under the Pathways Federal Internship Program with the Rocket Testing group. As an undergraduate funded through the OSGC, Dan has completed the NASA GRC Heat Melt Compactor Research during his senior year, and was published through the American Institute of Aeronautics and Astronautics. Currently, Dan is working on his Master's Degree with a focus on Thermal Fluids from Cleveland State University.

Abstract: The NASA Glenn Research Center (GRC) of Cleveland, Ohio in Collaboration with the Air Force Research Laboratory (AFRL), has been tasked with designing, analyzing and optimizing a testing environment for a low toxicity green propellant to replace current high toxicity propellants used on rockets. In general, the test engines used to test the green propellant are smaller and generate thrusts in the region of 1-5 lbf. The current thrust stand on the identified NASA GRC test cell is only capable of accurately measuring thrusts of the lower limit of 5 lbf. This poses a problem, as any generated thrust under 5 lbf will have a lot of data interference and will be inaccurately measured with the current set up. The scope of the project is to design, build and integrate a test stand that will be able to accurately measure thrust levels in the specified limits of 1-5 lbf (5-25 [N]) of thrust. This design is critical in ensuring accurate data is recording during the live testing of the green propellants in Summer of 2017. The data obtained will be used in the validation of the green propellant technology and will help move the efforts one step closer to replacing the current high toxicity propellant with green propellant.

Publications:

1. Feasibility Analysis of a Microgravity Condensing Heat Exchanger device for use on the Heat Melt Compactor (AIAA/OSGC).

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Eric M. Lange

Status: Master's 1, Chemical Engineering

Research Topic: Catalytic Gasification - A Sustainable Waste Management Alternative

Advisor(s): Dr. Jorge E. Gatica

Biography: Currently, I am enrolled in Cleveland State's 4+1 Master's program working towards my Master's Degree in Chemical Engineering. I graduated with my undergraduate degree in Chemical Engineering from Cleveland State University in May of 2016 as a member of the Jack, Joseph, and Morton Mandel Honors College. With my time at Cleveland State University I have had the opportunity to participate in a number of excellent experiences including cooperative education as well as undergraduate research. I completed two cooperative education semesters at PolymerPlus LLC, a small polymer research company located in Valley View, Ohio. In addition, I was able to spend over a year working in the Chemical Reaction Engineering (CRE) laboratory at Cleveland State University as an undergraduate student. The CRE research was my primary driving force towards pursuing higher education, as well as the first insight I had into the catalytic gasification process. In addition, I have been involved with the Tau Beta Pi Engineering Honor Society and American Institute of Chemical Engineer's student chapters.

Abstract: The process not only acts as a solution to improving mission and life support capabilities, but also solves current issues associated with waste management techniques in space. The catalytic gasification mechanism is initiated by two oxidation reactions. The liquid phase oxidation reactions produce a gas consisting of carbon monoxide, carbon dioxide, and water. Two additional gas phase reactions occur in the system: the "Water Gas Shift Reaction" (WGSR) and the "Sabatier Reaction". The WGSR converts carbon monoxide and water to carbon dioxide and hydrogen. Sequentially, the Sabatier Reaction converts the products of the WGSR to methane and water. Methane is just one example of a fuel that could be used to extend space exploration.

The main goal of this research is to determine the chemical kinetics of the multi-phase catalytic gasification process. To this point, only the kinetics of the Sabatier Reaction have been characterized. In addition, data is available to perform similar kinetic studies on the WGSR. The main focus is currently on gathering data to determine the kinetic parameters of the liquid phase oxidation reactions for a polyethylene substrate. Gasification experiments are carried out in a high pressure batch reactor. Upon collection, gas samples are analyzed with Gas Chromatography. Selectivity and conversion data can then be used to elucidate the kinetic parameters that characterize the liquid phase oxidation reactions. Upon the determination of the oxidation kinetics, a multiphase model will be developed that models the catalytic gasification process of waste generated during space exploration.

Publications: None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Kent State University

Dulcinea M. Avouris

Status: Doctoral 3, Applied Geology

Research Topic: Detection and Analysis of Harmful Algal Blooms in Lake Erie Using Varimax-rotated Principal Component Analysis of Visible/Near Infrared Reflectance Spectra from the Moderate Resolution Imaging Spectroradiometer (MODIS)

Advisor(s): Dr. Joseph D. Ortiz

Biography: I earned my B.S. from Michigan Technological University in 1996, where I gained a solid, foundational, education in geology. I returned to Michigan Tech for my Master's Program, graduating in 2011. My research investigated the triggering relationship between large, shallow tectonic earthquakes, and changes in volcanic activity. I monitored volcanic activity using data from the Ozone Monitoring Instrument (OMI), which detects sulfur dioxide, a common gas in volcanic emissions. I modeled the effect of the earthquakes by creating synthetic seismograms. This multi-disciplinary project inspired me to seek out other opportunities for integrated research. I grew up in Western Michigan, and spent much of my life near the Great Lakes, which influenced my choice of Ph.D. projects. I am now using my remote sensing background to monitor and promote the health of the Great Lakes.

Abstract: The appearance of Harmful Algal Blooms (HABs) in Lake Erie has been an ongoing problem for many years, and can cause serious risks, including affecting drinking water supplies. This project involves systematically analyzing imagery from the Moderate Resolution Imaging Spectroradiometer (MODIS) from 2010-2018. Varimax-rotated principal component analysis (VPCA) will be used on the derivative reflectance spectra from the MODIS data to determine the optical signature of the dominant pigments present in Lake Erie and identify concentrations of chlorophyll a. The pigment assemblages will be identified by comparing the resultant VPCA signals to various known pigment spectra extracted by high-precision liquid chromatography (HPLC). The results will be ground-truthed with samples collected from Lake Erie, and analyzed using a visible/near infrared spectrophotometer. This work will provide insight into anticipating the likelihood of HABs in the Great Lakes, as well as explore the interannual variability of primary production in Lake Erie.

Publications:

1. Avouris, Dulcinea M., "The Use of Derivative Spectroscopy in Analysis of Lake Erie Water Samples", Ohio Space Grant Consortium Student Research Symposium XXIII, Cleveland, Ohio. April, 2015. Pages 31-36. Online: http://www.osgc.org/symproceeding.html
2. Avouris, Dulcinea M., "Keeping an Eye on Lake Erie: Using Remote Sensing to Analyze Harmful Algal Blooms", Ohio Space Grant Consortium Student Research Symposium XXIV, Cleveland, Ohio. April, 2016. Pages 34-39. Online: http://www.osgc.org/symproceeding.html

Abstracts:

1. Avouris, D. M., Ortiz, J. D. 144949. Keeping an Eye on Lake Erie: Identifying Color-Producing Agents Using Derivative Spectroscopy of MODIS Images. AGU Fall Meeting 2016.
2. Avouris, D. M., Ortiz, J. D., Carey, K., Zheng, F., Bullerjahn, G. Keeping an Eye on Lake Erie: Analysis of 2015 MODIS Data Using Derivative Spectroscopy. IAGLR Annual Conference on Great Lakes Research 2016.
3. Avouris, D. M. Influence of Watershed Land Cover on Riverine Input of Dissolved Organic Carbon to Western Lake Erie. Kent State Water & Land Symposium 2016.
4. Avouris, D. M., Ortiz, J. D., Carey, K., Zheng, F., Bullerjahn, G. Keeping an Eye on Lake Erie: Identifying Color-Producing Agents Using Derivative Spectroscopy. Kent State Graduate Research Symposium 2016.
5. Avouris, D. M., Ortiz, J. D., Carey, K., Zheng, F., Bullerjahn, G. Algal and Cyanophyte Blooms in Lake Erie: Identifying Color-Producing Agents Using Derivative Spectroscopy. Kent State Water Symposium 2015.
6. Avouris, D. M., S. Carn, G. P. Waite. 1208305. Triggering of Volcanic Activity by Large Earthquakes. AGU Fall Meeting 2011.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

The Ohio State University

Dennis Omari

Status: Master's 1, Aeronautical and Astronautical Engineering

Research Topic: Plasma Controlled Cavity as a Shock trap in a Transient Environment

Advisor(s): Dr. Mo Samimy

Biography: Dennis Omari is currently a first year graduate student at The Ohio State University working towards his Master's of Science Degree in Aeronautical/Astronautical Engineering. Dennis graduated from Olentangy Orange High School in Columbus, Ohio in 2012. An early proclivity for mathematics and science encouraged him to pursue a career in engineering. He has had two summer research internships: the first was located at Mississippi State University researching the mechanical properties of polymer gels using a cavitation rheology technique. The second was a Summer Research Opportunities Program at The Ohio State University, researching the influence of Localized Arc Filament Plasma Actuators (LAFPAs) on the resonance of a weakly resonating cavity.

Dennis has a passion for soccer and travelling around the world. He is part of two engineering honors groups: Sigma Gamma Tau and Lambda Psi. He is also a member of the African Youth League. He has participated in the Men's Intramural Soccer since freshmen year and also enjoys playing volleyball during his leisure time. Dennis aspires to travel around the world to major cities like Barcelona, Rome, London, Paris, etc.

Abstract: Scramjets can provide efficient propulsion for aircraft flying at speeds greater than Mach 5, however, they are susceptible to inlet unstart. Typically, combustor thermal choke could cause inlet unstart, which would lead to loss of thrust and stalled engine operation. Isolators are generally employed to prevent unstart. The performance/stability of the scramjet engine operation would increase by expanding the isolator's unstart prevention. It is hypothesized that a resonating cavity, could supplement an isolator by trapping the upstream travelling shock train to prevent inlet unstart. Having already tested the shock trapping ability in a quasi-steady increasing back pressure environment, this study assesses the shock tapping ability in a more realistic, transient unstart environment. Based on results from the numerical simulations using techniques like tailored RANS calculations, a few selected cases that will be tested experimentally and compared to the simulation results. In conjunction to a redefined mechanism, the cavity's capabilities to prevent rapid inlet unstart will be demonstrated. For the transient back pressure testing, a new mechanism will be designed and built, to allow for rapid ramp motion, so that the shock trapping capabilities of the cavity can be experimentally investigated.

Publications: None yet.

Congressional District: 12th

Congressional Representative: Patrick J. Tiberi

The Ohio State University

Achal S. Singhal

Status: Master's 2, Mechanical Engineering

Research Topic: Unsteady Flow Separation Control over a NACA 0015 using NS-DBD Plasma Actuators

Advisor(s): Dr. Mo Samimy

Biography: My name is Achal Singhal, and I am currently attending The Ohio State University. My major is Mechanical Engineering, but as I have progressed throughout the curriculum, I have really enjoyed the fluids and research portion of my studies. Continuing on this path, I have completed my Master's at The Ohio State University and look to apply what I have learned either in an academic or industry endeavor.

Abstract: Flow field surrounding a moving body is often unsteady. This motion can be linear or rotary, but the latter will be the primary focus of this thesis. Unsteady flows are found in numerous applications, including sharp maneuvers of fixed wing aircraft, biomimetics, wind turbines, and most notably, rotorcraft. Unsteady flows cause unsteady loads on the immersed bodies. This can lead to aerodynamic flutter and mechanical failure in the body. Flow control is hypothesized to reduce the load hysteresis, and is achieved in the present work via nanosecond pulse driven dielectric barrier discharge (NS-DBD) plasma actuators. These actuators have been effective in the delay or mitigation of static stall.

The flow parameters were varied by Reynolds number (*Re* = 167,000-500,000), reduced frequency (*k* = 0.025-0.075), and excitation Strouhal number *(St_e=0-10).* It was observed that the trends of St_e were similar for all combinations of Re and k, and three major conclusions were drawn. It was first observed that low Strouhal number excitation *(St_e<0.5)* results in oscillatory aerodynamic loading in the stalled stage of dynamic stall. At high Strouhal number excitation *(St_e>2),* this behavior is not observed, as in the static stall cases. Second, all excitation resulted in earlier flow reattachment. Lastly, it was shown that excitation resulted in reduced aerodynamic hysteresis and dynamic stall vortex strength. The decrease in the strength of the dynamic stall vortex is achieved by the formation of excited structures that bleed the leading edge vorticity prior to the ejection of the dynamic stall vortex. At sufficiently high excitation Strouhal numbers *(St_e≈10),* the dynamic stall vortex was suppressed.

Publications:

1. Singhal, A. "Unsteady Flow Separation Control over a NACA 0015 using NS-DBD Plasma Actuators." The Ohio State University. Department of Mechanical and Aerospace Engineering Masters Theses, 2017.
2. Esfahani, A., A. Singhal, Clifford, C., and M. Samimy, "Flow Separation Control over a Boeing Vertol VR-7 using NS-DBD Plasma Actuators." 54th AIAA Aerospace Sciences Meeting, AIAA Paper 2016-0843, 2016.
3. Singhal, A. "Flow Control over a Rotorcraft Blade Modeled by a Boeing VR-7 Airfoil." The Ohio State University. Department of Mechanical and Aerospace Engineering Honors Theses, 2015.
4. Clifford, C., A. Singhal, and M. Samimy. "Flow Control over an Airfoil in Fully Reversed Condition using NS-DBD Plasma Actuators." AIAA Journal. Ahead of Print. doi: 10.2514/1.J054157.
5. Clifford, C., A. Singhal, and M. Samimy. "Leading Edge Separation Control on an Airfoil in Fully-Reversed Condition." 32nd AIAA Applied Aerdynamics Conference, AIAA Paper 2014-2144, 2014.
6. Clifford, C., A. Singhal, and M. Samimy. "A Study of Physics and Control of a Flow over an Airfoil in Fully-Reversed Condition." 52nd AIAA Aerospace Sciences Meeting, AIAA Paper 2014-1256, 2014.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

University of Dayton

Joshua A. Burrow

Status: Master's 1, Electro-Optics & Photonics

Research Topic: Topological and Material Investigation of Planar Metamaterials for Bio-Sensing Using Continuous-Wave Terahertz Transmission Spectra

Advisor(s): Drs. Imad Agha and Jay Mathews

Biography: Joshua Burrow earned his B.S. in Mathematics and Physics from Morehouse College, a historically black college and university and is a native of Baltimore, MD. His research interest lie in the area of terahertz (THz) research and its applications for environmental and biological sensing. His passion for this field evolved from two consecutive summer research experiences performed at the Center of Terahertz Research at Rensellear Polytechnic Institute under the direction of Dr. Xi-Cheng Zhang in 2009. In this position, he characterized explosive materials using THz time domain spectroscopy to more effectively eliminate the growing threat of chemical and biological terrorism. Josh returned to Morehouse and developed the first instructional laboratory manual for undergraduate physics, chemistry and engineering majors under the NASA Strategic Preparedness Advancing Careers in Engineering (SPACE) Program and Maximizing Access to Research Careers (MARC) U-STAR Award. Through these experiences, he developed a keen interest in THz applications and decided to pursue this area for his graduate studies. When Josh is not solving tomorrow's dire plights, he serves as a committee member of the Council of Graduate Students at the University of Dayton (UD) and as the president of the Optical Society of America and Society of Photographic Instrumentation Engineers student chapters at UD, as well as staying active with recreational sports such as basketball and weight lifting. Ultimately, Josh would like to become a research scientist, professor and pioneer to scientific discovery in materials and space sciences.

Abstract: Terahertz spectroscopy has been labeled as an effective nondestructive technique for chemical and biological material characterization because these materials exhibit rotational and vibrational modes at THz frequencies. Unfortunately, water molecules strongly absorb THz radiation which prevents studying bio samples in an aqueous solution. To expand the characterization capabilities to samples in liquid state we use a metamaterial as platform to sense the bio-molecules with a working principle based upon tracking the resonant frequency created by surface plasmon polaritons. A metamaterial is an artificially designed periodic material where its electromagnetic response properties are governed by its unit cell structure instead of being inherited directly from its constituent materials. These topological-based electromagnetic resonances lead to interesting properties such as negative refraction, extraordinary transmission and extreme environmental sensitivity.

I will design, fabricate and characterize a passive THz bio sensor. My project consists of three components: (1) designing a structure suitable for THz sensing using, COMSOL Multiphysics, a finite element method simulation program; (2) fabricating the device using standard UV lithography and ion implantation, and (3) testing and validating the device using both a continuous wave and time domain THz spectrometer. Several topologies and materials will be explored The project aims to experimentally explore various topologies and materials to create a flexible polarization insensitive device.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

SCHOLARSHIPS

CASE
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve

Kayla B. Andersen

Status: Senior, Mechanical Engineering

Research Topic: Baby Worm: A Small Worm-Like Robot

Advisor(s): Roger D. Quinn, Ph.D. and Akhil Kandhari

Biography: Kayla Andersen was born and raised in Stow, Ohio, where she attended Stow-Munroe Falls High School. During her youth she developed a passion for designing and building anything from tree forts to robots. Now, as a student in mechanical engineering, she continues to follow her passion. Kayla began working in the Biologically Inspired Robotics Lab the summer following her freshman year, where she worked on the design and testing of the CMM worm robot. During her sophomore spring she studied abroad at the University of Edinburgh and was privileged to get to work in the Soft Robotics lab on pneumatically actuated soft robots. Currently she is pursuing her masters in the Biologically Inspired Robotics Lab. In addition to research, Kayla is president of CWRUbotix, the robotics club at CWRU, where she also leads the design team for NASA Robotic Mining Competition. Beyond engineering, Kayla plays trumpet for the university orchestra and jazz ensemble. After graduation Kayla will be working at NASA Jet Propulsion Lab in California for the Mechanisms and Mobility group.

Abstract: The driving desire behind the creation of worm robots is two-fold: first creating a worm robot that mimics a biological worm enables insight into how biological worms may control their movements, and secondly a worm-like robot would function uniquely well scenarios such as locomotion inside a pipe, search and rescue, and inside the body. Baby Worm shall be one of the next iteration of worm robots striving towards potential inside-the-body applications, such as endoscopes. To this end, the structure will be compliant, the diameter minimized (with the goal of < 1in as the maximum diameter), and the actuation method will be shape memory alloy (SMA) - a technology that has been proven in the body. The robot will ideally be able to both move forward and turn. Additionally, Baby Worm robot will employ a suite of pressure sensors to enable the robot to determine whether or not it has contacted an external surface. If time permits strain sensors will also be incorporated into the design. These sensor types were selected because they reflect the sensors that biological earthworms possess. Therefore, this new robot will enable insight into the locomotion of biological earthworms in addition to paving the way for endoscopes of the future.

Publications:

1. Horchler, A. D. Kandhari, A. Daltorio, K. A. Moses, K. C. Andersen, K. B. et al. “Worm-Like Robotic Locomotion with a Compliant Modular Mesh,” Biomimetic and Biohybrid Systems, 2015, pages 26-37. doi:10.1007/978-3-319-22979-9_3
2. A. D. Horchler, A. Kandhari, K. A. Daltorio, K. C. Moses, K. B. Andersen, et al. Soft Robotics. December 2015, 2(4): 135-145. doi:10.1089/soro.2015.0010.

Congressional District: 14th

Congressional Representative: David Joyce

CASE
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve

Valerie A. Weaver

Status: Senior, Mechanical Engineering

Research Topic: Hybrid Neuroprostheses for Individuals with Paraplegia

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

Biography: Valerie Weaver is a Senior pursuing her Bachelor's and Master's Degrees in Mechanical Engineering through the BS/MS Dual Degree Program at Case Western Reserve University. She will graduate in May, 2017. Valerie began working on the Hybrid Neuroprostheses in spring 2016 and hopes it will lead to a career improving robotic prosthetics. Last summer, she completed an internship at BAE Systems working on armored vehicles, and looks forward to making use of her varied engineering experiences. Outside of class, Valerie is a member of Tau Beta Pi engineering honors society, is a teaching assistant for a materials engineering course, and has served as the president of Case's fencing club for 2 years and as women's foil captain for the 2016-2017 season. She is very grateful for the support of the Ohio Space Grant Consortium and is thankful for the opportunity to share her research.

Abstract: People with spinal cord injury (SCI) currently have few options beyond wheelchairs for day to day ambulation. By combining electrical stimulation and an engineered exoskeleton, another option can be offered and quality of life can be greatly improved. By tapping into the power of the muscles with electrical stimulation, device range can be extended and co-morbidities associated with SCI, such as muscle atrophy and osteopenia, can be reduced. The powered exoskeleton can provide support during walking with muscle use and can continue to be used after muscle fatigue through the use of small, low friction, integrated motors. In addition to providing support and, when needed, propulsion, the engineered exoskeleton frame provides hard stops to prevent abnormal range of motion to avoid injury. The device aims to allow for independent donning and doffing, which would enable independent use.

Publications:

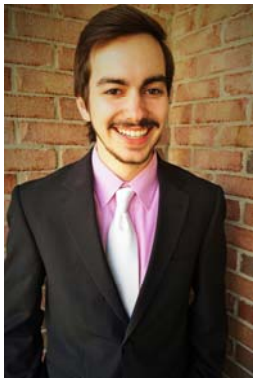
1. Weaver, Valerie. "Versatile Speedy Whegs for Varied Applications," 2015-2016 Annual Student Research Symposium Proceedings XXIV. Cleveland: Ohio Space Grant Consortium. Pages 256-257.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Cedarville University

Ryan M. Marquardt



Status: Senior, Biology

Research Topic: MiR-146a Upregulates Phagocytosis of Jurkats in a Human Macrophage Sjögren's Syndrome Model

Advisor(s): Dr. Kaleb M. Pauley

Biography: Ryan is a Senior at Cedarville University and will graduate in May, 2017, with a B.S. in Molecular and Cellular Biology and minors in Bioethics and Bible. While a student at Cedarville, Ryan has participated in various intramural sports and student organizations. Additionally, he has held positions as a lab assistant, lab teaching assistant, and student grader for the Science and Math Department. In addition to his research experience at Cedarville, Ryan participated in a summer research fellowship at the University of Cincinnati and Cincinnati Children's Hospital, where he researched Amyotrophic Lateral Sclerosis (ALS) by assisting in the development of a calcium imaging protocol to measure the activity of spinal cord interneurons in a transgenic mouse model.

After graduation, Ryan intends to enroll in a Ph.D. program in the biomedical sciences to continue his research career. His primary science interests lie in immunology and neurobiology, but he is open to new fields of study as long as he is able to satisfy his curiosity by doing research. Outside the lab, Ryan loves to work outdoors, read anything he can get his hands on, and spend time with his wife and baby daughter.

Abstract: Sjögrens Syndrome (SjS) is an autoimmune disease that attacks exocrine glands such as salivary and lacrimal glands resulting in severe dryness of the mouth and eyes. Previous studies have linked increased microRNA-146a (miR -146a) expression in peripheral blood mononuclear cells in SjS patients compared to healthy controls. Like all microRNAs, miR-146a negatively regulates specific genes through binding mRNA, leading to degradation or translational inhibition. Further investigation into the role of increased miR-146a expression in SjS revealed links to several immune functions including cytokine production, cellular migration and phagocytosis.

We have previously shown that upregulation of miR-146a in THP-1 human macrophages increases phagocytosis of E. coli. To find results more applicable to an SjS model, we set out to observe the effect miR-146a has on phagocytosis of Jurkats, cells of a human T cell line. Preliminary results have confirmed our hypothesis that upregulation of miR-146a in THP-1 cells results in an increase in phagocytosis of apoptotic Jurkat cells.

Publications:

1. Marquardt, R. (2015). The solution to dangerous antibiotic-resistant bacteria. In M. Grapes (Ed.), The idea of an essay (Vol. 2). Cedarville, OH: Cedarville University.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Cedarville University

Joseph R. Morin

Status: Senior, Mechanical Engineering

Research Topic: An Electrochemical Analysis of Fretting Corrosion in Metal-on-Metal Hip Implants

Advisor(s): Dr. Timothy Norman

Biography: Joe Morin is a Senior majoring in Mechanical Engineering with a minor in Biomedical Engineering. Since graduating from Bedford High School in Bedford, New Hampshire, Joe now attends Cedarville University to pursue his interest in bionics and prosthetics. In addition to research on metal-on-metal hip implants, Joe is also part of a senior design team working to 3D print an ACL using tissue engineering constructs. When he is not studying, Joe enjoys a variety of activities including skiing, mountain biking, ice hockey, and just about any outdoor activity.

Abstract: The metal-on-metal total hip arthroplasty, a procedure where the hip joint is replaced by a femoral prosthesis with a metal femoral head and a metal socket, has been a popular option for patients requiring a hip joint replacement. Metal on metal hip implants have been a successful implant design, but recently there has been an increased number of failures of this type of implant due to fretting corrosion, believed to be caused from the use of large femoral heads. Fretting corrosion in hip implants results from cyclic micromotion at the taper-trunnion interface, where the taper is the head and the trunnion is the stem of the prosthesis. This interface motion removes the protective oxidation layer from the metal allowing the fluid environment of the body to react with the metal and ultimately leads to the release of metal ions into the surrounding tissue and bloodstream, a process called fretting corrosion. This problem has grown to be a major topic in the orthopedic world today, and is therefore one that is critical in solving.

This research project aims to quantify the amount of fretting corrosion at the taper-trunnion interface after being cyclically loaded to 2000N. The fretting corrosion can be characterized through the implementation of an electrochemical experiment in order to measure the amount of metal ions released from the implant during loading, which is directly correlated to the amount of fretting corrosion.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Cedarville University

Sarah C. Rouse

Status: Junior, Geology

Research Topic: Characterization of Massive vs. Laminated Texture of the Coconino Sandstone (Permian), Arizona from the Study of Thin Sections

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 working through her third year in the program, 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: This project seeks to contribute to the work of Dr. John Whitmore and Sarah Maithel on the Coconino Sandstone (Permian) of Arizona. More than one hundred thin sections are available for study from this sandstone. Each thin section will be examined both macroscopically and microscopically to determine if the sample is "laminated" or "massive." The purpose of this project is to define what "laminae" are and then develop reliable quantitative criteria that can differentiate between the laminated and massive samples. These criteria might then be applied to distinguish patterns that occur across the deposit, which in turn may provide insight into the depositional conditions of the sandstone.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Central State University

Michael C. Curtice

Status: Junior, Manufacturing Engineering

Research Topic: Development of a Haptic Joystick System for Human Interaction

Advisor(s): Dr. Augustus Morris, Jr

Biography: Michael Curtice is currently attending Central State University. Majoring in Manufacturing Engineering. Recently he has attended at NASA Glenn Research Center as a summer engineering intern. He aided in the construction of a high altitude balloon to collect data using voltage and current (I-V) curves from photodiodes. His future plans are to work for the Department of Defense as a civil servant.

Abstract: Haptics is derived from the Greek word haptikos, defined as “able to come into contact with”. A modern definition of haptics is “relating to or based on the sense of touch”. The field of haptics involves the knowledge of how kinesthetic interaction with the surrounding environment provides useful information toward improving human performance. Haptics can be involved with the improvement of human movement for artistic or athletic endeavors. However, haptics is more commonly useful in the areas of human rehabilitation and man-machine systems.

Research on man-machine systems investigates the physical limitations and control effectiveness of humans when interacting with or operating machine systems. Driving a vehicle, being part of a manufacturing assembly process, and remotely operating a first responder robot are all examples of man-machine systems. This research project will investigate the interaction humans have with a joystick type of device while performing a tracking task.

There are many designs of haptic joysticks available. This project will utilize a popular open source device in kit form, called a Hapkit. The Hapkit is a one degree of freedom joystick driven by a DC motor and programmed to emulate the physical characteristics of conventional joysticks. However, the Hapkit can also provide sensations of touch or force otherwise not provided in virtual environments.

In the first phase of this project, a Hapkit will be built to interact with a compensatory tracking task viewed on a computer monitor. The Hapkit can be modeled through the computer to emulate a joystick with various spring constants, etc. The second phase of the project involves having human subjects performing the tracking task with the Hapkit emulated to having different physical characteristics. Data related to the tracking behavior and performance will be collected. Trends in how physical characteristics of the joystick affect tracking performance will be reported.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Central State University

Josephine Johnson

Status: Senior, Environmental Engineering/Water Resource Management

Research Topic: Pipeline Systems

Advisor(s): Dr. Krishnakumar V. Nedunuri; KrishnaKumar Nedinuri

Biography: Josephine Johnson was born in Gottingen, Germany; then, in 2004, moving to the great State of Ohio. Ever since she could remember she has had love for science. Growing up Josephine went to numerous summers science camps Including the Exxon Mobile Bernard Harris Summer Science Camp along with the W.E.B Dubois science camp. During her senior year at Beavercreek High School she was accepted into the Department of Defense Summer Bridge Program where she spent 4 weeks in the summer taking sciences course before the start of her freshman year at Central State University, where she is majoring in Water Resources Management.

Cumulatively, Josephine holds a 3.51 GPA and has been on the Dean's List all of her college career. She's involved in several campus organizations including the Gamma Mu chapter of Zeta Phi Zeta Christian Sorority Inc. where she serves as president. Josephine is also among the few in Alpha Kappa Mu Honors Society and the Honors Program at Central State University. She is also member of the Invincible Marching Marauders Marching Band where she holds the Co-Captain position in the color guard. She is the current titleholder of Miss Water Resources Management for the 2016-2017 academic school year. Josephine plans to pursue a Master's Degree, and then a Doctoral Degree upon her graduation.

Abstract: In 1887, Central State University was born. With the construction of the University, they had to think of where all the water comes from. Central State had water coming in from 3 different distributions systems. The water was being supplied from Greene County, Xenia and of course their every own distribution system on the campus its self. Over the years Central State has expanded and stops using their own water Distribution center. Now in 2016 new buildings have been added and with that came their pipeline. The goal of this study is to figure out the amount of water pressure is used in each pipe along with how much water is being used throughout the campus. Figuring out if it is the best and most cost effective way.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Central State University

Lauren B. Pinder

Status: Senior, Manufacturing Engineering

Research Topic: Development of a Haptic Joystick System for Human Interaction

Advisor(s): Dr. Augustus Morris, Jr.

Biography: Lauren Pinder is a 4th year student at Central State University, originally from the South Suburbs of Chicago, Illinois. She is in a 5 year program and expects to graduate in May of 2018. She is the youngest of three siblings, and the only girl. She graduated from Kenwood Academy High School located on South Side of Chicago. Through her high school years, Lauren participated in a Math & Science Engineering Program at Chicago State University where she was introduced to the concepts of engineering and the many areas it consists of.

Soon before high school graduation, she realized she would be attending one of the most prestigious Historically Black Colleges, Central State University, where she currently majors in Manufacturing Engineering. Lauren conducted research on Quantitative Light Imaging at the University of Illinois Urbana-Champaign under the Emergent Behaviors of Integrated Cellular Systems (EBICS) REU program. She also has interned at John Deere Commercial Products two summers. She worked as Manufacturing Engineer in Augusta, GA in the Agriculture and Turf Division and then as a Quality Engineer in the Construction and Forestry Division.

Upon graduation, she aspires to work in production management with a fortune 500 company. She is extremely excited to move forward in her career, and thanks the Ohio Space Grant Consortium for their constant help and support.

Abstract: Haptics is derived from the Greek word haptikos, defined as “able to come into contact with”. A modern definition of haptics is “relating to or based on the sense of touch”. The field of haptics involves the knowledge of how kinesthetic interaction with the surrounding environment provides useful information toward improving human performance. Haptics can be involved with the improvement of human movement for artistic or athletic endeavors. However, haptics is more commonly useful in the areas of human rehabilitation and man-machine systems.

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Congressional District: 10th

Congressional Representative: Michael R. Turner

Cleveland State University

Cleveland State

Aaron K. Smith

Status: Senior, Chemical Engineering

Research Topic: Implementing a Micromixer on a 3-D Printer

Advisor(s): Dr. Chandra Kothapalli

Biography: After a short career as the violinist of the music group The Lighthouse and the Whaler, I decided to return to school for an engineering degree. I was attracted to chemical engineering because it was said to be the most challenging and versatile branch of engineering, and I wanted to study something highly practical as opposed to music.

Now I am a Senior Chemical Engineering student at Cleveland State University, and I have looked for opportunities to apply my education along the way. I participated in volunteer research under a Ph.D. candidate in my freshman year, studied chemical engineering in Spanish in Tucumán, Argentina, my sophomore year, and worked as an undergraduate research assistant at CSU my junior year. This year, I am working to contribute valuable research to the OSGC Student Research Symposium. In the future, I hope to work as a chemical engineer in an industry position.

Abstract: An important area of microfluidics is the use of micromixers because of the fundamental knowledge gained regarding fluid flows and the applications to polymer science, medicine, and the aeronautics and space fields. For example, a well-designed micromixer as a part of a small, portable reactor would be essential to any sort of research performed outside of the earth's atmosphere because of the limitations in weight that can be carried into space; it is also important that experiments be carried out on a scale in which uncontrolled chemical reactions do not present a danger to the astronauts.

Most micromixing devices are currently made of a polydimethylsiloxane (PDMS) mold, which is a labor-intensive process. The goal of this project is to implement a micromixing device on a 3-D printer, a process that would be faster in production and modification of the micromixer, and to analyze its mixing properties.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Kent State University

Jonathan W. Boyd

Status: Senior, Physics

Research Topic: Structural and Resistivity Changes of Graphene Oxide via Electron Beam Irradiation

Advisor(s): Dr. Roberto Uribe-Rendon

Biography: Jonathan Boyd was raised in Champion, Ohio, where he attended Champion High School and developed a passion for physics. He earned his Eagle Scout award in 2012 and has remained active in the council's annual National Youth Leadership Training Course. He currently maintains a 4.0 GPA and good standing in Kent State's Honors College while also serving as the student representative for Kent's Society of Physics students. He has worked in Kent State's Academic Success Center as a tutor for the past 3 years helping students with their math and physics courses. Jonathan has been a Choose Ohio First Scholar since his freshman year and has participated in yearly research projects ranging from analyzing fractal dimensions of lightning patterns to developing an AI that plays Battleship. He participated in Kent State's inaugural Summer Undergraduate Research Experience this past summer where he started his current research involving the use of an electron beam accelerator to change the properties of graphene oxide. Jonathan will graduate with a B.S. in Physics this Spring and plans to attend graduate school to study Astrophysics this Fall.

Abstract: Graphene is a material that promises much technologic advancement, from more efficient solar cells to higher capacity batteries. Currently the use of graphene is limited due to the difficulty of obtaining large pure sheets. Graphene oxide is similar to graphene except oxygen-containing functional groups are attached to the carbon lattice. Graphene oxide is easier to synthesize than graphene; however, the functional groups reduce the electrical conductivity of the material. If these groups could be partially or fully removed from graphene oxide the material would have properties closer to those of graphene. This process of removing oxygen groups is known as reduction and the final product is aptly called reduced graphene oxide. We aim at investigating if beta radiation from an electron beam accelerator could reduce graphene oxide. Samples of pre-prepared graphene oxide solution were deposited on glass slides partially coated in Indium tin oxide. After being dried, the samples were irradiated using an electron beam accelerator at various electron energies and dosages. The samples where then tested using Fourier transform infrared spectroscopy and four-probe resistivity measurements to determine the effects of irradiation on the material.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Kent State University

Hannah L. Schlaerth

Status: Senior, Environmental Geology

Research Topic: Detection and Analysis of Biogeophysical Factors Influencing Local Water Quality and Coral Reef Health in the United States 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 attended Ohio University as a post-secondary student where she found a passion for math and science and a strong desire to pursue a career as a woman in STEM. Her sophomore year of college, Hannah was accepted into a National Science Foundation Research Experience for Undergraduates hosted by Vanderbilt University. She completed a research project on post-super eruption magmatic processes focused on the geochemistry of open system magmatic environments and presented a poster at the 2016 Geological Society of America National conference. On campus, Hannah 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 future research in geochemistry and environmental geology.

Abstract: Nearly a quarter of ocean species are constrained to coral reefs, making them important economic resources in terms of tourism and fishing. In recent years, climate change, agricultural runoff, and overfishing have started to degrade the coral reefs of the US Virgin Islands (USVI). This study aims to integrate data obtained from NASA satellites (Landsat 8 and Sentinel-2) with field measurements using a hand held spectroradiometer (GER-1500) in order to determine biooptical properties and to quantify water quality parameters that effect coral reef health in the coastal waters of the USVI. Satellite images from August 2016 onward 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 the main contributors of the signal. These contributors are likely colored dissolved material such as chlorophyll, diatoms, organic material, and detritus. Results from this data decomposition were then matched to standard reflectance spectra libraries. To verify these results and ground truth the satellite data, a week-long research campaign was conducted in and around the coastal waters of St. Thomas Island of the USVI. The GER-1500 was used to measure upwelling radiance and downwelling irradiance of surface water and water samples were collected. Water samples were gravimetrically filtered and dried, and a contact probe was used to identify and measure suspended matter. Previous work in Lake Erie has shown this method to be an effective tool for monitoring harmful algal blooms. Using VPCA-decomposition, it may eventually be possible to identify algal species and the minerology of detritus from satellite images alone, making near real-time water quality monitoring possible.

Publications: None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Kent State University

Courtney N. Wolfe

Status: Senior, Chemistry

Research Topic: Investigation of Thermodynamic Cooperativity of the Pseudourylation Enzyme, RsuA, and rProteins During Bacterial 30S Ribosomal Assembly

Advisor(s): Dr. Sanjaya Abeysirigunawardena

Biography: Courtney Wolfe born in New Galilee, Pennsylvania, is a Senior Chemistry major at Kent State University who is graduating this May. She has been a member of Kent State's Honors College for her entire college career and is currently the president of the universities' chapter of Knitting For Those in Need. Over this past summer, she was a fellow of the Summer Undergraduate Research Experience offered by the university. Courtney has had a passion for science since a young age and hopes to further her education in this field outside of Kent State University. In her free time, she enjoys hiking, knitting, and spending time with family and friends.

Abstract: Ribosomes are important for all living organisms. Nucleotide modifications found in various regions of the ribosomal RNA can influence ribosomal assembly, local structural, and thermodynamic stability changes in rRNA. At the same time modification enzymes can influence the binding thermodynamics and kinetics of various ribosomal proteins, hence influencing ribosome assembly. In particular, the enzyme pseudouridine synthase, RsuA, is responsible for modifying uridine at position 516 in the 16S rRNA to a pseudouridine that can influence the structure and thermodynamic stability of 16S helix 18. Previous studies have shown that protein RsuA is unable to bind to 16S rRNA alone and can only weakly bind to 30S ribosomes. It is proposed that protein RsuA is binding to a ribosome assembly intermediate. However, this assembly intermediate is yet to be discovered. We have successfully overexpressed, purified and fluorescently labeled the RsuA protein. We are currently investigating the binding thermodynamics of RsuA enzyme in the presence of various ribosomal RNA substrates to determine the high affinity substrate for protein RsuA. In addition, we are optimizing mass sspectrometry parameters to monitor the process as pseudouridine and uridine are mass silent.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Marietta College

Charles E. Drennen, Jr.

Status: Junior, Petroleum Engineering

Research Topic: Development of Formation Evaluation Program to Test Lithology Crossplot Hypothesis

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

Biography: Charles Drennen is a Junior at Marietta College earning a Bachelor of Science in Petroleum Engineering. Charles was born in Warren, Ohio, and graduated from Howland High School. Charles tutors fellow Marietta students in chemistry, geology, and engineering, and has achieved a spot on the Dean's High Honor List every semester of his college career. In May, 2016, Charles interned with Alliance Petroleum Corporation, where he learned about natural gas production and midstream transportation. Charles is a member of Marietta's student chapters of the Society of Petroleum Engineers and American Association of Drilling Engineers, as well as the Scholarship Chair for the Beta Rho Chapter of Alpha Tau Omega, America's Leadership Development fraternity.

Abstract: Following Ben Ebenhack's development of the theoretical effective porosity vs bulk density crossplot, this study involves the development of a formation evaluation computer program that will provide various crossplots (including Ebenhack's dual-water dual-porosity) from raw well data, while allowing the user to easily insert parameters and use buttons to generate the desired plots. A colleague of Professor Ebenhack developed a Fortran program to achieve this during his time in industry, and the objective is to develop a similar program viable for modern personal computers.

Such a program will be useful to petroleum engineers examining log data and students trying to understand how changes in the logs affect the crossplots. In addition to its usefulness as a general analytical and educational tool, the program will also display the elusive effective porosity vs bulk density crossplot. In a previous research project by Aaron Kurtz, this plot could not be fully developed when the data was highly influenced by gas effect and other natural sources of error. The effective utilization of this plot will enhance the petroleum engineer's understanding of the reservoir by displaying porosity and lithology in a novel way.

The methodology involves approaching the problem from two sides. First, using raw well data, attempts are made to recreate the program interface and graphing capabilities of the old program from verbal descriptions. The second arm of the approach involves combing through the Fortran code, specifically the plot generation of dual-water dual-porosity and the gas effect corrections. By decoding these parts and comparing them to Aaron Kurtz's project, Ebenhack's lithology hypothesis will be tested. When finished, this formation evaluation program will not only provide a handy tool for students and log analysts, but also display the viability of the effective porosity vs bulk density plot as a potential new and interesting way to glean lithological information from well log data.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Marietta College

Sheldon P. Mullet

Status: Senior, Petroleum Engineering

Research Topic: Waterless Fracturing Potential in the Appalachian Basin

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

Biography: Sheldon Mullet is a Senior at Marietta College where he plans on obtaining a Bachelor of Science Degree in Petroleum Engineering in May of 2017. Sheldon graduated from Hiland High School in Berlin, Ohio, in 2013, and chose to pursue petroleum engineering at Marietta College because of his strong interests in math, science, and the oil and gas industry. He has had three internships in the oil and gas industry with Anadarko Petroleum Corporation. The first two internships were in field locations as a production engineering intern. During Sheldon's third internship, he worked as a reservoir engineering intern for Anadarko's Gulf of Mexico Deepwater Exploration team. During his free time, he enjoys golfing, spending time outdoors, spending time with family, and playing almost any sport. After graduation, Sheldon will begin working full time for Anadarko as a production engineer.

Abstract: The recent shale boom in the United States would not be possible without the ability to horizontally drill and hydraulically fracture wells in shale reservoirs that previously were not producible. As a result of these techniques enabling the shale boom, the U.S. has become one the world's leading petroleum producers and is nearing energy independence. However, this new process is not free and comes with several potential drawbacks. One of the main drawbacks society sees with hydraulic fracturing completion techniques in Utica and Marcellus Shale wells in the Appalachian Basin is the large amount of water that must be used.

A large concern is that hydraulic fracturing uses too much freshwater. However, alternatives to hydraulic fracturing do exist, and this work shows the main alternatives and their viability in horizontal shale wells. The research includes case studies from other areas that have used waterless completion techniques and their economic outcomes. Also included in this work is a look into the net amount of water lost or potentially gained as a result of hydraulic fracturing. A conclusion, based on economics and the environment, is drawn on how petroleum exploration and production companies should fracture shale wells in the future.

Publications: None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

Marietta College

Jennifer A. Starkey

Status: Senior, Petroleum Engineering

Research Topic: Locating Abandoned Wells; Using Historical Documents and Records with Practical Physical and Technical Methods

Advisor(s): Professor Craig Rabatin

Biography: Jennifer Starkey is from San Diego, California. She attends Marietta College in Ohio and will graduate with a degree in Petroleum Engineering in May, 2017. She is the 2016-2017 President and 2015-2016 Vice President of the Marietta College Society of Women Engineers Club, Head of Research, Development and Risk Management and Founding Member of Thunder Resources LLC. - a PioBiz winning student run company developing technology to identify orphan wells in the state of Ohio, and a Founding Member of the Marietta College Energy Business Alliance Club - an on-campus group simulating an energy company focusing on making venture capital decisions in the energy systems market. She works part-time at Eramet Marietta, a metallurgical refining plant and at Marietta College as an on-campus Math Tutor.

Abstract: Abandoned oil and gas wells can be found anywhere drilling for oil and gas has occurred, but can often be hard to locate. It is estimated, by ODNR, that 270,000 wells have been drilled in Ohio in the past 150 years with 49,000 currently in production across the state. Since 1977, when the Orphan Well Program started, Ohio has been plugging 40 -50 old wells per year. At this rate it would take over 500 years to plug only 10% of the wells drilled in Ohio. Current standards require that wells not producing at an economical rate be plugged but in the early days of the oil and gas industry, these wells were simply loose ends due to lack of standards and became orphaned. With such a large volume of orphaned and abandoned wells, ODNR does doesn't have the man power to efficiently find and plug all the wells that need attention. An efficient method for commercially locating problematic abandoned wells needs to be designed. This paper highlights methods to locate orphaned and abandoned wells in Ohio using historical documents and records with practical physical and technical methods with a focus on drone based magnetometry.

Publications: None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

Miami University

Paul A. Goetze

Status: Junior, Mechanical Engineering

Research Topic: Design and Testing of Pulsatile Flow in Abdominal Arterial Bifurcation Models

Advisor(s): Dr. Jeong-Hoi Koo

Biography: My name is Paul Goetze, and I am a Junior pursuing a Mechanical Engineering Degree at Miami University in Oxford, Ohio. I grew up outside of Cleveland, Ohio, and attended Shaker Heights High School. While in high school, I played ice hockey and developed an interest in engineering through cycling and bicycle design and mechanics. Additionally, I enjoyed taking physics which pushed me to study mechanical engineering in college. At Miami University, I compete with the RedHawk Racing Team for the Baja SAE and Formula SAE events, work in the mechanical engineering machine shop, and play ice hockey and broomball. Last summer, I worked for MTD Products in Valley City, Ohio for the Utility Vehicle Group and developed a better understanding of industry practice, vehicle design, and product testing.

Abstract: The abdominal aorta supplies blood to the lower extremities of the human body, splitting into the left and right common iliac arteries. This is a major example of a bifurcation present in the human cardiovascular system and is the subject of interest because it has a significant effect on the characteristics of the human pulse profile. Previous studies on bifurcations indicate that they cause a back pressure in the artery, especially during the flow deceleration phase. This causes the blood pressure profile to have a second peak that occurs shortly after the first rise in pressure. This back pressure is present due to the flow around the apex of the bifurcation.

This study aims to experiment with the angle and radius of curvature of the bifurcation to determine their effects on the pulsation profile around the bifurcation. This is being done through the construction of both a computational and physical model of the bifurcation geometry. The computational model is being developed in the COMSOL Multiphysics Software where the fluid flow properties of the 2D geometry are explored. The physical bifurcations will be manufactured and used as an empirical comparison to the computational data. The goal of the research is to validate the computational models developed with measured values created in the physical testing set up.

Publications: None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Miami University

Alex J. Mazursky

Status: Junior, Mechanical Engineering

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

Advisor(s): Dr. Jeong-Hoi Koo

Biography: Alex Mazursky is a third-year 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. Last summer, he interned with Bruner Corporation as an energy engineering intern. This summer, he plans to complete his senior capstone project abroad at the Korea Advanced Institute of Science and Technology in Daejeon, South Korea. This project will focus on an aspect of humanitarian engineering, a field toward which he is very passionate. After obtaining his Bachelor's Degree in May of 2018, he intends to pursue further education in graduate school. His research interests include sustainability, control systems and robotics.

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 will be evaluated under different electric field conditions, such as magnitude and frequency. This project also explores cost-effectiveness by analyzing the performance of both commercially available ER fluid and a less costly ER fluid made from silicone oil and cornstarch.

Publications: None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Miami University

Adam L. Reece

Status: Senior, Mechanical Engineering

Research Topic: Characterization of Dynamic Responses of Bending Actuators Based on Magneto-Rheological Elastomers

Advisor(s): Dr. Jeong-Hoi Koo

Biography: My name is Adam Reece, and I am a Senior, Mechanical Engineering major at Miami University in Oxford, Ohio. I was born in Fairfield, Ohio, and attended Fairfield High School. In high school, I was on the dive team, I played tennis, and I was the mascot for one year. I really enjoyed calculus and physics in high school and that is why I decided to study engineering in college. I chose to attend Miami University because many of my family members, including my parents, grandfather, and numerous aunts and uncles had studied there in the past. At Miami, I play on the club tennis team, play broomball, string tennis rackets for the varsity players, and work at the university bookstore. Last summer, I worked as an intern for a company in Fairfield, Ohio, called Connector Manufacturing. I learned a lot about the manufacturing process and Lean Manufacturing practices during this time. I have truly enjoyed studying engineering the past two and a half years. Although I am still undecided on what I would like to study, I hope to attend graduate school after graduation.

Abstract: This study investigates the dynamic properties of Magneto-Rheological Elastomers (MRE) with hard magnetic particles used as bending actuators under an alternating magnetic field. As earlier studies demonstrated that a dispersion of hard magnetic particles in polymeric materials, aligned in a preferred orientation, cause rotational motion in the sample when a magnetic field is applied perpendicularly to the magnetization direction of the particles. They focused on static responses of MREs with hard magnetic particles. The primary goal of this study is to characterize the dynamic behavior of a flexible bending actuator based on MREs under alternating magnetic fields. In this study, samples from a previous study, consisting of barium hexaferrite particles at 30% concentrations by volume, were tested. A C-shaped electromagnet was constructed to apply alternating magnetic fields along the length of the sample. By securing only one end of the sample to the electromagnet, the sample is free to bend similar to a cantilever beam. Using this setup, the tip displacement of the sample was recorded using a precision load cell and a laser displacement sensor under various input magnetic field strengths and frequencies. The results show that increasing the voltage output or the magnetic field strength increases the displacement of the sample. The results also show that, as the frequency of the sinusoidal voltage input increases, the amplitude of the tip displacement of the sample decrease. A phase delay was noticed between the magnitude of the alternating magnetic field and physical tip displacement of the sample. A resonant frequency of the H-MRE beam was also observed.

Publications: None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Ohio Northern University

Molly C. Ballard

Status: Senior, Mechanical Engineering

Research Topic: CFD Analysis on SAE Aero Competition Plane

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

Biography: Molly Ballard grew up in Galloway, Ohio, and graduated from Central Crossing High School in 2013. She is currently in her senior year at Ohio Northern University for mechanical engineering with a concentration in aerospace. She is a member of multiple groups on campus which include Society of Women Engineers, American Institute of Aeronautics and Astronautics, and Kappa Kappa Psi which is a national honorary band fraternity. Molly has had the privilege to serve as the president for the Sigma chapter of Kappa Kappa Psi for the past two years. In the summer of 2016, Molly earned her Sport Pilots license. Flying has always been a passion of hers and she is looking forward to pursuing a career in the field of aviation.

Abstract: Ohio Northern University has an SAE Aero competition team that builds an airplane to compete at the SAE Aero competition every year. The team spends a lot of time deciding on all design aspects of the plane such as the tail configuration, wing location, wing span, wing airfoil shape, payload loading area, and landing gear configuration. The team designs the plane in 3D modeling software and then laser cuts each section of the plane to begin building. Calculations in computer programs are made to find the lift and drag the plane will produce to give the team an idea of what the plane will be capable of.

The purpose of this project is to see if the calculations the team made match up with the post processing of the CFD results. To do the analysis of the plane, the 3D computer model will be imported into Pointwise to create the grid for the plane. Once the grid is completed, the boundary conditions will be set. The job will be processed in Cobalt and all post processing will be completed in Field View. The coefficient of lift and drag will be analyzed to see if it matches what the team calculated. The pressure distribution across the plane will also be observed to see where the plane will receive the most aerodynamic pressure.

Publications: None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Ohio Northern University

Kayla M. Hummell

Status: Senior, Mechanical Engineering

Research Topic: The Evolution of Space Suit Technology

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

Biography: Kayla Hummell will graduate from Ohio Northern University with a Bachelor's Degree in Mechanical Engineering and a Minor in Applied Mathematics in May of 2017. She is an active member of the campus community, acting as liaison to the University President, alumni clubs, the Deans of Engineering, and prospective students in her various roles. Kayla has served as the Secretary of Technology on Student Senate, and Vice President of Leader's Council for three years. She is a member of Tau Beta Pi, Alpha Lambda Delta, Phi Eta Sigma, Mortar Board and Kappa Mu Epsilon honor societies.

Abstract: Human space exploration was made possible with the invention of the space suit. Space suit technology has evolved to meet the changing demands of human space exploration over time. The technology must protect humans from the perils of space, while giving them the mobility to accomplish their research. My research will explore the evolution of space suit technology from the very first space suits to the suits being developed for humans on Mars. Additionally, I will explore the contributions that space suit technology has made to society.

Publications:

1. Hummell, Kayla. Cooling Systems with Absorbents. NASA/Ohio Space Consortium 2015-2016 Annual Student Research Symposium Proceedings XXIV. April 1, 2016.

Congressional District: 15th

Congressional Representative: Steve Stivers

Ohio Northern University

Daniel D. Musci

Status: Junior, Electrical Engineering

Research Topic: Study of Drone-Drone Communication Algorithms and Applications

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

Biography: Dan Musci is a Junior at Ohio Northern University 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 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 recent area of interest in the Aerospace field is the topic of Drone-Drone Communication systems. With advanced drones becoming more and more prevalent, there has been research into creating drone networks that coherently work together. The creation of automated communication networks are key to achieve this goal, and this is precisely what is being studied in this paper. This paper focuses on studying the current protocols, algorithms, and applications of drone communications, and using the information found to speculate into the future of this field.

Publications: None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

The Ohio State University

Matthew M. Arnott

Status: Senior, Aeronautical and Astronautical Engineering

Research Topic: Comparison of an Excited Flow with an Unheated Subsonic Jet in Forward Flight

Advisor(s): Dr. Mo Samimy

Biography: Matt is a Senior at The Ohio State University studying Aeronautical and Astronautical engineering-. Originally from Gastonia, North Carolina (NC), an early interest in math and science lead Matt to pursue opportunities in engineering related clubs and teams through his high school career, both at Highland School of Technology in Gastonia, NC, and North Carolina School of Science and Mathematics in Durham, NC. At Ohio State, Matt is a member of Design/Build/Fly, the NASA Undergraduate Student Instrument Project, and the national aerospace honorary Sigma Gamma Tau.

Outside of the classroom, Matt has completed two internships with Eaton Corporation, two co-op rotations with GE Aviation, and one research internship at the Warsaw Institute of Aviation in Poland. Choosing to follow a passion to serve, Matt was accepted in August, 2016, to the United States Navy's Nuclear Propulsion Officer Candidacy Program. Following graduation Matt will complete a five-year commitment as a Nuclear Submarine Officer with the Navy.

Abstract: Developed at Ohio State University Gas Dynamics and Turbulence Laboratory, localized arc filament plasma actuators (LAFPAs) have been used to control flow and acoustics of subsonic and supersonic jets. These high bandwidth actuators (0-200 kHz) are capable of producing various excitation azimuthal modes (m = 0, 1, 3, and ±4). The purpose of this study is to compare baseline far-field acoustic conditions of an unheated subsonic jet (up to Mj=0.9) in forward flight (up to Mf = 0.3) to those of a LAFPA equipped excited flow under the same conditions.

Publications: None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

The Ohio State University

Nicholas R. Horn

Status: Senior, Aeronautical and Astronautical Engineering

Research Topic: Review and Design of Non-Axisymmetric Nozzles with Active Flow Control Capability

Advisor(s): Dr. Mo Samimy

Biography: From a very young age I have always been interested in engineering and aviation. Growing up in Tehachapi, California, I was very close to numerous aircraft development and flight testing facilities which helped spark my interest in aerospace engineering. While in high school, I participated on a FIRST Robotics team. This greatly helped to prepare me for a future in the engineering field.

I began my studies at Ohio State in 2013 and started to work on my Bachelor of Science in Aeronautical and Astronautical Engineering with a minor in Aviation. While here I have been actively involved in the Green Engineering Scholars program where I have mentored incoming students and also adapted toys for children with disabilities. I am part of the Design Build Fly team and have enjoyed being able to enhance my knowledge by using my education to develop an actual aircraft.

After graduating in May, 2017, I will be starting a career with Lockheed Martin on their F-22 design team. After working for a year I will be eligible for and plan on pursuing the opportunity to be part of the Leadership Development Program during which I will obtain a Master's Degree in Aerospace Engineering while rotating between two other positions within the company.

Abstract: The Gas Dynamics and Turbulence Laboratory at The Ohio State University is studying the use of localized arc filament plasma actuators (LAFPAs) as an active flow control method to reduce jet noise and modulate natural instabilities in the flow. Previous studies have looked at single axisymmetric nozzles, and twin axisymmetric nozzles. However, many tactical military aircraft being developed today feature non-axisymmetric jet nozzles to aid in their stealth capabilities. Therefore, this project is researching the nozzle geometry used on tactical aircraft as well as LAFPA implementation on non-axisymmetric nozzles. A literature search is being conducted to compare the physical parameters of various nozzle designs and to understand the impact of the nozzle geometry on the jet plumes and acoustic field. This project also looks into the existing active and passive flow control methods to help understand the advantages and disadvantages of each method. This will aid in confronting the challenge of designing non-axisymmetric (especially rectangular) nozzles implemented with LAFPAs.

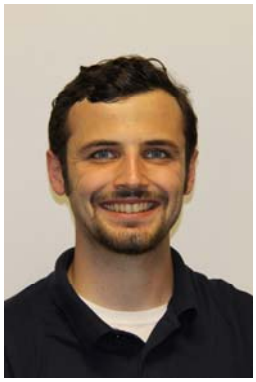
Publications: None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

The Ohio State University

Ryan S. Wilber



Status: Senior, Mechanical Engineering

Research Topic: Application of Parametric Reduced Order Models to Bladed Disk Analysis

Advisor(s): Kiran D'Souza

Biography: Ryan Wilber has been a resident of Ohio for his entire life, attending high school at Highland High School in Medina, Ohio. After joining his high school's FIRST robotics team he became interested in mechanical engineering. During his high school career he was able to attend the VEX and FIRST Championships, and his FIRST team was the runner up at the FIRST Pittsburg regional competition. He is pursuing a degree in mechanical engineering through the Honor's Program at The Ohio State University.

At Ohio State he has been involved in many engineering projects inside and outside of class. In his Freshman Honors Program he was part of a robotic design and build challenge. He was also a member of the OSU Baja SAE Team for 2 years, serving as treasurer and rear suspension team lead. More recently he was involved with a Product Design Senior Capstone project with a focus on physical therapy product design. He began research in his sophomore year, and has been involved with research at the Gas Turbine Laboratory and the Aerospace Research Center ever since. He is currently planning to return to Ohio State next year to continue research as a Master's student in Mechanical Engineering.

Abstract: In the study of vibrations of bladed disks in gas turbines full finite element models analyzing dynamic responses are very computationally intensive. Reduced order models are often utilized to approximate the dynamic response of a system while being computationally efficient. Many reduced order models focus on applying slight changes to the stiffness of each blade which can cause changes in the vibration of the system and ultimately damage the blades. However, another aspect that is relevant in this system is stress stiffening due to the rotational speeds experienced by the turbine. This stiffening changes the dynamic response of the blades when vibrating and changes based on speed. By utilizing Taylor Series approximations, the effects of rotational speeds can be applied in the reduced order model. Varying this parameter in the reduced space as opposed to a finite element analysis can increase the computational efficiency of the analysis. The purpose of this research project is to apply a new reduced order modeling method to vary rotational speed and couple it with an existing method of applying small stiffness changes in the blades to assist design stage vibration calculations of bladed disks.

Publications: None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

Ohio University

Eric S. Graf, Jr.

Status: Senior, Mechanical Engineering

Research Topic: Application of Cable Suspended Robots for Simulation of Gravity Conditions

Advisor(s): Dr. Robert L. Williams, II

Biography: Eric Graf is a fourth year Mechanical Engineering student at Ohio University's Russ College of Engineering and Technology. Growing up in Hilliard, Ohio, Eric had a passion for science, mathematics and ice hockey. As an undergraduate student, Eric interned at Bennu Oil and Gas in Houston, Texas, where he was primarily involved in the factory acceptance testing of various equipment and control systems used in subsea production. Since then, Eric developed a passion for automation and robotics which lead him to peruse his current research. Eric plans on exploring full time employment opportunities in manufacturing automation upon graduation in May, 2017.

Abstract: The Active Response Gravity Offload System (ARGOS) is used at NASA Johnson Space Center (JSC) for experimental simulations of reduced gravity on humans and vehicles for planetary exploration. NASA's JSC wants to replace the existing single-cable system with a much more capable cable-suspended robot system. In conjunction with Dr. Williams, Eric will be performing MATLAB simulations for kinematics, dynamics, and control of the proposed cable-suspended robot system as well as developing a small scale robot prototype to be used for further validation of the robot design.

Publications: None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

Ohio University

McKenzie L. Nelson

Status: Senior, Biological Sciences

Research Topic: Predictions of Human Arm Bone Strength from Measurements of Stiffness of Radii

Advisor(s): Dr. Anne B. Loucks

Biography: I am from Washington Court House, Ohio, and am currently attending Ohio University. In my four years at Ohio University, I have deepened my interest in the biological sciences, obtained a minor in Spanish, and been an active member of Phi Delta Epsilon. For the past two years, my research on bone in Dr. Loucks' lab has allowed me to gain skill in problem solving and a new passion for medical research. Next year, I will be attending medical school with the hopes of pursuing a career in primary care pediatrics, where I hope to apply the skills I have learned through research.

Abstract: Osteoporosis affects over ten million people in the nation, and by 2020 more than half of Americans over the age of 50 are expected to have or be at risk for developing osteoporosis. Currently, no FDA-approved device measures bone strength noninvasively, so osteoporosis is diagnosed by bone mineral density (BMD). However, research has shown that BMD does not predict fractures well. Bone strength is accurately predicted, though, by bone stiffness. The standard method for measuring stiffness is quasi-static mechanical testing (QMT), but it cannot be used in vivo. Mechanical Response Tissue Analysis (MRTA) is a non-invasive method for measuring bending stiffness of long bones in vivo that my research mentor, Dr. Loucks, is furthering the development of with others in the lab at Ohio University.

Many osteoporotic fractures occur in the arm. Conveniently, the ulna is ideal for MRTA testing. Previously, Dr. Loucks' lab was able to use fresh-frozen cadaveric arms to show that MRTA measurements of ulna bending stiffness accurately predict QMT measurements of ulna bending strength. For this to be clinically relevant, though, the ulna must be representative of other long bones.

The purpose of my research is to compare the accuracy with which MRTA measurements of ulna bending stiffness and DXA measurements of radius BMD predict the bending strength of the radius. I conducted QMT bending tests on the radius shafts to obtain the bending strength during fracture. This research could potentially improve both the diagnosis and treatment of osteoporosis.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Ohio University

Yonry R. Zhu

Status: Junior, Engineering Physics and Mechanical Engineering

Research Topic: Plasma Assisted Combustion in a Rotating Detonation Engine

Advisor(s): Dr. David Burnette

Biography: Yonry Zhu is a Junior 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. His current work is focuses on applying and modeling low temperature plasmas. These applications include treatment of cervical cancer cells, synthesis of boron nitride nanoparticles, and enhancement of a rotating detonation engine. 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: improving the efficiency of gas turbine engines. Integration of a rotating detonation engine (RDE) in lieu of a traditional combustor promises significant efficiency gains. In an RDE, a sustained detonation wave travels along an annular combustion chamber generating thrust.

The RDE operating regime is limited by poor fuel-air mixing as well as the immense energy requirements for detonation of heavy hydrocarbon fuels. Most current air-breathing RDEs have been restricted to the use of hydrogen or ethylene for successful operation. This restriction significantly impedes the integration of RDEs into existing aeronautical infrastructure.

The purpose of this research is to determine if RDE operating conditions can be expanded through the use of nanosecond pulsed plasma discharges. Non-thermal plasmas have been widely studied in plasma assisted combustion and flow control applications. These plasmas create reactive chemical species which significantly reduce ignition delay time and ignition temperature threshold. Nanosecond pulsed plasmas in particular, efficiently produce these species. These plasmas generate rapid localized heating which form compression waves that excite gasdynamic instabilities. This leads to increased flow turbulence and subsequently enhanced fuel-air mixing.

The RDE, both with and without the plasma system, will be run for a wide range of equivalence ratios and flow rates. The resulting map of successful and failed operation will be compared to determine the efficacy of the plasma system. Pressure traces and wave speed data will be collected to determine detonation wave strength. Future work would involve the testing of different types of fuel, characterization of plasma generation parameters, and collection of additional data such as high speed footage or schlieren images.

Publications: None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

The University of Akron

Andrea L. Felicelli

Status: Junior, Mechanical Engineering

Research Topic: Low Cost 3D Printing Using Vat-Free Photopolymerization

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. In the spring, Andrea will join UTC Aerospace in Uniontown, Ohio, as a research co-op.

Abstract: Stereolithography, a process in which a 3D structure is formed by using light to cure and harden liquid polymers, is traditionally done using a vat to hold the polymer, photoinitiator, and additives needed to create the structures. This technique has several limitations, including over curing and lack of depth control during the curing process. This project is a small part in a larger research investigating the possibility of replacing the vat used in the current technology with a “vat free” stacking mechanism using a liquid bridge, a common natural phenomenon generally formed between two solid bodies due to surface tension forces. The benefits of this approach include its simple configuration, material savings, and high-resolution layer formation. We are investigating the liquid bridge approach in applications of building low-cost 3D printers. The ultimate objectives of this project are to further understanding of the liquid bridge model in applications in 3D printing processes, and to complete or make significant progress in developing a low cost, community accessible 3D printer using this model.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

The University of Akron

AlRitia J. Gore

Status: Senior, Biomedical Engineering

Research Topic: Determining the Minimum Distance Needed Between a Hip Implant and Knee Implant Using Finite Element Analysis (FEA)

Advisor(s): Dr. Brian Davis

Biography: Hi, my name is AlRitia Gore. I am from Pickerington, Ohio. I am a fifth year Senior at The University of Akron majoring in Biomedical Engineering with a specialization in biomechanics. Upon graduation in May, I will have a minor in Applied Mathematics. I am actively involved in National Society of Black Engineers (NSBE), Society of Women Engineers (SWE), Increasing Diversity in Engineering Academics (IDEAs), as well as the Choose Ohio STEM Program. I am the current Vice President of UA's Chapter for NSBE, the Treasurer for UA's Chapter of SWE, and I am on the College of Engineering's Dean's Team. I was on The University of Akron's 2016 Homecoming Royalty. I am also a grad student at Case Western Reserve University in their Master's of Engineering and Management Program.

Abstract: When a patient undergoes a knee replacement, there is a stem that typically protrudes proximally within the femoral intramedullary canal. In some cases, a patient who has undergone this procedure also suffers from a broken femur following a subsequent fall. In these cases, additional orthopaedic implants are needed to reconstruct the femur. The general rule is that the two implants cannot be closer than two cortical diameters. Spacing less than this is thought to lead to stress risers, although there is no quantitative evidence for this. The goal of this research project is to determine the required distance needed between a femoral fracture fixation rod and a knee implant. In order to find different stresses that occur between the beginning of a knee implant and the end of a hip implant, finite element analysis (FEA) will be used.

Publications: None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

The University of Akron

Olivia L. Petrey

Status: Senior, Biomedical Engineering

Research Topic: Effects of Anti-Gravity on Bone Resorption in Coculture

Advisor(s): Dr. Marnie Saunders

Biography: **O**livia Petrey is a Senior at The University of Akron studying Biomedical Engineering with a focus in Biomechanics. Olivia started working in Dr. Saunders' bone biomechanics and mechanobiology research laboratory during the Spring semester of her Junior year. She was most intrigued by the bone cell culture research taking place in the lab and immediately began training under one of the graduate students working with cell culture. After spending the summer working on a method to coculture osteoblasts and osteoclasts, Olivia spent the fall semester working at Zimmer-Biomet as a co-op in the Advanced Technology department. She returned to The University of Akron for the Spring, 2016, semester to resume her studies and research in Dr. Saunders' lab. She has continued to work with bone cell coculture and is studying the effects of antigravity on osteoblastic bone resorption in coculture. Along with conducting her own research, Olivia spent the Summer, 2016, semester managing the College of Engineering's High School Research Academy, mentoring 12 high school students for 8 weeks while they assisted several Engineering professors with their research. She is also spending her final semester of undergrad as a software engineer at Perkin Elmer.

Outside of the lab, Olivia is involved in many extracurricular activities. She was a member of Kanga Blue, an all women a cappella choir, for her freshman and sophomore year and is now in her third year of music ministry at St. Bernard's Parish in Akron. She is also in her third year of tutoring for the College of Engineering. Olivia was inducted into Tau Beta Pi, an engineering honor's society, during the Fall, 2014, semester, and was initiated as a member of the Dean's Team during the Fall, 2016, semester. Upon graduating in May 2017, she plans to work in the biomedical industry for a few years before pursuing her Master's or Ph.D.

Abstract: It is well known that when bone is subjected to micro-gravitational conditions its density decreases significantly. The mechanism by which this bone loss occurs, however, remains unclear. It has been suggested that mechanical loading and unloading experienced by osteocytes is communicated to osteoclasts and osteoblasts to orchestrate bone remodeling. Bone remodeling consists of two processes: bone formation and resorption. Bone formation is performed by osteoblasts, while bone resorption is performed by osteoclasts. Therefore, the goal of this research project is to characterize a cocultured system of osteoblasts and osteoclasts and use it to quantify the effects of soluble signals versus cell-to-cell contact in bone remodeling that has been induced via osteocyte unloading.

Publications: None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

The University of Toledo

Heidi E. Kuchta

Status: Junior, Astrophysics

Research Topic: Searching for Brown Dwarfs on the in the Orion Molecular Clouds

Advisor(s): Dr. Thomas Megeath

Biography: Heidi Kuchta is a third year undergraduate student in the Astrophysics program at The University of Toledo. Growing up in Hinckley, Ohio, away from city lights she gained a love for the stars. This love is what drives her to learn more and explore astronomy. Heidi has been working on this project for 2.5 years. She is involved in the Society of Physics Students, works as a tutor and at 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 astronomy and cultivate a love for the stars.

Abstract: Brown Dwarfs are an important part of understanding both star and planet formation. By finding the ratio of the number of stars to brown dwarfs, we can look for variations in the relative numbers of brown dwarfs and stars formed in regions with different birth environments. I am looking for brown dwarfs in the less populated regions of the Orion Molecular Cloud to provide further constraints for the Initial Mass Function. This is being done using data taken in the visible and infrared bands. We have 10 fields in the Orion A cloud taken with the Discovery Channel Telescope. Of these, 184 of the stars have I and z magnitudes. The data from these has been reduced and analyzed, and they are currently being combining with infrared data taken with Spitzer and NEWFIRM. Once candidates brown dwarfs are found from this list they will be the targets of spectroscopic observations with the DCT to confirm their identity.

Publications: None yet.

Congressional District: 16th

Congressional Representative: James B. Renacci

The University of Toledo

Anthony O. Smoktonowicz

Status: Junior, Electronics Engineering Technology

Research Topic: Wide Area Autonomous Air Sampling Drone (W.A.S.P.)

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

Biography: The inspiration to design, build and program an autonomous robot to seek out methane leaks in a closed landfill setting begun in May of 2013. The first prototype was shown at the 2014 OSGC Symposium in April. This prototype was built from LEGOs and the Arduino Uno off the shelf parts. My goal was to build a prototype that could be done on a shoe string budget with a very limited skill set. Limited only in terms of what has been taught either through the community college education or additional readings done. That prototype received much support and encouragement from the OSGC community, for which I am very thankful.

Abstract: The 2014 and 2015 Symposium experiences held great support and encouragement to continue with gas detection robots. The previous prototypes have revealed many limitations to the terrestrial robot versions. The next step is to take the prototype to the air. The project has five new elements. The conversion from terrestrial to an autonomous flying drone creates new challenges in the form of aerodynamics, collision detection, and coordinate location. The second feature is the power systems; traditional battery power and charging are very limited on a shoestring budget, so a new power source will be required. 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. A more condensed, lighter and smaller locomotion system will be required. The fourth new element to this prototype is the gas sensors. Originally the use of a gas sensor utilizing a whetstone bridge was implemented. This new prototype will use plant cells that will change to a visually detectable color in the presence of hazardous gas. The cells can be genetically altered to respond to particular gases empowering the field user with real time visual results. This new prototype will incorporate the PICAXE 28x2 microcontroller chip, instead of the LEGO™ system. This will make the prototype lighter, small and faster than its predecessor. The final new element will be designing and programming the processors code and user interface, the implementation of dead reckoning instead of GPS will allow the drone to fly into even smoke clouds to perform the gas tests.

All five of these elements offer unique challenges and learning experiences. It is exciting to evolve a new system from the original 2013 prototype. Transferring to the University of Toledo will present new levels of education and opportunities to learn from remarkable instructors. This new version pushes the limits of my current education, budget and abilities. It is even more ambitious than the 2015 model, a truly exciting journey. I plan to continue this project and future permutations as I progress through my education.

Publications: None yet.

Congressional District: 5th

Congressional Representative: Robert E. Latta

University of Cincinnati

Jeffrey E. Bennett

Status: Senior, Aerospace Engineering

Research Topic: Water Testing Utilizing Unmanned Aerial Systems

Advisor(s): Dr. Kelly Cohen

Biography: Jeffrey Bennett is a fifth-year student in the Aerospace Engineering program at the University of Cincinnati (UC). During his time at UC, he was fortunate to have participated in the Co-op education program. This is where his love of Unmanned Aerial Systems (UAS) began. The Co-op program had opened his eyes to the wonders of multi-rotor copters and all the different applications in which they can be used. This exciting field has inspired him to design and build his own UAS that he pilots regularly.

Abstract: Harmful algae blooms (HABs) are colonies of algae that grow rapidly out of control. The algae are toxic causing harmful effects to humans, marine life, and birds. HABs have been reported in every U.S. coastal state and many other inland states. The consensus is that HABs are on the rise, but the lack of scientific data has made it difficult to understand why HABs occur. More data is needed to build an accurate forecast model. The current method to collect data is by boat, buoys, and satellite imaging. These methods are costly, take time to setup, and can give inaccurate data. A better method is needed to collect water samples. Utilizing an unmanned aircraft system (UAS) is a better method to collect the data. The UAS can accurately land on a predetermined GPS coordinate (waypoints) land, take a sample, and then fly to the next waypoint. The autonomous flight plan can easily be saved to ensure that samples are being taken from the same spot every time. This method is relativity cheap, quick, and can easily be done by one person. The UAS built for water sampling is a heavy lifting octo-copter that is equipped with a multiparameter sonde (EXO2), floatation tubes, and a zero latency high definition camera. With this configuration, a water sample can be taken every three minutes with a GPS coordinate label for every sample taken. The same flight path is used throughout the year to watch the trends and possible sources of the HABs. The data collected has the potential to save human and marine lives.

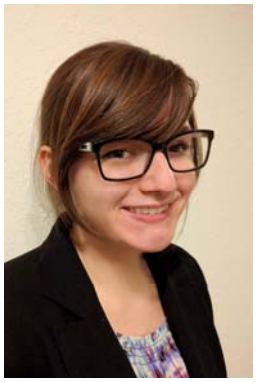
Publications: None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

University of Cincinnati

Amanda M. Miller



Status: Junior, Mechanical Engineering

Research Topic: Developing an Active Exoskeleton for the Sit-to-Stand Transition

Advisor(s): Dr. Kelly Cohen

Biography: Amanda is currently in her third year at the University of Cincinnati pursuing both a Bachelor's Degree and Master's Degree in Mechanical Engineering through the ACCEND program (Accelerated Engineering Degree Program). While at the University of Cincinnati, she has participated in the Co-op Education Program, where she has spent two semesters working for Siemens PLM Software. During the summer, she also participated in the WISE Program (Women in Science and Engineering), where her eyes were opened to how technology could help people live normally through research towards developing an active exoskeleton for the sit-to-stand transition.

Abstract: As of 2013, there are 40 million people over the age of 65, and it is projected to continue increasing in the coming years, resulting in more and more people needing assistance with the activities of daily living, including the sit-to-stand motion. This motion is a key factor to one's independence, as it is the beginning and ending action for moving from one place to the next, and is involved in many other basic tasks, such as getting out of bed and using the restroom. This work presents the process of developing an active lower body exoskeleton and its controls, designed to assist with the sit-to-stand transition. This includes recording the motion for the sit-to-stand transition, analyzing the forces acting at each of the joints, and interpreting the data to determine a proper model for the exoskeleton and motors. The next step is to begin fabrication of the exoskeleton and test different control designs.

Publications: None yet.

Congressional District: 12th

Congressional Representative: Patrick J. Tiberi

University of Cincinnati

Nathaniel L. Richards

Status: Senior, Aerospace Engineering

Research Topic: Genetic Fuzzy Trees for Closed-Loop, Time Optimal Control of Dynamic Systems

Advisor(s): Dr. Kelly Cohen

Biography: Nathaniel is a fourth-year undergraduate Aerospace Engineering student at the University of Cincinnati. He will be completing his Bachelor's Degree early and will start his graduate studies next year. He has co-oped at three organizations: Gulfstream Aerospace, NASA Langley Research Center, and the UAV MASTER Lab at the University of Cincinnati. He worked in the Rapid Prototyping and Validation departments at Gulfstream to create shop aids and to ensure safety of the new G500 aircraft, respectively. At NASA Langley, he prototyped an onboard geo-containment box to prevent UAVs from breaching no-fly zones. He also worked with ground-based navigation systems and developed a data visualization and collection system.

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 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 has also developed Fuzzy Logic modules in both C++ and Python.

Abstract: There are several approaches to determining the time-optimal control of dynamic systems, including direct and indirect methods. Many of the current approaches yield the optimal control in open-loop form. In the presence of sensor noise or uncertainty, these methods fail to exhibit robustness. Closed-loop feedback control is desired, driving the system to the desired final state in minimum time based on the current state information. GPOPS-II, an optimal control software package developed by Dr. Anil Rao and his students, will be used to obtain the optimal time histories of the state and control for open-loop control. A simple 1-DOF harmonic oscillator with variable damping will be investigated, and the spring constant will be able to take on a range of values, thus introducing uncertainty. GPOPS-II will generate the optimal control for a given spring constant, and training data will be generated for the range of spring constants. This training data will be used to train a Genetic Fuzzy Tree, which involves cascading several Fuzzy Logic controllers and training the system with a custom Genetic Algorithm. The resulting control will be robust to the uncertainty in the plant dynamics and will drive the system to the desired final state in near-optimal time.

Publications:

1. Richards, N., Cohen, K., and Kumar, M. (2016). "Genetic Fuzzy Trees for Closed-Loop, Time-Optimal Control of Dynamic Systems." 12th Dayton Engineering Sciences Symposium. Powerpoint. Dayton, OH. November 1.
2. Richards, N., Cohen, K., and Brown, B. (2015). "3D-Printed Octocopter with Motor Failure Compensation." 40th Dayton-Cincinnati Aerospace Sciences Symposium, PowerPoint. Dayton, OH. March 4.

Congressional District: 1st

Congressional Representative: Steve Chabot

University of Dayton

Edward S. Brinkerhoff

Status: Senior, Mechanical Engineering

Research Topic: Reducing Energy Consumption in Manufacturing Robotics

Advisor(s): Andrew P. Murray and David Myszka

Biography: About 4 years ago I decided to return to school and pursue my Bachelor's of Mechanical Engineering. Before returning to school I was in the residential and commercial construction trade. Having a construction background gave me the ability to visualize a completed project in my head before I started any work and I feel this is an important skill to have in engineering. I have had two Co-Op opportunities since returning to school, one at a local aluminum foundry that supplied aluminum castings to the natural gas industry and another at GE Aviation making turbine blades for commercial aircraft engines. I will return to GE Aviation in the Summer and hope to find employment there upon graduation in the Fall. I am married with 2 wonderful children, ages 5 and 11. When I'm not doing things with my kids I like to play the guitar and mess around with things in my garage.

Abstract: Energy consumption in manufacturing is on a rising trend. This increase is due to a shift in domestic manufacturing from increases in efficient practices through automation and robotics. Robots require motors to operate each degree of freedom associated with the mechanical motion needed to perform a task and these motors require power to operate even when holding an object or itself perfectly still, and even more power is required to operate the robot at a controlled rate of speed. This semester I will design a three to five degree of freedom apparatus on CAD software and run an energy and force analysis to determine the power needed to run a robot. I am going to optimize the motion with energy conservation as the goal of the project. I will use a microprocessor to control a motor and use a data acquisition device to record the current at different stages of motion and positions of the motor.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wilberforce University

Maxime Maisonnet

Status: Senior, Computer Science

Research Topic: An Intelligent Fuzzy Sensor Based Motion Control System for Autonomous Mobile Robots

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. Then, he attended Florida Memorial University in 2011 where he received a scholarship as a basketball player for the university. After that, he transferred 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. Now, he is pursuing his Bachelor's Degree in Computer Science as a Senior at Wilberforce University and he also plays basketball for the Wilberforce University team. Currently, he is working on a research topic related to the intelligent control of the autonomous vehicles including unmanned vehicles like unmanned mobile robots to explore the unknown areas due to the hazardous environments for the human beings with applying computational intelligent techniques.

Abstract: Recently, the assessment and the suitable control of the attacked areas by the catastrophic natural disasters are very important issues in big data control fields. To provide the efficient and appropriate solutions, the accurate examination of the hazardous or contaminated areas is the most critical factor for the afterwards assessments. One of the desirable ways is adapting an autonomous mobile robot to navigate and explore the attacked area to reduce the risk of the safety comparing to the methods done by the human being. Since an autonomous mobile robot (AMR) has to cope with uncertain, incomplete or approximate information and control the deployed autonomous mobile robots to examine the hazardous or contaminated areas efficiently, it is essential to have more sensitive and efficient sensors for the autonomous mobile robots. The proposed work presents an intelligent fuzzy sensor-based motion control system for the autonomous mobile robots' navigation in unknown environments surrounded by the hazardous or contaminated conditions with the various input conditions for the system. The proposed system will also help a wireless sensor-based remote control of mobile robots motion. In addition, a fuzzy logic based intelligent control strategy has been developed through the proposed work to computationally implement the approximate reasoning necessary for handling the uncertainty inherent in the collision avoidance problem. Finally, the performance of the proposed fuzzy sensor-based motion control strategy for autonomous mobile robots is demonstrated by the results of the motion control of the autonomous mobile robots with the obstacle avoidance behavior in unknown environments.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wilberforce University

Alexis R. Stanciel

Status: Junior, Computer Science

Research Topic: Cybersecurity Strategies in Law Enforcement

Advisor(s): Marvin L. Reid, Jr., DBA, MSIT, MBA

Biography: Alexis Stanciel is a Junior attending Wilberforce University studying Computer Science. She is from Saint Louis, Missouri; it was there that she discovered a dual enrollment program. This program allowed young adults ages (17 -24) to earn high school diplomas rather than a G.E.D. For those of who were still in high school they were allowed to take classes on a college campus while earning your high school diploma through college curriculum as well as gain transferable college credits. Alexis began classes at Florissant Valley Community College her junior year of High School graduating high school the following summer. She spent one school year and summer course at this program soon after transferring to Wilberforce University the following fall semester. Due to her credits, Alexis transferred in with enough credits to be classified as first Semester Sophomore. Fall semester she joined the cheerleading team, though enjoyable, it was not until being welcomed into a Prestigious Sorority; Delta Sigma Theta Beta Chapter marked a highlight in her life. Alexis plans to obtain an internship that introduces a variety of fundamentals and knowledge about the world of software and computer programming, working toward becoming permanent. Starting at entry-level positions, she plans to expand her credentials and become more of an asset to the vast, infinite world of technology.

Abstract: Reid and Van Niekerk (2014) stated the term Cybersecurity (CS) is often used interchangeably with the term information security (IS). Reid and Niekerk defined CS as the collection of (a) tools, (b) policies, (c) security concepts, (d) security safeguards, (e) guidelines, (f) risk management approaches, (g) actions, (h) training, (i) best practices, (j) assurance, and (k) technologies that used to protect the cyber environment and organizations and user assets. Reid and Niekerk point out the definition for CS is similar to that of IS. The purpose of this qualitative case study is to explore the best strategies needed by small local law enforcement to develop cyber security policies to protect organizational systems from cyber threats. The complex adaptive systems theory (CAS) will serve as the conceptual framework for this study. The results of this study may contribute to social change by (a) decreasing theft of sensitive, (b) protected, or (c) confidential data by businesses. The study's principal findings will assist local law enforcement on how to initiate the process of developing a cybersecurity strategy, but the gap analysis indicated that small local law enforcement still needs to adopt best practices for cyber security policies.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wilberforce University

Kweisi F. Wilson

Status: Junior, Electrical Engineering

Research Topic: Design of a Sensitive Probe for Endoscopic Imaging

Advisor(s): Nkorni Katte

Biography: My name is Kweisi Frederick Wilson. I am a Junior at Wilberforce University from Baltimore, Maryland, studying Electrical Engineering and also a member of Alpha Phi Alpha Fraternity Inc., mighty Xi Chapter. Before college, he attended the Baltimore Polytechnic Institute, a Blue Ribbon School. There he gained and interest in engineering and robotics. He enjoys studying martial arts. He also has competed in the VEX World Robotics Championship in 2014 and 2014, both times placing high in his division. Is motto for innovation is “making the futuristic more realistic.” He plans on designing planet rovers for space exploration.

Abstract: Endoscopic imaging is very useful in the early diagnostic of several diseases including cancers. There are several important imaging techniques used with endoscopy to enable proper diagnostic, such techniques include Optical coherence tomography (OCT) and Raman spectroscopy. An important device that makes such endoscopic imaging possible is a probe. In our current research we seek to develop sensitive probes that will enable high quality imaging for OCT. This will involve proper optical design and Multiphysics analysis of the micro-mirror which is a very sensitive part of the probe.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wright State University

Miles A. Burrage

Status: Junior, 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 Junior at Wright State University pursuing a Bachelor's 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.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wright State University

Joanna A. Fadel

Status: Senior, Biomedical Engineering

Research Topic: Modeling of a Bioinspired Water Filtration System: A Sustainable Approach

Advisor(s): Dr. Subhashini Ganapathy

Biography: I was inspired by Olympic athletes during my undergraduate years and realized that human potential fascinates me. I chose my undergraduate degree in biomedical engineering because it is an interdisciplinary program at the forefront of connecting the wonders of the human body with the innovation of the human mind. I am constantly striving to expand my own potential with my involvement in a wide range of academic interests from design and architecture to engineering and environmental science. My potential goes beyond the classroom too with my extracurricular activities in martial arts, art, languages, and harvesting an appreciation for different cultures. I do not want to limit myself to one school of thought, because I believe the world's toughest challenges require thinkers who are eloquent in multiple disciplines with the ability to intertwine them.

My way of thinking is unconventional, my goal is grand innovation, and my efforts never compromise my ethics. I love being in university because it is a true melting pot for diverse thinking. I have a passion for learning and I wish to always be in this setting and working on research that I can share with the world. I plan to continue my education through graduate school in hopes of attaining my PhD in a Bio-related engineering discipline.

I hold a great passion for the field of biomimicry, bio-inspired design, and environmental sustainability, and I hope to implement these concepts into my graduate studies. Subsequently, I wanted to formally expose myself to these concepts by way of my senior research through the NASA/OSGC program. I chose to focus on the global health issue of water.

Abstract: The filtration, accessibility, and transportation of water is a challenge that affects both technologically advanced and under-developed countries. It is a necessity to all, but an efficient channel for the spread of disease and pollutants. Modern day water filtration systems seek to purify water, but may pose health risks of their own with the use of harsh chemicals to accomplish this task. This project seeks to use bioinspired methodology and biomimetic design to model a water filtration system, that utilizes sustainable processes, to produce drinking water out of waste water. The goal is to model this system with methods that can be used globally with decreased risk to human health and the environment.

Publications:

1. J. A. Fadel, (2016). “The Treatment of Chronic Tinnitus with Endogenous Neuromodulation,” NASA/ Ohio Space Grant Consortium 24th Annual Student Research Symposium Proceedings, Cleveland, OH, 2016, pp. 79-82.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Wright State University

Alexandrea C. Oliver

Status: Junior, Computer Science

Research Topic: The Impact of Game Design Choices in Interactive Education Games

Advisor(s): Noah L. Schroeder, 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 Prep Course at Stebbins High School as well as a member of the Robotics and French clubs. She also took courses at Sinclair Community College for robotics, CAD, and manufacturing.

In the past, Alexandrea has held two internships with the Wright-Patterson Air Force Base through the Wright Scholar program. During these internships, she was able to work with modeling and simulation as well as video game research and design. She has held a strong interest in technology from a young age and has always enjoyed tinkering with it. After obtaining her degree in computer science, she hopes to continue on to receive her master's in computer science with a focus in video game design and development. In the future, Alexandrea wants to aid in the development of video games that hold a focus on education, rehabilitation, training, and entertainment.

Abstract: This project focuses on developing a modular education game framework. The Student-centered Interactive Modular Performance-based Learning Environment (SIMPLE) is a program that is designed to aid students in improving upon different areas of learning. SIMPLE is to become a learning tool for both K-12 students and college level students. The game is being created using Unreal Engine 4 and its visual scripting system known as "blueprints". The end goal of the current development is to create a level that better targets the college age population. This will be accomplished by providing a non-linear path to the end as well as additional paths and opportunities.

SIMPLE can be described as a prisoner-escape genre game. We are developing and testing features of different levels that utilize the framework of SIMPLE. In this iteration of the framework, the user must escape the level by using their "hacking" skill to open doors leading to the final room from which they may escape from. To hack each door, the user must solve a series of questions that are read into the game using a file system that is populated by the instructor prior to the user beginning the game. The user may also encounter aid in the form of hints around the ship.

The purpose of this project is to compare three versions of the game. The three versions include a standard version that contains only the typical questioning system, a level with increased interactivity in the form of an interactive non-player character, and a final level with the inclusion of artificially intelligent systems that create additional gameplay challenges for the player. We hypothesize that by increasing the interactivity as well as the depth of the storyline, the user's immersion, engagement, and perceived challenge will increase. As this is a part of an ongoing project, I will be presenting the research findings to date.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Youngstown STATE UNIVERSITY

Youngstown State

James D. Harding

Status: Junior, Chemical Engineering

Research Topic: 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 Junior 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 Junior 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 or internship, 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 a member of the American Institute of Chemical Engineers. 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.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Youngstown STATE UNIVERSITY

Youngstown State

Joseph V. Lonardo

Status: Junior, Mechanical Engineering

Research Topic: Low-Cost Metal Printing

Advisor(s): Dr. Eric W MacDonald

Biography: Joe Lonardo is currently a third-year Mechanical Engineering student at Youngstown State University (YSU). He is from New Springfield, Ohio, where he attended Springfield Local High School. Mentoring and opportunities to visit industries courtesy of his father, Rich Lonardo, led him to seek engineering as a career and develop a passion for how things work.

Joe has been an active member in his community's Boy Scout Troop over the past ten years, during which he earned his Eagle Scout rank and now serves as a troop Assistant Scoutmaster. He is also a member of the YSU chapter for American Society of Mechanical Engineers (ASME) and serves as one of the chapter's Junior Representatives.

Joe spent the summer following his sophomore year working as a co-op intern with Defense & Energy Systems, LLC. With D&E, Joe held the position of Assistant Project Manager. This co-op provided a challenging opportunity to gain experience with project management, specifically dealing with the advancement of additive manufacturing for metal casting. Joe gained experience in project proposal technical writing (one of which was awarded), reports and graphic designs for projects, metal casting, 3D-printing, simulation, and design software.

Abstract: The goal of this project is to further develop a delta 3D-printer designed to print metal layers using a conventional MIG (Metal Inert Gas) welder that feeds molten metal wire onto a moving platform. This open-source printing method was originally developed by a team at Michigan Technological University under Dr. Joshua Pearce. The most appealing aspect of this research is the relatively low cost for using such a setup in comparison to commercial metal 3D printers that can exceed costs in the millions of dollars. The low-cost metal printer currently resides in YSU's Center for Innovation in Additive Manufacturing (CIAM) lab where work on printing firmware development is underway. Before the addition of the meta MiG welder platform, the movements of the printer must be fully operational. Once this occurs, the first tests using the MiG welder to act as the "extruder" for the printing material will begin. Once basic operations of the printer are underway, the final steps will be to add post-printing analysis elements. Such elements will include cameras to monitor each printed metal layer and provide adjustments (speed, distances, welder power magnitudes) throughout the printing process to optimize print quality. The end-goal will be printed parts of superior quality and development than past research conducted at YSU using this printer design.

Publications: None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

COMMUNITY

COLLEGE

SCHOLARSHIPS

COLUMBUS STATE COMMUNITY COLLEGE

Columbus State CC

Cameron R. McNair

Status: Sophomore, Electro-Mechanical Engineering Technology

Research Topic: Silicon Carbide's Applications in Aeronautics

Advisor(s): Professor Erik Aagard

Biography: I am from Akron, Ohio, and am currently in the last year of my Associate Degree Program. A few years ago I moved to Columbus, Ohio, to attend school; I attended The Ohio State University then transferred to Columbus State Community College. My desire to pursue a career in engineering derives from my appreciation for science and Project Lead The Way (PLTW) courses that I took in High School. I recently completed an internship with Marathon Petroleum Corporation working as an Operations Technician Intern. Currently, I am a participant in NASA's Community College Aerospace Scholars program. After obtaining my Associate Degree I plan on pursuing my Bachelor's in Electro-Mechanical Engineering Technology while working as an Engineering Technician. After completing my education I hope to work in aerospace or manufacturing.

Abstract: Silicon Carbide (SiC) is a desirable engineering material in aerospace. A few of the well-known advantages of SiC are its high thermal conductivity, high yield strength and elasticity at high temperatures. The goal of this literature study is to examine the role of SiC in the design of spacecraft from the past, present and also future applications as it relates to Aeronautics.

Publications: None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

Columbus State CC

John A. Reynolds

Status: Sophomore, Construction Management

Research Topic: Virtual Reality in Construction

Advisor(s): Dean M. Bortz, M.A., CSI, CDT

Biography: I have lived in Ohio most of my life, graduating from Reynoldsburg High School. I currently help in the family business doing demolition and complete renovations. I am also a Sophomore at Columbus State Community College working towards receiving my Associate of Science Degree in Construction Management. My passion is to take the information I attain during school and use it to help others. My interest in this degree is to further my knowledge and understanding in construction so I can start my own business/organization rebuilding houses for areas in the world affected by natural disasters.

Abstract: Virtual Reality (VR) is a growing method in the construction industry. It allows companies to show owners or investors how a structure will look, as well as the process of which it will be built. This not only helps the customer understand the method of how the structure will be built, but also help grow a trusting relationship. Using virtual reality glasses will allow companies to make free changes before the construction even begins. This will help companies be more efficient in time and money by saving them from costly changes that might have occurred during the building process. It is a more resourceful way to fine tune everything that goes into constructing a structure. Virtual reality proved to be a vital asset in building the Martin Luther King Multi-Service Ambulatory Care Center in Los Angeles, California completed in 2013. Nurses and doctors wore the headset in order to bring valuable insight on logistical details like equipment location all the way down to figuring out the appropriate spacing between beds. All that is required is a highly popular VR set called the Oculus VR headset and hooking it up to a powerful gaming system. By using this method to acquire your clients input before you start constructing you will improve the client satisfaction, increase the rate of project approval, and save the company money by allowing them to make changes for free.

Publications: None yet.

Congressional District: 3rd

Congressional Representative: Joyce Beatty

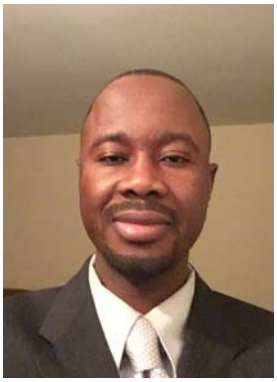
CC-STARS!

COMMUNITY

COLLEGE

SCHOLARSHIPS

Cincinnati State



Salif A. Athie

Major: Chemical Technology

Research Topic: Educating People on Prevention of Chemical Usage in the Household

Advisor(s): Ann Fallon

Biography: I am finishing an Associate of Science Degree at Cincinnati State Technical and Community College. My program is Chemical Technology, and I worked as a quality technician in the wet chemistry lab. I am from Mauritania, West Africa. I have a degree in Navigation and Fishing from my country. When I started working in the food industry as a quality assurance technician, I decided to go back to school to get a degree in chemistry. Therefore, I will be able to educate many my people from country on how to prevent the foodborne illnesses and disease outbreaks.

Abstract: I will be working on finding on how much caffeine is contained in various medication. I want to evaluation the dosage of medicine containing high amounts of caffeine, which the most used drug in the world. My goal is to statistical data needed to allow the government to encourage the pharmaceutical industry to reduce the amount of caffeine in their products. Instead of getting health benefits from medicines containing caffeine, people are facing caffeine addictions from the drugs prescribed by their doctors. Children are among the most affected by these caffeinated drugs because of the prevalence of the drugs at home. Through my research I will develop a procedure for evaluating the caffeine content of various medications. I will compile the data collected and make statistical comparisons between different medication types.

Publications: None yet.

Congressional District: 2nd

Congressional Representative: Brad R. Wenstrup

Solomon Ellison, III

Major: Pre-Engineering (Computer Engineering Focus)

Research Topic: Design of Clothing Integrated with Circuitry to Regulate Body Temperature

Advisor(s): Professor Abigail Yee

Biography: My name is Solomon Ellison, and I am currently attending Cincinnati State Technical and Community College. My major is Pre-Engineering with a focus on Computer Engineering. I really enjoy the thought processes and theory related to designing hardware and programming hardware to complete the desired goal. As I have navigated further along in my research and studies I have realized that the electrical engineering component of designing certain technology really piques my interest.

Abstract: My proposal for research deals with developing clothing integrated with various technologies to regulate body temperature in various conditions. “Performance Clothing” traditionally has worked to either retain heat from the body (Insulated clothing) or dissipate heat from the body. However, traditional clothing has normally achieved body temperature regulation based on the molecular makeup of the materials alone; materials such as polyesters, or cotton, and sometimes poly-blends in an effort to achieve the desired goal. This basic reliance on the materials for temperature regulations present challenges. One of the major challenges presented is that the materials don’t allow a mechanism to increase or decrease temperature of the clothing itself, but rely solely on the body adjusting to the temperature and the construction of the clothing in order for regulation to happen. However, none of these options deal with actually “regulating” temperature with an option to vary the temperature depending on the desire of the consumer. The Scope of this project is to design, build and integrate circuitry into clothing that can be controlled via a programmable interface. This interface will regulate the temperature of the clothing in various settings.

Publications: None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

Cincinnati State
TECHNICAL AND COMMUNITY COLLEGE

Cincinnati State

Amanda E. Gibson

Major: Pre-Engineering

Research Topic: Materials Associated with Various Types of Renewable Energy

Advisor(s): Professor Abigail Yee

Biography: Amanda Gibson graduated from Batavia High School in 2009 and is in her second year at Cincinnati State with a major in Pre-Engineering. After the spring semester, she will graduate with an Associate's of Science and expects to transfer to a four-year college for Materials Science and Engineering. She is considering Northwestern University and The Ohio State University for her Bachelor's Degree. Being gravely concerned for the environment and the role of people in it, she wants to work to improve the technologies associated with renewable energy. Amanda is an officer in her college's chapter of Phi Theta Kappa, a Jack Kent Cooke Scholarship semi-finalist, and has maintained a 4.0 GPA.

Abstract: People have always used the natural resources of the planet, but mounting demand is sure to overwhelm this supply if practices are not changed. Scaling back civilization and its advancements is not practical or popular, so it is charged to scientists and engineers to find solutions that are. Energy production is a major contributor to the adverse effects inflicted by people on nature, and it is our responsibility to find alternatives which will preserve our beautiful planet. It is my career goal to assist in this great endeavor and will use this opportunity afforded by NASA and the Ohio Space Grant Consortium to research the materials used in various clean energy technologies including, but not limited to, photovoltaic cells, fuel cells, and geothermal systems. I will also summarize the obstacles with which each technology is faced and outline some of the research currently in progress that proposes to address those obstacles.

Publications: None yet.

Congressional District: 2nd

Congressional Representative: Brad R. Wenstrup

Katie S. Griffin

Major: Dietetics and Pre-Nutrition Science

Research Topic: Heart Disease Awareness on a College Campus

Advisor(s): Candice Jones

Biography: My name is Katie Griffin, and I am 2nd year Dietetics student at Cincinnati State Technical and Community College. I am also a proud mother of three children, ages 6, 8, and 10, and I have been married to my high school sweetheart for 12 years. We have been trying to raise our children around whole foods and a healthier lifestyle by planting our own garden, raising our own animals for meat and eggs, and also hunt for wild game. This really became important to me after we had 3 people in our family diagnosed with cancer within a very short time. I want to be a dietetic technician so I can not only teach my children and my family about the risks associated with poor nutrition, but also will be able to help many more people in my community.

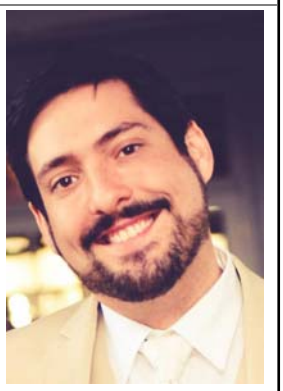
Abstract: As a prospective dietetic technician, the probability that I will be working with people who have heart disease is very high. According to the American Heart Association, heart disease kills more than 600,000 people a year, which is one in every four deaths. There are many risk factors that contribute to the development of heart disease such as family history, smoking, hypertension, high cholesterol, diabetes, overweight/obesity, sedentary lifestyle and simply aging all increase one's chances of having heart disease. Only 27% of people are aware of the risk factors and that they may be at risk. I have a family history of heart disease and I have personally seen the impact of heart disease on one's health first hand with my mother and both grandpas. I would like to concentrate on heart disease for my research project. I will be assessing students' heart disease knowledge who are working on both health-related degrees and non-health related degrees, and will compare the knowledge between the two. Based on my findings. I will research ways to increase knowledge and awareness of Heart disease.

Publications: None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Joshua D. McIntosh



Major: Dietetic Technology

Research Topic: Diabetes and the College Student

Advisor(s): Candice Jones, M.Ed., R.D., L.D., C.D.E.

Biography: My name is Joshua McIntosh. I am currently entering my final semester before completion of my Associate Degree. I am a 34 year old. I am married to my wife, Gina, and together we have one son named William. During my time at Cincinnati State, I have become enamored with the food, nutrition, and the sciences. Biology, chemistry, and physiology all play a dynamic role in the inner workings of food and the human body. Whether it is in regards to antioxidants and their defense against free radicals in the body or the digestive enzymes and their specific functions in the digestive process of macronutrients, science is the culprit. Science has become my passion. I plan on pursuing a Bachelor's and Master's Degree in Food Science or Dietetics upon completion of my Associate Degree from Cincinnati State. My ultimate goal is to use food and science to educate others as to the importance of proper nutrition in their every day life and how it can affect the entirety of their lives.

Abstract: According the American Diabetes Association (ADA) and Center for Disease Control (CDC), 29.1 million people have diabetes, with 8.1 million people unaware that they have the disease. If current trends continue, it is predicted, that by 2050, 1 in 3 people will have diabetes *(National Diabetes Statistics Report, 2014).* As a prospective Dietetic Technician and, hopefully a future Dietitian, there is a high probability that I will be assessing, educating, counseling, and treating patients with diabetes. I plan on conducting a campus wide information seeking venture focused on attitudes towards Diabetes. I want to see how college students perceive diabetes and components, such as blood glucose levels, medications, insulin and the dietary behavior changes that are important in diabetes self-management. For data gathering purposes, I will be using the Michigan Diabetes Research and Training Center's "Attitudes Survey." Using a Likert scale, the survey contains 33 questions which address people's beliefs about diabetes self-management practices, including the role of health care workers, and dietary needs of the diabetic. From there, based upon my findings, I will try to discover what programs or approaches could be utilized to improve the attitude and the knowledge level of college students on the subjects of diabetes. Through this research project, my goal is to ultimately discover the knowledge level of the typical college student and which program/approach can be utilized to lessen any knowledge deficit amongst college students, whether through literature distribution, on campus lecturers, or a health and nutrition blog on the campus homepage. The data will be collected, analyzed, and conclusions will then be drawn as to the proper steps to be taken from that point forward.

Publications: None yet.

Congressional District: 8th

Congressional Representative: Warren Davidson

Tyland J. Worrell

Major: Mechanical Engineering Design

Research Topic: Robotics

Advisor(s): Professor Abigail Yee

Biography: I am a third year college student studying at Cincinnati State Technical and Community College seeking my Associate's Degree in Mechanical Engineering Design in hope to pursue my Bachelor's and Master's Degrees.

Abstract: Robotics helps students in all different fields of engineering that include mechanical engineering, electrical engineering, computer science, and others. With the increase for robots in developing companies they will need employees to know how they work, how to solve mechanical failure and even run these robotics manually to perform certain tasks. Robots can be used in any situation and for any purpose, but today many are used in dangerous environments. I believe this career is a great start for any student because as time goes by, the need for new technology will be in demand.

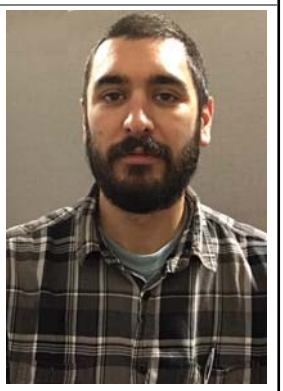
Publications: None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

Cuyahoga CC

Anthony J. Cancian



Major: Construction Engineering Technology

Research Topic: Insulated Concrete Forms: An Energy Efficient Building Solution

Advisor(s): Dr. Trent Gages

Biography: Anthony Cancian was born and raised in Cleveland, Ohio, and attended Trinity High School in Garfield Heights. Anthony is currently a Sophomore at Cuyahoga Community College studying Construction Engineering Technology, working towards a BS in Civil Engineering. He is a member of the Phi Theta Kappa Honors Society, and has received scholarships for his academic accomplishments, which have led him to the Ohio Space Grant Consortium. His passion for building construction and engineering has influenced his interest of different construction methods and materials, one of which includes insulated concrete formwork. Aside from his studies, Anthony currently works full time and volunteers at the Cleveland Food Bank.

Abstract: Insulated Concrete Forms (ICF) take the place of traditional formwork that is used when pouring concrete walls, floors, and sometimes roofs. ICF's were initially developed in the late 1960's, and are used today in residential and low-rise commercial construction. They are most commonly constructed of 2 pieces of either extruded or expanded Polystyrene foam connected with a series of plastic webbing which serves different purposes. ICF construction has come far since its initial development, and there is now an industry standard in place for companies manufacturing this product. It is an acceptable product to use according to building codes of almost every state, as well as Canada. By increasing the R-value of a building envelope and virtually eliminating thermal bridging, ICF construction not only reduces monthly heating and cooling costs, but also reduces greenhouse gases emitted from homes and buildings. ICF is resistant to termites, wind and other elements, and is not subject to rot or decay making it a strong and sustainable method of construction. Additionally, ICF construction creates a fire rated assembly, making the home or building safer. Using ICF's to build a home or building can contribute approximately 29 points towards LEED Certification (Leadership in Energy and Environmental Design).

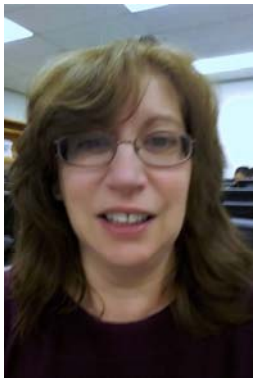
Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Cuyahoga CC

Marisa D. Bartholomew



Major: Health Information Management Technology

Research Topic: Interoperability in Healthcare

Advisor(s): Joslyn Dalton, RHIA

Biography: I am in my final year of the Health Information Management Technology program at Cuyahoga Community College. I will graduate in May, 2017, with an Associate in Applied Science. After graduation, I plan to take the Registered Health Information Technician (RHIT) national certification exam which will allow me to work in the healthcare field.

I currently hold a Bachelor of Business Administration Degree from Cleveland State University. I decided to return to school to fulfill my desire to work in the healthcare industry. Upon graduating from Cuyahoga Community College, I hope to make use of both degrees in the continuously expanding medical health data environment.

Abstract: The advent of the Electronic Health Record (EHR) has created vast amounts of data for the healthcare provider, government, insurers, and patients. Interoperability, in healthcare, is the ability of different information technology systems and software applications to communicate and share this data. It is a key component to lowering healthcare costs, diagnosing diseases, and improving treatments available to patients. However, the US healthcare system has trouble sharing the EHR information between providers and across facilities.

The objective of my presentation is to explain what is needed to solve the obstacles to interoperability in the healthcare industry.

Publications: None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Cuyahoga CC

Steven A. Fairley

Major: Engineering

Research Topic: A Self-sustainable Ecosystem Utilizing Extreme Green Concepts

Advisor(s): Dr. Lam Wong

Biography: I joined the United States Air Force on 16 December, 1976. My AFSC was Administration Specialist (70250). I spent two years at Chanute AFB in the school squadron. I then went overseas to Rhein Main AB in Frankfurt, Germany. Where I worked in the Communications Group and was in charge of seven administrative sections of the group for two years.

I enrolled in Veterans Upward Bound in September, 2012, while I was homeless staying at 2100 shelter for two months. I then went to the domiciliary in Wade Park across from the V.A. Hospital, I stayed there several months. I graduated from Veterans Upward Bound in November, 2012.

I enrolled at Tri-C in the Summer Semester of 2013. In the Fall Semester of 2014 I joined the Honors Society (Phi Theta Kappa). I received a Choose Ohio First Scholarship and a Certificate of Achievement for the 2014-2015 academic year, at the Student Success Symposium. In the Spring Semester of 2015, I received a letter for being a Dean's Honor Recipient, and Certificate of Academic Excellence for a distinguished academic record in the 2014 Spring Semester; (GPA 4.00). I also joined The Black American Council, received a Certificate of Excellence as well as a scholarship for the 2015-2016 Fall and Spring Semesters

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In the Spring Semester of 2015, I was elected the President of Student Government (Metro Campus). In the 2015 Fall Semester I became a member of Tri-C Honors Program, The Robert L. Lewis Academy of Scholars for Social Justice and the Vice-President of Joint Student Council of all four Tri-C campuses. I plan on going to a four-year college to get a BS in Computer Engineering. I've already received email letters for admissions from several four-year colleges. The prominent one is Cornell University.

Abstract: The three most important global resources are water, food, and energy. I will investigate using and eXtreme Green solution that can potentially optimize the world's water and food resources. Extreme Green is a concept originally developed at NASA's Green Lab Research Facility and focuses on combining renewable, alternative, and sustainable techniques. I will conduct an 8-week feasibility study optimizing a portable self-sustainable renewable ecosystem by evaluating three plant species (Lima camelina, Salicornia Virginica, and Salicornia subterminalis). I will used Poecilia species (freshwater Mollies) fish waste as a natural fertilizer to provide essential nutrients for the plants. My goal is to develop portable self-sustainable renewable ecosystems using (salt water), that can be implemented worldwide. I will present the results of my 8-week study and my recommendations or adapting the ecosystem to future eXtreme Green concepts.

Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Cuyahoga CC

Kayle L. Kornblum

Major: Electrical/Electronic Engineering Technology

Research Topic: Eradicating Bacteria in Water using UV Lights

Advisor(s): William E. Lane, III, P.E.

Biography: I am finishing my Associate Degree at Cuyahoga Community College and plan on furthering my studies at Cleveland State University. I have always had an interest in engineering since my father is a maintenance mechanic and electrical engineer. He had always included me into his projects that he had to take home with him or just to do for fun. I am now doing my own projects at home. I have wanted to develop a product to help out people and especially in third world countries and this had provided me with an opportunity to make a difference. Also, I have been recently accepted into NCAS Scholar program as well, and I hope to be doing more projects and work for NASA in the near future.

Abstract: I will be designing a water bottle case that will enclose UV (ultraviolet) lights. The user would be able to use a clear plastic water bottle. I would be exploring the idea of using photovoltaic as the source of energy that will charge the device. And I would be testing the efficiency of the product using bacterial test strips from water sources coming from streams, ponds, rivers, etc. to get a good, all around, efficiency test.

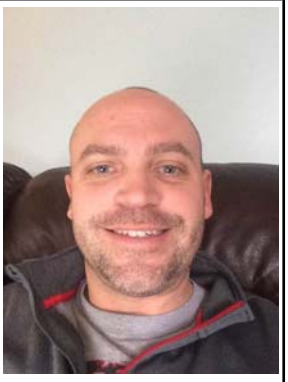
Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Cuyahoga CC

Jeffrey M. Kudrna



Major: Electronic Engineering Technology

Research Topic: Aging of Solar Panels and Their Connections

Advisor(s): Joseph Arendt

Biography: Currently finishing my Associate Degree at Cuyahoga Community College in Biomedical Engineering. As of the end of 2014, I have decided to change my career from the mortgage-underwriting world to this career. It has been a long road and a very growing experience. I have learned that I do have a passion for learning when I really want something. This experience back in school has also brushed me up on my networking and group skills. Looking forward to starting my internship this summer and getting my career started. Thank you Cuyahoga Community College for making this dream come true!

Abstract: This paper will cover the aging of Solar Panels and their Connections from the start when they where first developed to how they are used to current time now.

This project will also include a poster board with references and a breakdown of the main idea, peer reviews and pictures.

Publications: None yet.

Congressional District: 7th

Congressional Representative: Bob Gibbs

Cuyahoga CC

Nicholas Z. Tolbert

Major: Electrical Engineering

Research Topic: A Comparison in the Cost Effectiveness of Experimental Photovoltaic Cells

Advisor(s): Joseph Arendt

Biography: Nicholas Tolbert is a currently a Sophomore at Cuyahoga Community College pursuing an Associate of Science Degree. He's from Cleveland Heights, Ohio, and attended Benedictine High school. His interest has always remained in engineering and, through the Co-op program, he plans on transferring over to Case Western Reserve University to complete an advanced degree in electrical engineering.

Abstract: The current commercially available solar cells have a maximum efficiency of around 20%, which varies depending on the amount of sun light and accumulated internal heat. Several recent innovative forms of solar cells modify segments of these panels to increases the efficiency of the system while addressing the costly expense of existing models. These range from the addition of raw elemental wafers for increased conductivity to flexible transparent surface meshes that can be used on most surfaces and even the installation of thermoelectric generators in the effort of using the excess heat as energy. The goal of this project is to study some of these new photovoltaic cells to gauge their efficiency in power intake up to 450 kilowatts, which is about half of the average energy intake per household in 2015, using each system's maximum light intake. While evaluating this efficiency, I will also consider the overall cost of each solar cell.

Publications: None yet.

Congressional District: 11th

Congressional Representative: Marcia L. Fudge

Lakeland COMMUNITY COLLEGE

Lakeland CC

Rosario J. Ceraolo, Jr.

Major: Geographic Information Systems

Research Topic: Crime Correlation Analysis

Advisor(s): Bobby Oliver, GISP

Biography: My name is Rosario Ceraolo, and I am currently a student pursuing an Associate of Applied Sciences Degree at Lakeland Community College. I have been involved in various service projects in my community. My interest in geography and maps has led me to Geographic Information Systems. The reason I am attending Lakeland Community College to further my education in the sciences.

Abstract: What does the location of law enforcement stations and median wages of the community have on the location of crimes committed? Geographic information systems (GIS) will be used to analyze crime in correlation to median income in Northeast Ohio. The data will be analyzed to determine how law enforcement stations and average median income effects where crime is more likely and less likely to occur. The skills learned by taking GIS at Lakeland Community College will be applied to this project to display what was learned.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Lakeland COMMUNITY COLLEGE

Lakeland CC

Brett K. Enders

Major: Geospatial Technologies

Research Topic: Identification of Invasive Phragmites Plants

Advisor(s): Mark Guizlo

Biography: Brett Enders is currently pursuing his Associate of Applied Science Degree in Geospatial Technologies at Lakeland Community College. As a life-long resident of Northeast Ohio he has a special connection to the Great Lakes and this region in general. Going forward his hope is to work more with conservation and protecting our environment. The plan is to find work where he can contribute and possible continued education. With the continued use of imagery and satellites, remote sensing can help us have a better understanding and interaction with our only environment, the Earth. He greatly looks forward to being involved and a part of this ever expanding field to improve the way of life for all.

Abstract: The purpose of the project is to classify and display invasive phragmites plants using 4 band Near Infrared composite imagery with a 1-meter resolution. The imagery will be provided by the State of Ohio or (NAIP) National Agriculture Imagery Program. Then using GPS, points will be taken and ground truthing of their locations will be continued.

Publications: None yet.

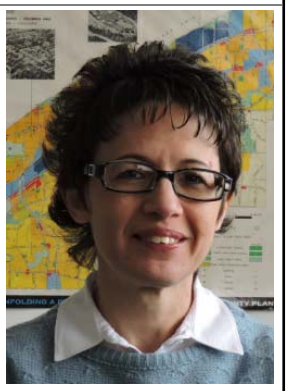
Congressional District: 14th

Congressional Representative: David Joyce

Lakeland COMMUNITY COLLEGE

Lakeland CC

Joanna C. Maniglia



Major: Geospatial Technology

Research Topic: GIS Analysis of Factors Impacting Changes in Bird Migration

Advisor(s): Bobby Oliver, GISP

Biography: I earned my degree in Library and Information Science and have worked in the library field performing library cataloging and working extensively with databases and computers. I am interested in GIS and Geospatial Technology and hope that the field will prove to be an exciting way to pursue new knowledge while building on my background in information science.

Abstract: Birds need food and water sources, as well as rest areas during their travels from their breeding to non-breeding ranges. This research will use GIS to visualize the typical migration routes used by North American bird species and analyze what factors have impacted changes in those routes over time. Factors such as climate change can be mapped and spatially analyzed to reveal patterns and trends impacting bird migration.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Lakeland COMMUNITY COLLEGE

Lakeland CC

Lydia E. Tamburro

Major: Associate of Arts

Research Topic: Inundated Destinations: An Analysis on Sea Level Rise in Puerto Rico and the US Virgin Islands

Advisor(s): Lisa Stanich and Mark Guizlo

Biography: I have been a student at Lakeland Community College for three semesters. After receiving my Associate of Arts Degree, I plan to transfer to Cleveland State University to pursue a Bachelor of Science in Biology- Medical Technology. A career as a medical laboratory technician has always been appealing to me, but my real interest lies in Mortuary Science. Upon completing a Bachelor's Degree, I plan to attend Cincinnati College of Mortuary Science. I believe a career in Mortuary Science is a promising and rewarding one.

Abstract: Tourism is a key component of the Caribbean's economic system. In this project, I will display the potential impact of sea level rise on resorts in Puerto Rico and the US Virgin Islands. First, I will map Marriott resorts on these islands. I will then create a simulation map using NOAA's sea level rise inundation shapefiles for a 3 foot and 6 foot sea level rise. After creating my simulation map, I will overlay this with the map of the resorts in order to classify how sea level rise will impact beaches and transportation infrastructure in the study area.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Lakeland COMMUNITY COLLEGE

Lakeland CC

Marlo R. Wolfe

Major: Biology

Research Topic: Bracing and Athletic Performance

Advisor(s): Justin Rosemier

Biography: Marlo Wolfe is progressing through her second year at Lakeland Community College. She is from Mentor, Ohio, and graduated from Mentor High School in 2015. She is going to be expanding her studies at Cleveland State University majoring in Biology beginning in the Fall of 2017. In the Summer of 2015, she partook in a two-week program working at the Lake MetroParks Penitentiary Glen Reservation, particularly in the animal rehabilitation center where she assisted in daily care for the temporary and permanent animals. I have not yet decided which biological concentration I am going to pursue, so I enjoy researching different fields to help me decide what I want to do.

Abstract: I am interested in the effects of ankle and knee bracing in regards to athletic performance. Braces are used in sports for the prevention of common injuries. As a result of braces being worn, there is a possibility of the braces restricting the athlete and potentially contributing negatively to their performance. With this being said, I am going to be researching athletic performance results when braces are used and also testing an athlete's performance during a set of drills with and without functional braces applied.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Lakeland COMMUNITY COLLEGE

Lakeland CC

Bryce J. Zwagerman

Major: Associate of Science

Research Topic: Adjustable 3D Printed Prosthetic Leg

Advisor(s): Michael Prochask

Biography: Bryce Zwagerman graduated from Mentor High School and was also part of the CAD Engineering Technologies Program at Lakeland Community College and is now a Sophomore at Lakeland Community College where he is working on his Associate of Science Degree and will transfer to Youngstown State University to work on a Bachelor's Degree in Mechanical Engineering. In the Summer of 2015 Bryce interned at American Roll Form as their drafter. Bryce is also a member of the Lakeland golf team.

Abstract: Additive Manufacturing such as 3d printing can be an easier, cheaper way to produce prosthetics that will be more available to younger consumers. It can also be an easier way to make it more adjustable so that younger people who are still in the growing process will be able to walk around and do some activities that they would not be able to do without a specific body part.

With the adjustability of the 3d printed prosthetic leg, it would be a much cheaper alternative for a child that is still growing and would be easier for people with lower income. A typical prosthetic is between $5,000 and $50,000. With the 3d printed prosthetic leg, the cost would be under $200.

Publications: None yet.

Congressional District: 14th

Congressional Representative: David Joyce

Chad A. Coolidge

Major: Automation Engineering

Research Topic: Removal of Metal Contaminants in Water

Advisor(s): Regan Silvestri

Biography: Chad Coolidge has a BA from Bowling Green State University and is currently working toward an Associate Degree in Automation Engineering from Lorain County Community College. He worked in the medical industry for over 15 years before making a change to the STEM fields. Family is extremely important to him, and it is because of their support he has been able to return to school. Two years ago he was afforded the opportunity to work for Nanotech Innovations as an intern and now works there as a research associate. Now Chad is part of a team working on the removal of heavy metal contaminants from industrial waste water. In his spare time he enjoys spending time with his family and dogs, riding his bicycle and reading. His once secret guilty pleasure is watching the old television show "Murder She Wrote."

Abstract: Nanotech Innovations, in collaboration with other companies, has been working on the development of a granulated activated carbon (GAC) hybrid particle for the removal of heavy metals in industrial waste waters. The GAC will have multi-walled carbon nanotubes (MWCNT) and melanin deposited on the surface for contaminant removal. In addition, the research goal is to be able to recover those metals removed and be able to reuse the hybrid particle. Currently there are multiple GAC water filtration systems. However, none of them 1. use a GAC/MWCNT/melanin particle or 2. can recover and reuse the particles. The purpose and goal of the research project is to design a particle that is hearty enough to withstand the rigors of an industrial process. To optimize the ability of the hybrid GAC to remove the largest quantities of the broadest spectrum of heavy metals. Recover metal(s) removed by the hybrid particle. Finally, the ability to scale up from bench top to full production. This research will move forward current technology and processes to areas that are yet untested and undocumented. The ability to produce this hybrid GAC could clean and recycle millions of gallons of water a year.

Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Sinclair CC

Julian L. Casey

Major: Electrical Engineering

Research Topic: 60 Cycle Interference with Electromagnetic Pick Ups

Advisor(s): Professor Doug Bradley-Hutchison and Professor Jessica

Biography: Since a child, I have always seemed to have a passion to find out how things work. As soon as I could cognitively draw I began designing mechanical devices. Inventions to help problems that I saw in my daily life. Most of them already existed; however, at my age I was unaware of this. As far back as I can remember there has been a passion fueling me to improve people's lives. Since mechanical design came so natural I followed that path until I was about 26 years old. In that time span I worked as a mechanical engineer for Lemke racing team, three time national champions. As well as I was a mechanical design engineer for a leading multi-million-dollar industrial company for three years managing and directly running over 50% of their business. In this time frame, I also managed to travel the country working with and interacting with over a quarter million people as I held a business management position working for a variety of clients including the president of the United States. In the past year, I have found a new passion to learn electrical engineering so I can use the combined skills to continue the life dream of being an inventor to help improve people's lives. More importantly to improve their lives through improving the environment and our impact on it. It is obvious to me the disconnect the majority has with “natural resources” and the fact that most often a resource to us is a habitat to another. My mission is to introduce new ways of thinking, living, and designing that will sustain life in a more balanced way. A way that will allow life for our children's grandchildren to live happily and proud to be here now on Earth. I have an 8-year-old daughter who is more beautiful and loving than I could have ever dreamed of. She has helped me instill the need to improve the future instead of focusing on our momentary wants and desires. Which has in turn provided the drive to make the awareness shift from self to whole and begin the want to yet again be an inventor to improve lives.

I just finished my Associate’s Degree with a 3.759 GPA and am transferring to Wright State to complete the B.S. Degree with intention of not stopping until I have the Master’s Degree in Electrical Engineering.

Abstract: To find the source of interference with an electromagnetic pickup. Commonly thought to be a 60-cycle hum that interferes with magnetic pickups not unlike that of an electric guitar or MRI machine. Through intensive testing in various conditions I will find out what the frequency is as well as potential sources of the interfering signal. From here I can then begin to find ways to reduce/ eliminate the interference of the outside signal to the magnetic pickup. In the guitar world, it is a common problem that and there are several devices or tricks you can employ to reduce the sound. However, it does not seem to identify the actual source and only seems to pad the problem. My goal is to find the root cause of the interference, then use this information to apply it more generally to electromagnetic devices in general.

Publications: None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

Sinclair CC

Jeanette A. Gardner

Major: Electrical Engineering

Research Topic: The Beginnings of an Autonomous Robotic Hand

Advisor(s): Doug Bradley-Hutchison and Jessica Hendricks

Biography: My name is Jeanette Gardner, I am 19 years old, and majoring in Electrical Engineering. I have five siblings, and have lived in the Dayton area all my life. I attended Stebbins High School, and I am currently attending Sinclair Community College, and transferring to Wright State University after I finish at Sinclair. I decided to be an engineer after spending time in my high school's freshman engineering class and working on projects for my teacher Mr. Prater. I found it to be a lot of fun and the possibilities of what could be done near endless. The reason I want to go into electrical engineering specifically is that I really enjoyed working with the robots and getting to actually wire the electric guitars we made ourselves for my high school engineering class. Another factor that may have an effect on why I want to get into electrical engineering is that my dad works with quite a bit of technology in stores such as their cash registers and servers. Also when my dad was in the Air Force, he was a radio operator back when NASA needed the Aria unit to help them communicate back and forth with the space shuttles.

Abstract: My project is to try and create the basic structure of a functional robotic hand. I will use strain gauges to determine how much force the hand needs to use to grip an object without breaking it or letting it slip out of its grip. I will also try to program the hand to read the information sent in by the strain gauges so the hand knows when to stop applying additional force to the object. The type of hand I will be using for this is a claw, in order to get the basic understanding of what would need to be done to add more fingers.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Sinclair CC

Maiya A. Kyles-Stewart

Major: Biology

Research Topic: Plants and Their Various Responses to H_2O_2

Advisor(s): Professor Doug Bradley-Hutchison

Biography: Maiya A. Kyles-Stewart is a recent Sinclair graduate and will be a Junior at Miami University during the Spring, 2017, Semester. She is currently majoring in biology (botany). One of Maiya's favorite interests include the fashion industry. Her main goal before graduating with a Bachelor's Degree is to create an accessories line influenced by science and fashion.

Abstract: The nature of plants is complex and thought provoking. Plants are unique and are essential to many organisms. In this experiment, Arugula seeds were used to determine if hydrogen peroxide had any effect on the growth of plants (in regards to the length/width of leaves, length of stem, and weight). Hydrogen peroxide is a part of the reactive oxygen species (ROS), which are chemicals that contain oxygen such as superoxide (O_2-) and are known to interact with plant hormones such as auxin. Hydrogen peroxide is also known to affect the rate of germination, provide protection from desiccation (dryness), and give overall resistance to mold. So far, the results positively correlate with the research! In future studies, the main challenge is to see if different/higher concentrations of hydrogen peroxide will negatively impact the plants' health, since H_2O_2 (and other members of the ROS) has the ability to cause harm to the plants' cells through oxidization of fatty and amino acids.

Publications: None yet.

Congressional District: 1st

Congressional Representative: Steve Chabot

CC-STARS!

BRIDGE

SCHOLARSHIPS

Valerie N. Gardner

Status: Senior, Biology

Research Topic: GC-MS Analysis of Unprecedented Whiskey Flavors Created by a Novel Aging Process

Advisor(s): Dr. Regan Silvestri

Biography: Valerie Gardner is dually enrolled at Lorain County Community College and Cleveland State University. A non-traditional student, she is earning her second Bachelor's from Cleveland State University in Biology. She graduated cum laude from The University of Akron in 2009, with a B.S. in Marketing Management. Valerie will be graduating in the Fall of 2017, and plans to pursue a Master's Degree

Abstract: Gas Chromatography-Mass Spectroscopy (GC-MS) can be readily utilized to generate an analytical profile of flavor compounds in whiskey. This method has successfully been applied to bourbon whiskies produced by a novel accelerated aging process which employs pressure, as opposed to conventional time, to mature the whiskey. New experimental flavors of whiskey have been generated which are completely original, having been made possible only by this innovative technology of accelerated pressure aging. These unprecedented bourbon whiskey flavors include cherry, apple, hickory, maple and honey locust. The distinct flavor compounds in these uniquely flavored bourbon whiskies have been identified and profiled using routine straight injection GC-MS. As such, it has been observed that cherry bourbon has more ethyl octanoate, a compound known to impart a sweet fruity flavor, than traditional oak flavored bourbon. Furthermore, it has also been observed that cherry bourbon has less phenethyl alcohol, a compound known to impart a floral and bready flavor, than traditional oak bourbon.

Publications:

1. "Imparting Whiskey Wisdom", Chemical and Engineering News, Volume 94, Number 18, page 40, May 2, 2016, http://pubs.acs.org/doi/pdf/10.1021/cen-09418-newscripts
2. "Distilling Lessons from a Whiskey Research Program", inChemistry, Volume 25, Number 2, pages 12-13, November/December 2016, http://www.inchemistrydigital.org/inchemistry/november_december_2016?pg=14#pg14
3. "Chemistry of Whiskey Flavor", Reactions, April 6, 2016, https://acsundergrad.wordpress.com/2016/04/06/chemistry-of-whiskey-flavor/
4. "GC-MS Analysis of Unprecedented Whiskey Flavors Created by a Novel Aging Process", Proceeding from SAS 60th Annual May Conference, May 18, 2016, http://www.msneo.org/uploads/3/1/7/7/31779867/60th_annual_program-full.pdf

Congressional District: 7th

Congressional Representative: Bob Gibbs

Christopher B. Wright

Status: Junior, Health Science

Research Topic: Using GCMS to Analyze a Novel Aging Process

Advisor(s): Dr. Regan Silvestri

Biography: After I graduated from high school, I was not sure what I wanted to do with my life. My parents always asked me what I wanted to become when I grew up, but the answer was never the same. I found myself working as a collision repair technician at a body shop. After being employed here for years, I had a revelation that I wanted to do more. I remembered that as a kid, I always admired my doctor and we maintained a good relationship, even as I have gotten older. I wanted to help people similar to how he does, so I decided that I would go back to school and get into healthcare. I chose to become a Physician's Assistant, but I knew the journey ahead would be long. I registered my courses at Lorain County Community College (LCCC), and I recently graduated with an Associate of Science Degree. While I was attending LCCC, I was selected to participate in Dr. Silvestri's research project. I enthusiastically accepted his offer and began work as soon as possible. Since then, our group has given many presentations and have attended many meetings. In the Spring of 2017, I started my B.S. in Health Science at Cleveland State University (CSU). Once I obtain my B.S. Degree, I plan enrolling into Cleveland State University's "PA School". Furthermore, I am employed at the Cleveland Clinic as a night shift nursing assistant while being a full time student at CSU. The unit I work is on a rapid observation unit. It is interesting because we are directly linked to the ER, so people with various illnesses can be admitted to our unit. Balancing school while working night shifts at the hospital on the weekends has been challenging. However, I have an excellent support group and I can always lean on my family and my supportive fiancé for encouragement when I need it.

Abstract: Gas Chromatography-Mass Spectroscopy (GC-MS) can be readily utilized to generate an analytical profile of flavor compounds in whiskey. This method has successfully been applied to bourbon whiskies produced by a novel accelerated aging process, which employs pressure as opposed to conventional time to mature the whiskey. New experimental flavors of whiskey have been generated which are completely original. This has been made possible only by this innovative technology of accelerated pressure aging. These unprecedented bourbon whiskey flavors include cherry, apple, hickory, maple and honey locust. The distinct flavor compounds in these uniquely flavored bourbon whiskies have been identified and profiled using routine straight injection GC- MS. Accordingly, it has been observed that cherry bourbon, as compared to traditional oak flavored bourbon has more ethyl octanoate, which is a compound known to impart a sweet fruity flavor. Furthermore, it has also been observed that cherry bourbon has less phenethyl alcohol than traditional oak bourbon, a compound known to impart a floral and bready flavor.

Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

EDUCATION

SCHOLARSHIPS

Cedarville University

Elizabeth L. Herting

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

Project Title: Thrust and Efficiency Rates of Burning Fuel

Advisor(s): Professor Sarah Gilchrist

Biography: I grew up in Beavercreek, Ohio, and have attended Cedarville University for the past two and a half years. I am currently a Senior in my math education program at Cedarville and will also graduate with a Bible minor. During my time at Cedarville, I have played on the JV Volleyball team, tutored, and worked in financial aid in addition to my participation in discipleship groups and bible studies. Upon graduation from Cedarville University, I plan to teach mathematics through an integrative and investigative approach in the public school system. It is important for students to see how mathematics fits into the world as a whole and the order that is in the universe. Therefore, I believe that students are genuinely more interested and engaged when you can actively involve them in the content, making cross-disciplinary connections including subjects that students care about. I love working with students and helping them to realize connections between the concepts and to achieve their full learning potential in mathematics.

Abstract: In this lesson, we will focus on thrust of rockets and determining what method/container for burning fuel will produce the desired amount of thrust for rocket propulsion. Using NASA resources on thrust and fuel burn rate, students will get to explore surface area, volume, and unit conversions through the exploration of different fuel tanks and the burn rate that is desired to create the necessary speed in order to launch a rocket. The students will get to use an investigative approach to explore different fuel tank designs in order to ultimately achieve the results they desire. This activity will draw off of students' natural curiosity towards space and rocket propulsion and give them a real world application of how surface area and knowledge of surface area could affect different areas of their lives.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner

Zachary D. Kordeleski

Status: Post Bacc., Middle Childhood Education, Mathematics/Physics

Project Title: "You Can't Handle the Physically Correct Truth"

Advisor(s): Paul Lockhart and Dr. Kristine Still

Biography: I recently graduated from Cleveland State University (CSU) with a B.S. in Physics and Mathematics and re-entered the university as a post-bacc to finish up my grade 7-12 teaching licenses in both subjects. I grew up with two science teachers as parents which meant growing up with science as a regular part of my childhood. Be it chemistry, biology, or physics, if you're looking then you'll find it in daily life. And if you're not looking, it's still there! Physics, however, especially caught my interest. In high school, I constructed a catapult for a competition and, using some basic projectile motion equations, was able to bulls eye a target tens of meters away. I was hooked. It was during my physics and math career at CSU I realized something interesting: *These subjects were nothing like how most people experience them in high school.* In my high school, math was presented in a traditional lecture format with a 'plug-and-chug' mentality; memorize formulas then export results. This deters many students. True mathematics more akin to solving puzzles than memorization. Similarly, I have found many students avoid physics as it is either "too hard" or "too boring." Neither statement could be farther from true. Working as a tutor in the Math Learning Center at CSU for 5 years, I have worked with many students with all sorts of backgrounds. What I found is most students who struggle in a subject have a learned helplessness. Students "learn" that they are "bad" at a subject and get stuck in this mentality. This inspired me to become an educator. No student should ever feel this way. The goal of an educator is to inspire within students the desire to learn. I want only to share my passion for my fields with my students and show them the joys of truly exploring science as scientists and math as mathematicians.

Abstract: Misconceptions in physics are numerous. A brief survey of recent college graduates found that many of the graduates completed the entirety of their schooling without knowing what caused the seasons on Earth. A common answer is distance from the sun is the main factor in Earth's seasonal patterns, a misconception developed by the observation that being closer to hot things makes one feel hotter. Unfortunately, some teachers and media perpetuate misconceptions like this one as children go through the education system. In the unit "You Can't Handle the Physically Correct Truth," students explore the misconceptions perpetuated by creators in cinema. Be it be the presence of sound in space in the iconic Star Wars films or the violation of the conservation of momentum in countless action movies, students identify flawed scenes and recreate them with corrected physics. With many films like The Martian and Interstellar taking painstaking measures to keep NASA proud with wonderful displays of proper physics, students will have the opportunity to explore the misconceptions present in modern and historic films, find the errors, and right the wrongs.

Publications: None yet.

Congressional District: 4th

Congressional Representative: Jim Jordan

KENT STATE UNIVERSITY

Kent State

Abigail E. Recker

Status: Senior, Early Childhood Education

Project Title: Examining Water Quality in Lake Erie

Advisor(s): Dr. Joseph Ortiz, Dr. Bridget Mulvey

Biography: Abigail is currently completing her final year in the Early Childhood Education undergraduate program at Kent State University. This program involves multiple field experiences in birth to grade three settings. She will also be graduating with a minor in dance performance. During her time at Kent State she has attended and performed at the ACDFA conference and represented Kent State as undergraduate presentation leader for the Propel Ohio Conference. Abigail is a four-year member of the National Society of Collegiate Scholars.

Work through the field of special education has also been a big part of Abigail's undergraduate work. She was an intern, for a semester, with the Verlezza Dance company. This company aims to create inclusive dance opportunities for adults with physical and intellectual disabilities and senior citizens. Abigail also worked as a licensed, independent caregiver for the Ohio Department of Disabilities. She was responsible for the care of a young child with RETT syndrome. These experiences have contributed, a great deal, to her drive to create inclusive spaces where all children can succeed. Throughout her undergraduate education she also worked as a dance teacher for children of all ages in the greater Cincinnati area.

Beyond undergraduate work, Abigail plans to pursue her Master's Degree in Early Childhood Education, with a concentration in Globalization and Intercultural Competence. She aspires to start her teaching career in an elementary school on the west coast. Upon completion of her bachelor's degree, Abigail will have an International Baccalaureate teaching certificate. She hopes to have the chance to teach in an IB school after graduation.

Abstract: This series of lessons will help grade 3-5 students to understand how natural resources are impacted by human actions through observation, inference, and the use of scientific tools and data. Students will act as Dr. Ortiz's assistants to help find out why the water in Lake Erie is polluted. They will examine real water samples from the lake, using tools to see how they compare to other bodies of fresh water. NASA satellite images will be used to help the students make observations and inferences about water quality. Students will research and evaluate their predictions, using technology and NASA articles. Finally, the students will create an action plan to make a difference and share their findings with Dr. Ortiz. This hands-on approach to science content will support a high level of engagement and intrinsic motivation to learn. Language arts standards are integrated with science standards in this problem-based science unit. Student learning will be assessed through work samples and an observational checklist, updated throughout the unit of inquiry.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Marietta College

Emily D. Tornes

Status: Senior, Early Childhood Education

Project Title: Self-Sustaining Ecosystems

Advisor(s): Dr. Cathy Mowrer

Biography: I am currently a Senior at Marietta College, pursing my Bachelor's Degree in Early Childhood Education. Upon graduation, I will also have obtained my license as an Intervention Specialist and an endorsement to teach fourth and fifth grades. Currently, I am the President of Kappa Delta Pi, an International Honor Society in Education. I also have been involved in the Marietta College Teacher Education Association, serving as President, Vice President, and Treasurer over the past four years.

I have had several life experiences that have pushed me to study education. I love children and having a large family has given me the opportunity to be around kids for my entire life. I have been able to play "teacher" from an early age, and I fell in love with the profession. I have also seen how school positively affects children throughout my numerous clinical field experiences. Children are able to gain friendships and an immense amount of knowledge by attending school. After graduation, I plan to teach in an early childhood setting, and pursue my Master's Degree in Education.

Abstract: Using the Ohio Science Standards for third grade, we will focus our lesson on the life science strand, specifically the relationship between organisms in their natural environment and their traits, which affect its ability to survive and reproduce. Students will learn about ecosystems and the elements necessary for life. We will use NASA's online resources to enhance the lesson. I will use a portion of "Field Trip to the Moon" along with authentic text sets to explore the elements necessary for survival. Through inquiry, students will learn and discover what an environment needs to have for living things to survive. To assess student learning, I will have groups of students create self-sustaining ecosystems that will be presented to the class.

Publications: None yet.

Congressional District: 6th

Congressional Representative: Bill Johnson

MIAMI UNIVERSITY

Miami University

Lindsey A. States

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

Project Title: Rising Stars

Advisor(s): Michael Todd Edwards

Biography: I am a Junior dual majoring in Math Education and Mathematics at Miami University and was raised in Lima, Ohio. In 2014, I graduated from Bath High School and was eager to begin pursuing my degree in education. I grew up the child of two educators resulting in my passion for teaching. Once I began classes at Miami University, my feelings towards education were only reinforced. I aspire to be a math teacher that is able to inspire young students to pursue a career involving math. In order to prepare for this, I have been increasingly getting involved with the math education community at Miami and in the greater Cincinnati area.

In my time at Miami University thus far, I have presented at five academic conferences, served as a Teaching Assistant for two courses, and served as an executive member of Miami University Council of Teachers of Mathematics for two years. I had the opportunity to present at several GeoGebra conferences as well as the Ohio Council of Teachers of Mathematics Conference. These presentations have been wonderful opportunities to connect research with classroom examples for other educators. These experiences have also afforded me the opportunity to collaborate with Miami University's faculty as well as fellow pre-service teachers. As I begin to enter the classroom, I hope to use these experiences to foster a sense of appreciation for mathematics in the classroom.

Abstract: This lesson connects Common Core Standards for geometric proofs with NASA resources to provide a rich and challenging problem for students. The students will be asked to discuss in what direction the sun, moon, and start set in. As student discuss this question in small groups, they will be encouraged to research the answer to this question through various NASA websites and search engines. Students will then come to the conclusion that Earth rotes from west to east, but the sun, moon and stars rise in the east and set in the west. Then students will be challenged to prove this using geometry. Some review over how to construct a proof and known theorems may be required. Students will work in groups of four to construct a geometrically correct proof. These groups will then work together to turn their proof into a mathematical argument backing the fact discovered earlier in class. Groups will present their arguments and proofs to the whole class. During this time, other students will have the chance to evaluate their peers work and provide feedback. This reflection on peers' work will promote greater conceptual and procedural understanding amongst students.

Publications:

1. States, Lindsey A. "Surviving on Mars with GeoGebra", Ohio Space Grant Consortium Student Research Symposium XXIV, Cleveland, Ohio, April 1, 2016, pages 241-243.

Congressional District: 4th

Congressional Representative: Jim Jordan

Ohio Northern University

Kenton C. D. Jarvis

Status: Sophomore, Engineering Education

Project Title: Exploring Projectile Motion

Advisor(s): Dr. Todd France

Biography: My name is Kenton Jarvis. I am a Sophomore 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. 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 and feel supported.

Abstract: This lesson plan will explore the topic of projectile motion on Earth, Moon, and Mars. It is primarily project based learning with key engineering concepts incorporated. By the end of this lesson students will be able to apply prior knowledge to preform calculations on projectiles in motion. Prerequisites for this lesson include an understanding of kinematic equations, friction, and gravity. Students will research the topic given (including criteria and constraints) and then create a rough draft of their design individually. Students will then work in teams to discuss and create a team design based off the team’s decision matrix. The teams will then create and test their projects attempting to meet predetermined benchmarks. If the benchmarks are not met the teams will redesign and retest proceeding through the engineering design process. Students will keep a log of what they are doing and when they are doing it so they can refer to when it is time to present their designs.

Publications: None yet.

Congressional District: 13th

Congressional Representative: Timothy J. Ryan

Ohio University

Ellie N. Conrath

Status: Junior, Early Childhood Education

Project Title: Wondrous Weather

Advisor(s): Sara Helfrich

Biography: I am currently a Junior at Ohio University as an Early Childhood Education major. I am spending my time this year in elementary classrooms, one semester in first grade and one in a third grade classroom. I also enjoy teaching Sunday School at my church any chance I get. After I finish my undergraduate degree I plan to attend a master's program in Early Childhood Intervention. I plan to also get a certificate to become a Visual Impairment Specialist. This certificate would allow me to work with the school district to make sure that those who are visually impaired get the support they need to succeed in the classroom. I am looking forward to my future career in education and teaching students to value and love learning.

Abstract: This lesson is first grade level and stationed based. It focuses on weather and how the sun effects the air, water and land. The lesson plan lines up with the Science Learning Standards that states; The sun is the principal source of energy. Sunlight warms Earth's land, air and water. The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land. The stations are based off lesson plans created by NASA. These include sun paper, pizza box oven, *Seeing the Invisible Experiment Number One,* and temperature measurements of the land, water and land. If possible all parts of the lesson would take place outside on the playground. With sun paper students are going to use paint and paint the sun as well as observe how the sun helps the paint dry. The pizza box oven will be built by the students and used to make s'mores. *Seeing the Invisible Experiment Number One* has students experiment with ultraviolet beads and how they react to the sunlight. Lastly, the students will use lab thermometers to measure several samples of land, water and air and how the sun has affected them. After the lesson in completed students will journal about their experience and what they liked and disliked as well as what they learned.

Publications: None yet.

Congressional District: 15th

Congressional Representative: Steve Stivers

The University of Toledo

Brittany A. Layden

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

Project Title: Investigating the Climate System: Clouds and the Earth's Radiant Energy System

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 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 clouds are, how they form, and how they are affected when variables, such as temperature, change. With each topic the students will brainstorm about a series of questions relating to clouds, 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 clouds are and how they form. They will then explore the water cycle and discover how clouds form and what they are made of. To finish, the students will learn about the Ideal Gas Law and use that knowledge to create their own cloud in a bottle. They will use all this information to understand the role that clouds play in our planet's climate system.

Publications: None yet.

Congressional District: 9th

Congressional Representative: Marcy Kaptur

Wright State University

Hayley R. Crider

Status: Sophomore, Early Childhood Education

Project Title: Can You Go the Distance?

Advisor(s): Linda Hockaday

Biography: I am a Sophomore 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: This multi-day unit called, "Can You Go the Distance?" covers principals of flight and includes some materials from NASA and some ideas I came up with. Students will learn the background on flight and how the Wright Brothers created the first airplane. Students will then learn the parts of the plane that cause the plane to work together and also the four principals that are the reason causing the plane to fly and stay in the air for long periods of time. After they master the meanings of all of those things they will design their own airplane out of a Styrofoam tray, milkshake straws, beans, tape and scissors. This project will bring out the creative and engineering parts of the student's brains. After the students design their aircraft they will test it by measuring the distance it flies. The students will fill out their worksheet with the distance travelled and also calculate the speed of their planes.

Publications: None yet.

Congressional District: 10th

Congressional Representative: Michael R. Turner