Gemstone Honors Program
Thesis Conference: Class of 2020

Friday, April 17, 2020
University of Maryland, College Park

Gemstone Staff

Dr. Kristan C. Skendall, Interim Director & Associate Director
Dr. Vickie E. Hill, Assistant Director for Operations
Dr. Leah K. Tobin, Assistant Director for Student Engagement
Jessica Lee, Coordinator for Student Engagement
Sydnee Garcia, Graduate Coordinator
Lauren Healy, Gemstone Leadership Council Advisor

We are very disappointed to have canceled our May 17th Gemstone Citation & Awards Ceremony as a result of the COVID-19 outbreak. We look forward to celebrating the Class of 2020 and recognizing all of their outstanding accomplishments!

Thesis Conference Schedule

all presentations will be hosted via the Zoom platform

Time	Team	go.umd.edu/
1:30-2:15 PM	ART	gems2020art
	PROCESS	gems2020process
	OPTIC	gems2020optic
2:45-3:30 PM	FEELS	gems2020feels
	VISOR	gems2020visor
	COR	gems2020cor
4:00-4:45 PM	SWARM-AI	gems2020swarmai
	TISSUE	gems2020tissue
	CAPTURE	gems2020capture
5:15-6:00 PM	E-JUSTICE	gems2020ejustice
	LYTIC	gems2020lytic

We are so incredibly proud of all of our Gemstone Class of 2020 teams for defending their theses today!

ART: Exploration of Augmented Reality as an Assistive Device for Students with Dyslexia

Research Team

Christine Bailey, Computer Science
Jacqueline Deprey, Computer Science and Operations Management & Business Analytics
Abdulfatai Fakoya, Computer Engineering; Geospatial Information Sciences Minor
John Nolan, Mathematics; Physics Minor
Ivan Quiles-Rodriguez, Computer Science and Mathematics
Cameron Soderberg, Electrical Engineering
Jeong-Yoon Wu, Physiology & Neurobiology; Creative Writing Minor
Richard Yu, Aerospace Engineering & Computer Science

Faculty Mentor

Dr. Matthias Zwicker, Professor, Endowed E-nnovate Professorship, Department of Computer Science, UMD

Librarian

Dr. Nevenka Zdravkovska, University Libraries, UMD

Discussants

Dr. Donald Joseph Bolger, Associate Professor, Department of Human Development & Quantitative Methodology, UMD
Dr. Rodger Eastman, Professor, Department of Computer Science, UMD
Dr. Vibha Sazawal, Lecturer, Department of Computer Science, UMD
Alexandra Shelton, PhD Candidate, Department of Counseling, Higher Education, & Special Education, UMD
Dr. Amitabh Varshney, Dean, College of Computer, Mathematical, and Natural Sciences, UMD
Dr. Gulnoza Yakubova, Assistant Professor, Department of Counseling, Higher Education, & Special Education, UMD

Research Description

Individuals with learning disabilities drop out of school at a rate twice that of their general education peers. Dyslexia, a disorder which affects one's ability to read and write, is among the most common of these learning disabilities. As members of Team ART (Augmented Reality Technology), we explored the use of augmented reality (AR) as an assistive device platform for people with dyslexia. We first began our project by surveying the dyslexic community to determine the most helpful features and user interface for an application that provides real time handwriting correction. The feedback from the dyslexic community and interviews with members of the Special Education Department at University of Maryland assisted in designing which evolved into our prototype application. We then performed controlled tests on school-aged children to determine the efficacy of the application in improving the dyslexic population's writing abilities and increasing their motivation to learn.

CAPTURE: Graft Polymerization of Nitrogenous Monomers onto Commerical-Grade Fabrics for Atmospheric CO_2 Extraction

Research Team

Sean M. Cook, Physics
Pablo A. Dean, Chemical Engineering
Eli J. Fastow, Material Science & Engineering
Patrick S. Ott, Chemical Engineering
Jonathan L. Wilson, Material Science & Engineering
Hojin Yoon, Chemical Engineering; Sustainability Studies minor

Faculty Mentor

Dr. Mohamad Al-Sheikhly, Professor, Department of Materials Science & Engineering, UMD

Librarian

Jordan Sly, University Libraries, UMD

Discussants

Dr. Robert Briber, Associate Dean, UMD
Dr. John Cumings, Professor, UMD
Dr. Alison Flatau, Professor, UMD
Dr. Luz Martinez-Miranda, Professor, UMD
Dr. Zois Tsinas, Post-Doctoral Researcher, UMD

Research Description

Primary amines contribute to a well-studied mechanism for capturing carbon dioxide (CO_2) from the atmosphere. This thesis describes two approaches to grafting amine-rich monomers to three commercial-grade fabrics: polyethylene terephthalate, high-density polyethylene and nylon 6. Initially, two monomers, allylamine and butenylamine, were chosen and evaluated for their sorbent capabilities. After confirming the selected monomers chemisorb CO_2, six novel copolymers, comprised of each of the three fabrics grafted with one of each monomer, were synthesized through two unique single-step fabrication processes, though both rely on free radical addition polymerization of the monomers. In the first synthesis method, electron beam radiation created the free radicals necessary for grafting. In the second, nitroxide and peroxide chemical initiators created the free radicals. All copolymers synthesized with radiation-induced graft polymerization achieved greater grafting with butenylamine compared to allylamine, likely given the closer proximity of the primary amine to the radical on the latter's structure. Characterization of CO_2 capacity, the figure of merit for sorbency, revealed not only that the majority of the grafted amines likely reacted to adsorb CO_2, but secondary physical mechanisms also contribute to CO_2 abstraction.

COR: Investigation of the Pathogenesis and Treatment of Atherosclerosis

Research Team

Tiffany Cao, Bioengineering
Victoria Haass, Physiology & Neurobiology
Tom Kariyil, Physiology & Neurobiology
Samantha Kennedy, Public Health Science
Carly Rosenfeld, Cellular Biology and Genetics; Spanish Minor
Aza Shiao, Microbiology
Madina Smagulova, Physiology & Neurobiology
Margo Sybert, Physiology & Neurobiology
Syona Tuladhar, Physiology & Neurobiology
Justin Wu, Physiology & Neurobiology

Faculty Mentor

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Librarians

Nedelina Tchangalova, University Libraries, UMD

Discussants

Bill Evans, Research Assistant, Department of Kinesiology, UMD
Dr. Steven J. Prior, Assistant Professor, Department of Kinesiology, UMD
Dr. Sushant Ranadive, Assistant Professor, Department of Kinesiology, UMD
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Research Description

This study explores the prevention of arterial plaque buildup characterized by atherogenesis. Atherogenesis is the process by which oxidized low-density lipoproteins (oxLDL) penetrate the endothelial lining of the arterial wall. The damage to the endothelial wall induces a signaling pathway to trigger an inflammatory response. Monocytes then phagocytose oxLDL in an attempt to prevent damage to the endothelial wall and ultimately transform into foam cells that constitute plaque tissue. LOX-1 is one particular scavenger receptor on the monocyte that responds to the damage signals from oxLDL. After a thorough literature review, let-7g miRNA was found to be the most promising miRNA that inhibits LOX-1 expression. By preventing the expression of LOX-1, the macrophage will no longer respond to oxLDL signaling and ultimately inhibit plaque development. The first aim of this study is to determine the efficacy of miRNA let-7g to reduce expression of oxLDL receptor LOX-1. The second aim of the study is to determine the effects of miRNA let-7g when used with rapamycin. Rapamycin is another immunosuppressive drug that is currently applied to coronary stents to reduce rejection rates. It is expected that using rapamycin and let-7g in conjunction will further inhibit oxLDL uptake by macrophages and result in a novel treatment for atherosclerosis.

E-JUSTICE: Investigating the Intersection of Flood Risk and Environmental Justice in Maryland

Research Team

Maud Acheampong, Government & Politics
Candela Cerpa, Environmental Science & Policy; Geographic Information Science Minor
Anna T. Cheng, Operations Management & Business Analytics; Sustainability Minor
Nicolette M. Corrao, Civil & Environmental Engineering
Audrey B. Krimm, Anthropology
Shifali A. Mathews, Public Health Science; Sustainability Minor
Haley M. Mullen, Environmental Science & Policy
Olasunbo O. Salami, Information Science
Lynne Zhang, Environmental Science & Technology
Jaclyn K. Zidar, Civil & Environmental Engineering

Faculty Mentor

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Librarian

Judy Markowitz, University Libraries, UMD

Discussants

Dr. Caroline Boules, Lecturer, Department of Environmental Science and Policy, UMD
The Honorable Dannielle Glaros, County Council Member, Prince George's County
Dr. Marccus Hendricks, Assistant Professor, School of Architecture, Planning and Preservation, UMD
Dr. Onyemaechi Nweke, Office of Environmental Justice, EPA
Dr. Devon Payne-Sturges, Assistant Professor, Maryland Institute for Applied Environmental Health, UMD
Annette Spivy, Lecturer, Department of Environmental Science and Policy, UMD

Research Description

Considering the implications of environmental justice, we sought to identify areas of Maryland with high socio-economic vulnerability, flood risk, and environmental risk to assess whether emergency preparedness policies in these areas were effective. We characterized this disparity based on a review of hazard mitigation policies in areas of Maryland that were susceptible to flood risk and toxic release. Our first phase of research determined which counties met our criteria of containing low-income, minority populations and being subject to flood risk. With the use of GIS technology to visualize pollution risk factors, we chose various counties in Maryland to use as our focus of comparison. The second phase analyzed emergency management plans for flooding and hazard mitigation policies of the selected counties. In our third and final phase, we interviewed officials or related personnel in the emergency preparedness policies and practices to gain a better understanding of the reality of their implementation. We found that Baltimore City, Dorchester County, Anne Arundel County, and Prince George's County had high-risk factors for flooding and socioeconomic vulnerability and had less comprehensive emergency plans. Additionally, we found that the explicit mention of environmental justice was not a priority of most plans, creating space for future improvements and research.

FEELS: Investigating a Cooperative System of Sensing and Transmitting Haptic Feedback of Soft Tissue for Robotic Surgical Applications

Research Team

Sophia N. Darwin, Biological Sciences and Sociology
Salma M. Ghorab, Mechanical Engineering and Computer Science
Priya Kulkarni, Mechanical Engineering
Melika Marani, Biological Sciences; Spanish Language, Culture, and Professional Contexts Minor
Emma T. Margolis, Psychology; Art History Minor
Priya D. Mittu, Electrical Engineering; Computer Science Minor
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Stephanie Richie, University Libraries, UMD

Discussants

Dr. Shamus Carr, Assistant Professor of Surgery, University of Maryland School of Medicine
Dr. Timothy Horiuchi, Associate Professor, Institute for Systems Research Maryland Robotics Center, UMD
Dr. Axel Krieger, Assistant Professor, Mechanical Engineering and Maryland Robotics Center, UMD
Dr. Xinan Liu, Research Associate Professor, Department of Mechanical Engineering, UMD
Dr. Shelby Stewart, Assistant Professor, University of Maryland School of Medicine

Research Description

Robotic-Assisted Surgery (RAS) improves upon traditional minimally invasive (MIS) and open surgical techniques by maintaining the benefits of MIS while also providing surgeons with a wider range of motion, increased depth perception, and control for tremors. However, an inherent limitation of the technology is that surgeons performing RAS must rely solely on visual feedback and lose the sense of touch. This creates a steep learning curve for the technique. Previous literature and results from our own survey (n = 15) of robotic surgeons suggested that the introduction of haptic feedback to RAS will improve overall patient outcomes as well as decrease error rates and operating times for surgeons. To address this, we proposed a proof-of-concept addition to RAS systems that relays the firmness of soft tissue to surgeons. We constructed a probe containing a force-sensitive resistor (FSR) to collect information on silicone samples of known varying firmness that mimic soft tissue. From the FSR, currents were generated and amplified into a solenoid actuator. By pressing on the actuator, the user feels a force corresponding to the firmness of the silicone. Preliminary testing of the unified feedback system indicated that users were able to successfully distinguish between varying silicone firmnesses with a 38.89% average accuracy. Future testing will need to be done with participants to further evaluate the system's effectiveness and mitigate preliminary testing errors.

LYTIC: Therapeutic Use of Bacteriophage-Antibiotic Formulations for the Treatment of Antibiotic Resistant *Acinetobacter baumannii* Infections

Research Team

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Spencer E. Grissom, Chemical Engineering
Zachery L. Keepers, Bioengineering
Anna Lavrentieva, Cell Biology & Genetics; Statistics and Spanish Minor
Hannah E. Sutton, Biological Sciences; Art History Minor
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Librarian

Zaida Diaz, University Libraries, UMD

Discussants

Joseph Fackler, Director, Manufacturing and Senior Microbiology, Adaptive Phage Therapeutics, Inc.
Scott Gibbons, Director of Manufacturing, Intralytix
Greg Merril, CEO, Adaptive Phage Therapeutics, Inc.
Dr. Daniel Nelson, Professor, UMD
Jimmy Trinh, Senior Research Scientist, Intralytix
Ben Woodard, Director, Biotechnology Research and Education Program, UMD

Research Description

Widespread use of antibiotics has enriched global bacteria populations for strains possessing antibiotic resistance (AR) genes. Proliferation of AR genes and mechanisms have resulted in numerous multidrug resistant (MDR) infections for which there are no effective treatments. *Acinetobacter baumannii* is a major cause of hospital acquired (nosocomial) infections and is associated with outbreaks of MDR infections. Virulent bacteriophages (phages) present a way to remedy bacterial infections, while also having built-in mechanisms to circumvent resistance. This proposed study aims to develop a phage therapeutic targeting antibiotic resistant *A. baumannii*. The phages chosen for the final formulation exhibited high bactericidal activity and were able to infect several strains of *A. baumannii* from a provided library. Additionally, the phage-antibiotic synergy (PAS) effect was investigated in formulations with sublethal doses of ampicillin and chloramphenicol. The effectiveness of the phage therapeutic at different multiplicity of infections (MOI) and antibiotic concentrations were assessed relative to standard antibiotic doses. Well-plate studies suggest that higher MOI and antibiotic concentrations resulted in the greatest initial bactericidal effects, longest time to develop resistance, and lowest overall bacteria concentration. In future formulation studies, we would like to investigate using spray-drying technology to create an inhalation product to deliver the phage-antibiotic mixture directly to the lungs`.

OPTIC: Underwater Optical Wireless Communication Link for Short-Range Data Transmission: A Proof of Concept Study

Research Team

Arjun Agarwal, Aerospace Engineering
Andrew Liu Chen, Computer Engineering; Math Minor
Thomas Charles Enrique Good, Fire Protection Engineering
Miles Montgomery Grissom, Computer Engineering
Daniel Tai Klawson, Electrical Engineering
Jacob Oren Levit, Government & Politics; Spanish Minor
William John Nix, Electrical Engineering
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Edward Ramon Salvatierra, Electrical Engineering
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Faculty Mentor

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Librarian

Nevenka Zdravkovska, University Libraries, UMD

Discussants

Dr. Christopher Davis, Professor, Dept. of Electrical & Computer Engineering, UMD
Dr. Yongzhang Leng, Assistant Research Scientist, Dept. of Electrical & Computer Engineering, UMD
Dr. Thomas E. Murphy, Director, Institute for Research in Electronics and Applied Physics, UMD
Dr. Derek A. Paley, Professor, Dept. of Aerospace Engineering and Director, Maryland Robotics Center, UMD
Dr. Steven Tretter, Professor, Dept. of Electrical & Computer Engineering, UMD

Research Description

The purpose of this thesis is to lay the groundwork for the development of an Underwater Optical Wireless Communications system. Currently, one of the largest barriers to the expansion of underwater enterprise and research is a lack of high-speed wireless communication systems. Wireless communication underwater is essential for safety, improving aquatic technology, and many other marine ventures, yet it is still technologically limited. Current methods, such as acoustic communication, are often power inefficient, cumbersome, and notably expensive. The proposed system would enable scuba divers and researchers to bridge the current gaps in available underwater data transmission technologies. This paper proposes using visible light to wirelessly transmit data underwater. Visible light is an effective carrier wave underwater due to its large bandwidth and low absorption coefficient. Using light emitting diodes, silicon PIN photodetectors, and consumer-grade microcontrollers, a model for the development of a wireless optical communications system is proposed. The system will also adopt a modular design which allows each layer to evolve as needed. The proposed system can transmit and receive audio and vital signals underwater, illustrating the potential of a technology that could make diving and other underwater endeavors safer and more efficient. Furthermore, the proposed data link shows the potential for this technology to be used in other underwater applications that were previously limited by data speeds or mobility. Above all, this technology seeks to build upon existing knowledge of optical wireless communication and advance the field of underwater science and technology.

PROCESS: A Data-Driven Approach to NBA Team Building

Research Team

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David W. Creegan, Physics
Olivia M. Majedi, Biological Sciences and Mathematics; Creative Writing Minor
Daniel B. Smolyak, Computer Science and Economics
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Discussants

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Dr. David Klossner, Associate Athletic Director, UMD
Dr. Nicholas Montgomery, Lecturer, Department of Economics, UMD
Dr. David Waguespack, Associate Professor, Robert H. Smith School of Business, UMD

Research Description

In the National Basketball Association (NBA), it has historically been difficult to build and sustain a team that can consistently compete for championships. Given this challenge, we have developed a series of analyses to support NBA teams in making data-driven decisions. Relying on a variety of datasets, we examined several facets related to the construction of NBA rosters and their performance. In our analysis of on-court performance, we have used clustering algorithms to classify teams in terms of playstyle, and determined which playstyles tend to lead to success. In our analysis of roster construction and transactions, we have investigated the relative value of draft picks and the impact of trades involving draft picks, as well as the effect of roster continuity (i.e. maintaining the same players across seasons) on team success. Additionally, we have developed a model for predicting player contract values and performance versus contract value, which will help teams in identifying the most cost-effective players to acquire. Ultimately, this assembly of analyses, in conjunction, can be used to inform any NBA team's decisions in its pursuit of success.

SWARM-AI: Platform Development for the Implementation and Testing of New Swarming Strategies

Research Team

Sara Celidonio, Mechanical Engineering
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Helen Kent, Mechanical Engineering
Paul Motter, Computer Science
Matthew Patsy, Mechanical Engineering
Kevin Postlethwait, Computer Science
James Farquhar, Aerospace Engineering

Faculty Mentor

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Librarians

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Discussants

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Dr. Evan Golub, Principal Lecturer, Department of Computer Science, UMD
Dr. Michael Otte, Assistant Professor, Department of Aerospace Engineering, UMD
Dr. Huan Xu, Assistant Professor, Department of Aerospace Engineering, UMD

Research Description

Swarm robotics is useful for mapping, light package transport, and search and rescue operations, among other tasks. Researchers and industry professionals have developed robotic swarm mechanisms to complete these tasks. Some of those mechanisms or "strategies" have been tested on hardware; however, the technical requirements involved in fielding a drone swarm can be prohibitive to real-world tests. Team SWARM-AI has developed and tested a platform that provides a starting point for testing new swarming strategies. This platform allows the user to select vehicles of their choosing--either air, land, or water based, or some combination thereof--as well as define their own swarming method. Using a novel decentralized approach to ground control software, this platform provides a user interface and a system of computational "units" to coordinate drone swarms with a centralized, decentralized, or combination architecture. Additionally, the platform propagates user input from the master unit to the rest of the swarm and allows each unit to request sensor data from other units. The user is free to edit the processes by which each drone interacts with the environment and the rest of the swarm, giving them freedom to test their swarming strategy. The software system is then tested with a decentralized swarm of quadcopters.

TISSUE: Reducing Deformation in 3D printed Hydrogel Lattices with Low Temperature 3D Printing

Research Team

Yahya A. Cheema, Bioengineering
Kunal S. Dharmadhikari, Bioengineering; Computer Science Minor
Michael B. Hildreth, Bioengineering and English
Neal H. Kewalramani, Bioengineering and Mathematics
Catherine Liu, Biochemistry
Alexi J. Rodriguez, Bioengineering
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Pavan S. Vemulakonda, Bioengineering; Philosophy Minor
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Faculty Mentor

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Librarian

Dr. Sarah Over, University Libraries, UMD

Discussants

Cdr. James Coburn, Senior Advisor for Emerging Technologies and Additive Manufacturing Expert, USDA/FDA
Dr. Marc Ferrer, Biomolecular Screening and Probe Development Leader, NIH
Dr. Matthew Di Prima, Materials Scientist, Food and Drug Administration (FDA)
Dr. Martha Wang, Research Specialist, Robert E. Fischell Institute for Biomedical Devices, UMD

Research Description

3D printed hydrogel lattices printed at cryogenic temperatures display fewer instances of deformation than lattices printed at room temperature. Hydrogels present unique challenges in additive manufacturing due to the softness of the material which allows for deformation during the printing process. As a result, it is often difficult to obtain desired geometric structures. Prior research suggests that cryogenic temperatures can be utilized to improve the structural integrity of a print by rapidly solidifying the hydrogel as it is deposited on the print bed. A custom Peltier-based cooling system with fine temperature monitoring and control was used to achieve cryogenic temperatures. A CELLINK Inkredible+ Bioprinter and CELLINK START hydrogel was used with a 24 gauge nozzle to print multilayer 24mm x 24mm lattices with nine equally sized rectangular pores. Digitized uncompressed images of each lattice were taken and analyzed using NIH ImageJ. We compared the internal angle deformation and rectangular pore size of lattices fabricated at room temperature (23°C) and lattices fabricated at -26°C. Lattices fabricated at -26°C also had larger rectangular pores with less variation in rectangular pore size. The theoretical size of the rectangular pores was approximately 13 mm2 with a 24 Gauge nozzle. These results demonstrate that the use of cryogenic temperatures may reduce the deformation of soft hydrogels during additive manufacturing.

VISOR: Development of a Heads-Up Display for Extravehicular Activities

Research Team

Katheryn Fox, Computer Science; Business Analytics Minor
Radhika Karsalia, Mechanical Engineering; Technology Entrepreneurship Minor
Jillian Kunze, Astronomy and Physics
Christoph Neisess, Aerospace Engineering; Art History Minor
Zachary Peters, Aerospace Engineering; Astronomy Minor
Roshan Rao, Mechanical Engineering; Technology Entrepreneurship & Global Engineering Leadership Minors
Brady Sack, Aerospace Engineering; Physics Minor
Matthew Sieh, Materials Science & Engineering
Ryan Skoletsky, Astronomy and Physics
Shelly Szanto, Aerospace Engineering
Matthew Wilkin, Astronomy and Physics

Faculty Mentor

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Librarian

Lindsay Inge Carpenter, University Libraries, UMD

Discussants

Lindsay Aitchison, Space Suit Engineer, National Aeronautics and Space Administration
Dr. Mary Bowden, Professor, Department of Aerospace Engineering, UMD
Lemuel Carpenter, Engineer, NASA Langley
Ed Rezac, Engineer, NASA Goddard and InuTeq, LLC
Brian Roberts, Engineer, NASA Goddard

Research Description

During extravehicular activities, also known as EVAs or spacewalks, astronauts are exposed to the hazardous conditions of space. Therefore, they must accomplish tasks quickly and have easy access to important information. This study aimed to investigate the effect of heads-up displays (HUDs) on astronaut performance during a maintenance-focused EVA. We first compared users' completion times, comfort, and other factors while they performed tasks on a task board using audio instructions, instructions on an off-the-shelf Microsoft HoloLens HUD, or a combination of the two. These tests showed a decrease in mental and physical demands as well as a decrease in mean task completion time for the combined HoloLens and audio as compared to the HoloLens or audio alone. Using these results, we designed two versions of a display integrated with an astronaut helmet: (1) a screen system mounted outside the helmet in the lower right of the wearer's comfortable vision range and (2) a projector integrated into the structure of the helmet that projects onto glass in the wearer's upper field of view. By making important task information more accessible, our prototypes have the potential to increase astronaut safety by decreasing the time they spend on EVAs.

CLASS OF 2021 JUNIOR POSTERS

The Gemstone Honors Program is excited to share the work of the junior class. Attendees are encouraged to view the posters at the Undergraduate Research Day poster exhibition on **Wednesday, April 22nd,** held virtually on the DRUM (Digital Repository at the University of Maryland) online platform.

Click here for more information regarding Undergraduate Research Day.

We hope to see you at next year's Thesis Conference on Friday, April 16, 2021!

Stay Connected with the Gemstone Honors Program!

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Follow our hashtag #ThesisConference20 throughout the day!

GEMSTONE
Honors College
University of Maryland

Vision

Shaping the future through undergraduate interdisciplinary team research by addressing society’s most crucial, compelling, and complex questions.

Mission

The Gemstone Honors Program engages students in an academically rigorous and rewarding undergraduate research experience through an interdisciplinary team approach. In partnership with extraordinary faculty, Gemstone research teams advance knowledge and explore society’s urgent questions. The Gemstone Honors Program challenges and supports student growth and learning in a community that instills the enduring values of leadership, mentorship, and relationship building.

Values

We value integrity, intellectual curiosity, tenacity, collaboration, and inclusiveness.