Acknowledgments

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Old Dominion University Undergraduate Research Symposium
Saturday, March 19, 2022
Learning Commons, Perry Library

2022 Undergraduate Symposium: Sessions at a Glance

8:45 – 9:00 AM	**Presenter Check-in**
9:00 – 9:15 AM	**Welcome and Opening Remarks** David Metzger, Dean of Perry Honors College
9:15 – 11:00 AM	Art Exhibit (pp. 5-8) Poster Session (pp. 9-19)
11:00 – 1:00 PM	**Break / Prep for Zoom**
1:00 – 2:00 PM	**Oral Session 1 (pp. 19-24)** **Art History 1: The Art of Transformation [4 presentations]** **Moderators: Kayla Everett, Jared Benton** 1. Ashlee Webb. *Botticelli's Primavera: A Gateway Drug into the World of Pagan Imagery* 2. Kayla Cochran. *Metamorphosis: Examining Parmigianino's Self-Portrait in a Convex Mirror* 3. Kayla Bruce. *Pieter Bruegel the Elder's Series of the Months: A Celebration of Dutch Humanity Amidst Religious Turmoil* 4. Kayla Cochran. *Museum Demographics: Food for Thought* **College of Sciences UG Research #1 [3 presentations]** **Moderators: Sophie Clayton, Colin McCormack** 1. Stephanie Trusty. *COVID-19 Classroom Occupancy Detection System* 2. Emma Hood. *A Field Study In An Urban Area: Examining Distracted Pedestrian Unsafe Crossing Behavior* 3. Gregory Hubbard. *Two-Stage Transfer Learning for Facial Expression Classification in Children* **Monarchs Maximizing Access to Research Careers #1 [3 presentations]** **Moderators: Alvin Holder, Sarah Bulger** 1. Lindsay C. Days, Michael J. Celestine, Criszcele M. Tano, Elizabeth A. Tonsel-White, Chloe B. Smith, Duaa R. Alajroush, Stephen J. Beebe, Alvin A. Holder. *Synthesis, characterization, and biomedical uses of cobalt(III) complexes with 1,10-phenanthroline and salicylaldehyde and its derivatives as ligands* 2. Chloe Smith, Duaa R. Alajroush Mrs., Novia Mann Mrs., Alexis Fletcher Ms., Brittney Ruedlinger Dr., Stephen J. Beebe Dr., Alvin A. Holder. *Anticancer studies of a Cu(II) complex in a Triple Negative Breast Cancer cell line* 3. Daja Goodrich, Craig A. Bayse. *Determining Trigger Bonds in High Energy Density Materials with Catenated Nitrogen Compounds* **College of Education UG Research #1 [2 presentations]** **Moderators: Jenn Grimm, Ireland O'Hare** 1. Ashley Middleton, Leryn Reynolds Ph.D., Joel Harden. *The effect of physical activity on polychlorinated biphenyls: A Pilot Study* 2. Antra Patel, Venkat Maruthamuthu. *Quantifying cell adhesion strength with a novel flow assay*

2:00 – 2:15 PM	**Presenter Check-in**
2:15 – 3:15 PM	**Oral Session 2 (pp. 25-29)** **Art History 2: New Research Commemorating the 450th Anniversary of Caravaggio's Birth [4 presentations]** **Moderators: Kayla Bruce, Jared Benton** 1. Kim Hardy. *Caravaggio's Inspiration of Saint Matthew: A Lesson in Penance* 2. Kayla Cochran. *Interpreting the Divine Magdalene: Caravaggio's Martha and Mary Magdalene* 3. Louis Berbert. *Caravaggio's Faith and Good Works: A New Interpretation of Saint Jerome Writing, and its Implications About the Artist* 4. Timothy Cline. *Abnegated Atonement: Caravaggio's The Beheading of Saint John in Malta* **Monarchs Maximizing Access to Research Careers #2 [3 presentations]** **Moderators: Alvin Holder, Raksha Kandlur** 1. Lauren Butler, Kelly Romano, Kristin Heron. *The Association between Childhood Trauma Experiences and Eating Disorder Behaviors: Risk Factors and Racial Differences* 2. Aislin West, Anna Bulyshev. *Reduction of the plasmid vector backbone length enhances reporter gene expression* 3. Stephonda Lewis. *Accessing Biologically Important Imines and Nitrogen Heterocycles Using an Organocatalyst* **College of Sciences UG Research #2 [3 presentations]** **Moderators: David Gauthier** 1. Fenny Chaudhary. *Synthesis of bacteria nanocellulose for wound dressing.* 2. Bethany Norris, David T. Gauthier. *Hybrid Genome Assembly of the Gulf Coast Tick Amblyomma maculatum* **Interdisciplinary Research #1 [3 presentations]** **Moderator: Christopher Zajchowski, Raksha Kandlur** 1. Dan Burzek. *AM Radio Receiver Using the RTL-SDR* 2. Stephen Lamczyk. *Semantic Segmentation of Flooding for Flooding Detection* 3. Taylor Harvey, Bethany Arrington, Rowan Williams, Eddie Hill. *Friendship and Fun: Piloting a Medical Speciality Tween Day Camp*
3:15 – 3:30 PM	**Presenter Check-in**
3:30 – 4:30 PM	**Oral Session 3 (pp. 30-35)** **Art History 3 Through the Eyes of Women [4 presentations]** **Moderators: Lizzie Tippett, Jared Benton** 1. Hannah Austin. *Madonna of the Long Neck and Elena Tagliaferri as the Virtuous Wife of Deceased Francesco* 2. Andrew Marlowe-Cremedas. *Rubens and The Disembarkation at Marseilles: Display of Female Power in Patriarchal France* 3. Debra Dowden-Crockett. *Art Outside the Museum: Researching the Lochaven Garden Club's Beautification of Norfolk, 1920 – 1*

	College of Sciences UG Research #3 [4 presentations] **Moderator: Jing He, Sarah Yahoodik** 1. Thu V. Nguyen, Jing He. *Segmentation of Protein Secondary Structure from 3D Cryo-EM Images Using Deep Convolutional Neural Networks* 2. Stephanie Trusty. *Diabetic Foot Exam System* *3.* Taylor Powell. *Exploring Parallelization with a Raspberry Pi Cluster* *4.* Gabriel Del Razo*. Flooding Detection in Hampton Roads* **College of Arts & Letters UGR #1 [3 presentations]** **Moderator: Elizabeth Hogue, Qiqi Liang** 1. Catharine Cipriano. *Books and Bars: Expanding Community Ties Through a Bookstore By and For Lesbians* 2. Annette Roberts*. Fa'amatagi: From Whence the Wind Blows* 3. Chelsea Lembert*. Dignity Norfolk: How One Tidewater Group Enabled Gay and Lesbian Catholics to Form Long Lasting Friendships and Chosen Families* **College of Arts & Letters UGR #2 [3 presentations]** **Moderator: Sheila Keener, Kate Warnock** 1. Gabriela Igloria. *On Faith & Dignity: Uncovering Local Gay Catholic History* 2. Samuel Wheeler. *Wittgenstein and Hume on Miracles* *3.* Rachel Mannetta-Torres*. History of The Wildcats Motorcycle Club* **College of Arts & Letters UGR #3 [1 presentation]** **Moderator: Suzanne Emmons, Rowan Williams** 1. Alanis Gonzalez Torres*. 1% left of 100: Taino History and Puerto Rican Identity*
4:30 – 4:45 PM	**Regroup for Closing Remarks**
4:45 – 5:00 PM	Closing Remarks

This program is available online through ODU Digital Commons, the university's institutional repository: https://digitalcommons.odu.edu/undergradsymposium/ Students are encouraged to submit their final presentations, posters, and artwork to the repository.
Contact Karen Vaughan kvaughan@odu.edu for more information about how to submit.

Art Exhibit

9:15-11:00 AM

Artist Statements

Using Art as communication for Mental Health
Alison Miller (Mentor: John Roth, Greta Pratt)
Arts & Letters

As an outlet to help me process my thoughts, the use of art as communication has become an important aspect I have been embracing in my work lately. My process includes research of and attention to the selection of materials, methods and subject matter that contribute significance to the overall concept. Inspiration emerges from the exploration of topics that influence the identity of myself and those individuals close to me. Focusing on the psychological implications, various perspectives of mental health are the centralized theme in this body of work.
Mental health has gradually become a normalized conversation in our society. However, this has also led to a culture that is increasingly desensitizing or even romanticizing the serious nature of this topic. Stigma continues to prevent critical reaches for help. My intention was to promote awareness in creating work that conveys situations and experiences that can alter the emotional and mental health of an individual. Between the usage of abstract and representational elements, I am optimistic that viewers will identify and establish confidence in becoming part of the conversation.

Willing Vessels- Ceramics As A Vehicle for Social Justice
Amber Pierce (Mentor: Rick Nickel, Natalia Pilato)
Arts & Letters

A vessel can be seen as a container for holding something or as a person into whom some amount of quality can be contained (or shared from). The function of a vessel varies- as a decorative treasure or practical tool, to fill the cups of others, or to be poured into. The potential of these willing vessels mirrors our own potential as members of society.

Assembled Art Commentary: Works Influenced by Social Media
Debra Dowden-Crockett (Mentor: Emily Culver)
Arts & Letters

The tactile nature of glass and metal, as well as their complementary properties, are what inspire me to combine them in my work. Two such works use metal and glass to convey thoughts on the influence of social media in our lives and its sometimes negative effects.
The Lost Art of Reading Between the Lines is a commentary on the impact of unfiltered thoughts, feelings, and opinions posted on social media. The transparent quality of glass in this work delicately suspends excerpts found in various online forums. By hiding behind technology, people often share feelings and conversations that would have otherwise been withheld. The derogatory result/effect of this exchange is that fewer of these important conversations will ever be had in person.
The work *Simultaneous Reflection* incorporates digitally modeled and 3D and printed frames, glass, and fine silver into wearable rings. The two pieces complement each other in allowing both the wearer and viewer to observe their reflections simultaneously. Hinting at the fanaticism of selfies in social media, these devices both adorn and serve as an aid for real reflection for those engaged in using them. By incorporating technology, these devices become

more modern apparatus for scrying or glimpsing into the future – an interesting juxtaposition of ancient beliefs with modern knowledge.

Celebrate

Hannah N. Austin (Mentor: Kenneth Fitzgerald)

Arts & Letters

This piece is called Celebrate. The world needs more reasons to celebrate amid a pandemic, gun violence, and all other personal trials endured within the past few years. The world also needs more educated and certified American Sign Language interpreters, which is a limited yet incredibly important human resource. This video is intended to get the deaf and hard of hearing communities' attention and to include them as well as clearly communicate a celebratory message of survival and endurance to all who watch.

To Be A Statistic

Holly Castle (Mentor: Brendan Baylor)

Arts & Letters

This piece of work has probably been the most vulnerable piece I've made so far in my artistic journey. It's personal, uncomfortable, and frankly it was difficult to go back to and think about those memories. Which might be hard for others to view as well so here's my trigger warning for things relating to rape and sexual assault.

Rape culture is in its prime, well it's kind of always been in its prime, but a shed of light is finally beaming down onto it. Yet, it's still very much prominent in our society. I've been affected by it personally and I've witnessed it with peers, friends, and even strangers. The over sexualization and bluntly blaming women for the harm done to them is pretty horrific. Also, the backlash they face, and what I faced, when we finally speak up about what happen isn't always supportive. People don't like hearing the truth that their friend or son has done something at such a disgusting degree. And I know I'm talking like this can't happen to men, when it very much can and does happen to them, this art piece is about my experience. When I finally spoke up my assault, I was met with comments like I'm lying, he's a good guy it was a misunderstanding, what happen to me was completely fine; which is my personal favorite because what the actual fuck do you mean by that?!?!

I wanted to make this art as an outlet for myself but to also tell people that even through all the bullshit comments that make you question yourself and what you went through, there is still someone here that believes you. Speaking out about what had happened to me felt like the worst thing I could do but it brought me some closure. It weeded out people who shouldn't be my friends and showed me who really has my back. And I learned that I wasn't his only victim, which in some twisted way put to rest the idea that I could have been overreacting. It showed me that my reaction was normal for what happened and led me to be a lot kinder with myself and to realize it was never my fault.

Abstract Paintings by Ann-Claire Wood

Ann-Claire Wood (Mentor: Leigh Anne Chambers)

Arts & Letters

Experimentation is at the forefront of my studio practice. I am constantly challenged and inspired by the way paint reacts to itself and to the substrates I use. Imagery develops from the puddles of watered-down paint I leave overnight to dry. Often it takes multiple passes for the spills to take form. I also incorporate surrealist automatic drawing practices into my work. In this way I let the process develop the painting without starting with a preconceived plan.

Finding Peace in the Emptiness
Roger Evans (Mentor: Greta Pratt)
Arts & Letters

Some of us, if not all, have felt some kind of emptiness. It can come from sadness, not having life goals to achieve, or not feeling like there's a purpose in life. It's real and depending on the person, that feeling of emptiness can last a few days or remain for a decent time. The experience varies from person to person.
With this series, I am exploring feelings of loneliness and alienation that I have been experiencing over the past couple of years as I am slowly learning to accept it. Being in a pandemic has increased this feeling and has made many others feel the same types of feelings. I hope the viewer will take comfort in knowing that they are not alone. My procedure was to work at night, as this is typically when people feel alone.

Commodities: Invasive and Precious
Sarah Thompson (Mentor: Jonn Roth, Emily Culver)
Arts & Letters

My work is often autobiographical and inspired by nature's ability to reclaim and erode. I find beauty in the imperfections of salvaged materials and enjoy breathing new life into discarded objects. Through the dichotomies of order and chaos, light and shadow, ephemeral and enduring, I explore my past experiences and hopes for the future. My work in metals explores the ephemeral nature of life and natural resources. My piece, *Precious Commodity*, speaks to the weight of parenthood and the impact our current rate of resource consumption will have on the future my children inherit. My sculpture, *Novel Hypocrisy*, was inspired by a bamboo forest on the path behind my home. It is an invasive species that doesn't belong here, and I can relate to that. After serving in the Air Force for eight years and following my husband while he completed his military career, I found myself planted in many places where I felt displaced and a few where I questioned if I was a part of something invasive. I hope my works inspire a moment of reflection and introspection as the viewer considers their impact on the natural world around them.

Resting
Stephanie Buckley (Mentor: Emily Culver)
Arts & Letters

Resting is a brooch that was created to reflect my self-identity. The dragonfly flies around most of its life and rests for just a moment then it takes off again, no one knows where it comes from or where it's going. I can relate to it because I'm always on-the-go. The dragonfly is kinetic and the wings flutter to appear as though it is about to take off again. The brass leaf represents a dual meaning, a comfortable place to rest and is easily pushed by the wind similar to how I like to go with the flow. As a flame provides light and warmth to those around, the copper flame represents my light heartedness, warm personality, and positive energy.

Mama Jean
Stephanie Buckley (Mentor: Emily Culver)
Arts & Letters

Mama Jean is created as an heirloom parure, a cuff, handpiece and ring jewelry set, in honor of my maternal grandmother, Mama Jean, who reared me in rural Texas. This floral heirloom represents my maternal lineage like a family tree. Starting with the figurative root is the layered

copper and nickel silver cuff with a fully opened flower and handmade glass bead represents Mama Jean. Next, the figurative tree trunk is the copper wire and red and blue beads that connect the cuff to the handpiece to represent the bond between my birth mother and the distant relationship she had with her mother, Mama Jean, me, and Tyrese, my son. The continuation of the figurative tree is the branch, the copper hand piece represents me with a partially opened flower and cast bronze totem inside to ward off evil spirits. Lastly at the top of the figurative tree is the leaf, the copper and nickel silver ring with a slightly open flower represents Tyrese, and the disconnection reflects the separation between his great grandmother and him because they have never met. The handmade glass beads, made by Tyrese, reflect the fragility of our family bond and are placed in the center of the copper flower to protect it. Creating this heirloom to give to Tyrese someday is what bonds us together.

Bodoni: Then and Now Pop-up and Interactive Guide

Stephanie Buckley (Mentor: Kenneth Fitzgerald)
Arts & Letters

Bodoni: Then and Now Pop-up and Interactive Guide is about the Bodoni typeface and its usage in type, logos, branding, advertising, and marketing over time. It is a brief biography highlighting the accomplishments of Giambatistta Bodoni (1740-1813), an eighteenth century Italian typeface designer, master printer, and graphic designer. The pop-up scene is a representation of Bodoni's print studio with an abbreviated Manuale Tipografico book, originally published in 1815. Throughout the interactive guide, there are several ways to discover who Bodoni was, his influences, and contributions to book making, printing, and graphic design, which are still being used today. Sharing my favorite typeface in an interesting and interactive way reflects how I combine my passion for typography, graphic design, and pop-up books to present information in a new and creative way.

Wear & Tear

Wymberley Davis (Mentor: Margaret Konkol)
Arts & Letters

Wear & Tear is a documentary poetics project acknowledging and addressing the systematic policing, silencing, violence, and stripping of self-expression that women have suffered at the hands of cultural, societal, religious, and sexist norms. *Wear & Tear* is a hybrid research project which draws together mass culture archives and uses heterogenous sources like advertisements and juxtapose these with excerpts from sacred texts which seek to proscribe and circumscribe women's clothing choices. It models itself on archival works such as Theresa Hak Kyung Cha's *Dictee* which works with image, language, and voice. My project presents a distinctly material cultural history of women's work and labor. *Wear & Tear* is about those in the world who have done and still do their best to *tear* women down and those who have used what women *wear* to do it. But more importantly, this poem is about women *wearing* whatever they please, without fear of reprisals, and *tearing* down the walls that confine them along the way.

Poster Session

9:00-11:00 AM

Asymbiotic seed germination of native Virginia orchid Tipularia discolor

ALEXIS HUNGERFORD (Mentor: Lisa Wallace)
Sciences

Tipularia discolor, commonly referred to as crippled cranefly, is a perennial terrestrial orchid found across the eastern coast of the United States. Characterized by its purple-spotted leaves and plain, crane fly-like flowers, *T. discolor* has slowly started to disappear from its native woods. Speculation around the decline of *T. discolor* generates the same insights gained from the reputation of orchids and their specificity on locale and the vital relationship with its mycorrhizal partners. Currently, there are no published methodologies which explore *T. discolor* seed germination, likely due to the complexity of its requirements. The purpose of this study is to develop methods of asymbiotic germination and to test variable levels of ammonium nitrate, which may give insight to the little-known nature of germination in *T. discolor*. Our initial tests indicate that *T. discolor* seeds can be germinated asymbiotically, and the results of these additional experiments will be presented. Understanding how botanists and ecologists can protect fragile orchid populations in light of human disturbance and human-accelerated climate change is instrumental to the reintroduction of orchids to their native habitats and survival of this plant family.

Similarities and Differences in Female Same-Sex Couples' Drinking and Eating Behaviors

Alicia Moulder, Charlotte A. Dawson M.S., Kristin E. Heron (Mentor: Kristin Heron)
Sciences

Prior research has supported co-occurring hazardous alcohol use and disordered eating within individuals and concordance in couples' drinking habits, with couples displaying similar hazardous drinking behavior. Less is known about concordance in couples' eating behaviors, particularly in female same-sex couples. This study examined eating and alcohol use patterns in female same-sex couples where at least one couple member engaged in risky drinking. This study examined if couples had similar or differing drinking and disordered eating behaviors. An online survey with alcohol use and disordered eating measures was administered separately to both partners in 163 young female same-sex couples. Using intraclass correlation coefficients (ICCs), we measured the proportion of variance in drinking and disordered eating variables attributable to the couple level of analysis. Results showed partners were moderately similar in their hazardous drinking, with 29.2% of the binge drinking frequency variable, 35.5% of the average drinks/binge drinking day variable, and 28.3% of the problematic alcohol use variable explained at the couple-level. Conversely, of the disordered eating variables, 14% of eating cognitive restraint, 0.3% of body dissatisfaction, 2.8% of binge eating, 9.2% of dietary restriction, and 7.7% purging, were explained by the couple-level ICCs, indicating far lower within-couple similarities in disordered eating. Couple-level associations explained more variability in problematic alcohol use than disordered eating, suggesting partners were more similar in their drinking than disordered eating. Future research should explore why couples are less similar in their disordered eating than hazardous drinking and if this pattern is unique to female same-sex couples.

Satellite Analysis of Iridium NEXT

Benjamin Durr (Mentor: Otilia Popescu)

Engineering & Technology

Low Earth Orbiting (LEO) Satellites are the closest to Earth orbiting category of satellites, with an altitude no higher than 1000km, and they are commonly used for communication and remote sensing satellites systems, such as the Iridium system that orbits at about 780km altitude, for Earth observation and imaging, for providing Internet service, and more. It is to note that the International Space Station (ISS) orbits at about 400km altitude and the Hubble Space telescope orbits at about 540km altitude, among the most famous LEO satellites. This research focuses on orbital calculations for the LEO satellites, with data specific to the Iridium Next constellation.

Hand Gesture Classification for Human-Robot Interaction in Rock-Paper-Scissors Game

Elija A. Bullock, Megan A. Witherow, Khan M. Iftekharuddin (Mentor: Khan M. Iftekharuddin)

Engineering

Human-Robot Interaction (HRI) is a field dedicated to understanding, designing, and evaluating robotic systems for use by or with humans. The NAO robot, a humanoid robot developed by SoftBank Robotics, has emerged as a powerful platform for HRI and has become a standard in education and research. NAO has 25 degrees of freedom which enable it to move and perform actions. The NAO robot is enabled with multiple sensors to perceive its environment including 4 directional microphones and speakers to interact with humans. Among these sensors, the NAO is equipped with two 2D video cameras which enable an important component of an HRI system: the robot's perception of human actions to make an appropriate response. In this project, we demonstrate shared perception and action in HRI between a human actor and the NAO humanoid robot via a rock-paper-scissors game. Python is used to program the robot to create animations and speak to the human actor in this project. An in-house database of rock-paper-scissors hand gestures is collected, cleaned, and curated to serve as ground truth for the rock-paper-scissors gesture recognition task. Transfer learning is used to fine-tune a deep neural network model pre-trained on hand gesture classification for recognition of rock-paper-scissors hand gestures. The platform is aimed at K-12 outreach to allow the K-12 students to grow their interest in STEM and understanding of engineering principles. This project has the potential for broader impacts in the facilitation of human-robot collaboration and the development of HRI systems for children.

Single Cell RNA Sequencing

Fozi Alkaifi, Jiangwen Sun, Xing Fu (Mentor: Jiangwen Sun)

Sciences

Studying gene activity in single cells is an important factor in understanding cell functions. Cell reaction is different depending on where the gene is expressed. This phenomenon happens because the structure of the cell determines its function. The concept of measuring gene activity and its changes in individual cells is referred to as RNA velocity. This concept has expanded the techniques of studying cellular differentiation. Using scVelo framework that was developed by Bergen et al. (Nature Biotechnology, 2020), we were able to obtain velocities using the ratios of spliced and un-spliced mRNA obtained from Velocyto framework, visualize velocities of each cell on a plot, track where each gene is expressed, and visualize which cells are spliced or un-spliced. Being able to use the scVelo framework will help with determining how cells functions with respect to each gene studied.

Automatic Costal Flood Detection in Norfolk City

Gabriel Del Razo (Mentor: Dr. Ayman El Mesalami)
Sciences

A project to automatically detect the height of water in a tank. Uses Raspberry Pi and a camera as a vision system to automatically determine the severity of a flood. Raspberry pi image processing to detect low, moderate, and severe floods.

The Experiences and Effects of Sexism in Online Video Game Culture
Hannah Galbraith (Mentor: Dr. Jason Sawyer)
Education & Professional Studies

The experiences of sexism in online video game culture are understudied within various human services disciplines, such as social work, counseling, and non-profit management (Gates & Cade, 2016). More study is needed to understand how human service professionals can effectively respond to the effects of sexism in online video games. The researcher hopes to learn the experiences of participants, how they cope, and provide recommendations for human service practitioners in the field.

Recent technological advances have resulted in more people spending an increased time in virtual spaces (Lehdonvirta, 2010). The culture of virtual spaces grew during a pivotal stage of development for two generations: millennial and generation z. They created the foundation for it, shaping it to what it might be in the future. Engaging with people who are active in these communities can give a vision of how this generation deals with sexism in the digital video game space. Sexism has been critiqued and well documented within online spaces, but experiences of sexism in video game culture and its implications for human service practice could use further investigation.

Interpretive Phenomenological Analysis will be used as a methodology to compare participants' experiences of sexism in online video game spaces. The researcher will acknowledge the ways in which the participants deal, respond, and cope with the sexism they have faced, while exploring and describing participants' own sense making to identify the core structures of these experiences.

Ancient Roman Glass
Holly Castle, Nichole Shirley, Ann-Claire Wood (Mentor: Jared Benton)
Arts & Letters

The Hermitage Museum and Gardens here in Norfolk hosts a surprisingly strong collection of ancient Roman glass vessels collected by Florence Sloane in the early 20th century. These glass objects have not only never been studied before, but they have also never been on display. Our poster is the presentation of some early efforts to study the glass and to make inferences about the people who made it and the woman who collected it. We drew every vase, we photographed with meter scales, and we made photogrammetric models. We also researched comparanda from other sites and museums to help us understand the social and historical context of such glass objects. As artists, we focused primarily on process and practice, reverse engineering how the ancient glass blowers made these object. Finally, we used archival evidence to explore why and how Sloane initially collected the objects and what that reveals about her as a person, because she seems to have intended them to serve a didactic function.

Usage of Bacterial Nanocellulose to Develop Smart Bandages
Isabella Gay (Mentor: Christopher Animashuan, Gymama Slaughter)
Sciences

An abstract detailing work done at the Old Dominion University Center for Bioelectronics.

Objective Measure of Working Memory Capacity using Eye Movements

James Owens, Gavindya Jayawardena, Vikas G. Ashok, Sampath Jayarathna (Mentor: Sampath Jayarathna)

Sciences

Human-autonomy teaming (HAT) has become an important area of research due to the autonomous systems being developed for different applications, such as remotely controlled aircraft. Many remotely controlled vehicles will be controlled by automated systems, with a human monitor that may be monitoring multiple vehicles simultaneously. The attention and working memory capacity of operators of remote-controlled vehicles must be maintained at appropriate levels during operation. However, there is currently no direct method of determining working memory capacity, which is important because it is a measure for how memory is being stored for a short term and interacting with long term memory with a capacity limit that is dependent on attention and other executive functions. This study uses machine learning algorithms to find an objective relationship between participant eye tracking measurements and their responses on the NASATLX which determines subjective workload. The dataset used in this study was collected and published by researchers at the University of Windsor and publicly available.

Autonomous observations of light and temperature under the arctic ice pack from a buoy deployed on March 8th, 2017

Kylie Harrison, Immanuel C. Burns, Cheyenne L. Goodman (Mentor: Dr. Victoria Hill)

Sciences

As part of the Arctic Observing Network, an ice-tethered buoy was deployed in first-year sea ice in the spring of 2017. The buoy measured light, temperature, salinity, and phytoplankton biomass within and under the ice through the spring. The buoy captured the complex light field that developed during the spring ice melt, as well as increased phytoplankton in the water column that represented the spring bloom. The data from the buoys provide unprecedented observations of the upper water column under current ice pack conditions, increasing our understanding of the physical, biological and chemical impacts of a thinner and more fractured ice pack.

The Robustness of Sequence Tagging and Transformer Models in Leaderboard Entity Extraction from Scholarly Papers

Leeshi Lin (Mentor: Jian Wu)

Sciences

Automatic extraction of leaderboard entities, such as datasets, methods, and evaluation metrics, is useful for keeping track of the evolution of algorithms and models proposed for certain tasks. Sequence tagging and transformer models have been proposed and exhibited outstanding performance on named entity extraction. In this project, we investigate the performances of these two models in the task of leaderboard entity extraction, focusing on datasets and methods from research papers in Computer and Information Sciences and Engineering. We compare sequence tagging and transformer models trained on in-house and published datasets. The results exhibited large discrepancies between performances obtained by models trained on different datasets. In general, transformer-based models perform better than sequence-tagging models. The discrepancies between transformer models trained on different datasets were smaller than sequence tagging models, indicating that the transformer model seems less susceptible to the changes of entity annotation schemas. Further experiments on more datasets are needed to verify this.

The Relationship Between Rumination of COVID-19 and Anxiety Levels.

Madyson Hernandez, Alicia Kruzelock, Nathan Hager (Mentor: Nathan Hager, Alicia Kruzelock)
Sciences

The COVID-19 pandemic has caused an increase in psychological distress among individuals around the world (Saddik et al., 2021) (Ting et al., 2021.) Rumination is a factor in increased distress caused by the pandemic. Rumination about COVID-19 may be related to the contraction and transmission of the virus. Previous literature suggests that rumination about COVID-19 increases anxiety symptoms (Jamieson, D., et al, 2021.) However, it is unknown whether time thinking about COVID-19 impacts this relationship uniquely and directly as well.

A sample of 225 undergraduate psychology students completed an online survey in April 2020 evaluating rumination, time spent thinking about COVID-19, and symptoms of anxiety. Rumination was assessed using the rumination subscale of the Regulation of Emotion Systems Survey (RESS). Anxiety symptom severity over the past 2 weeks was measured using the seven-item Generalized Anxiety Disorder (GAD-7) questionnaire.

A linear regression analysis tested the relationship between rumination, time thinking about COVID-19 and anxiety. Results indicated that both rumination, $B = .44$, $p < .001$, and time spent thinking about COVID-19, $B = 1.05$, $p = .001$, predicted the severity of anxiety symptoms. Our results suggest that the tendency to ruminate and time spent thinking about COVID-19 are related to increased anxiety symptoms. Understanding how COVID-19 impacts the psychological mind can aid in targeting this issue in therapy. The current study suggests that limiting one's time thinking about COVID-19 may reduce anxiety. Remaining self-aware of the relationships between rumination and negative feelings about COVID-19 may improve one's quality of life during the COVID-19 pandemic.

Autonomous observations of light and temperature under the arctic ice pack from a buoy deployed on 2018

Mary LePere, Kim Lockwood, Isabel Martinez (Mentor Dr. Victoria Hill)
Sciences

As part of the Arctic Observing Network, an ice-tethered buoy was deployed in first year sea ice in the spring of 2018. The buoy measured light, temperature, salinity and phytoplankton biomass within and under the ice through the spring. The buoy captured the complex light field that developed during the spring ice melt, as well as increased phytoplankton in the water column that represented the spring bloom. The data from the buoys provides unprecedented observations of the upper water column under current ice pack conditions, increasing in our understanding of the physical, biological and chemical impacts of a thinner and more fractured ice pack.

An Importance-Performance Analysis of Local and Destination Visitors to Monocacy National Battlefield

McKenzie Mosher, Colin McCormack, Caleb Scruggs, Chris Zajchowski, Jessica Fefer (Mentor Chris Zajchowski
Education

The purpose of this study was to understand the evolving visitor experience at Monocacy National Battlefield (MONO) in Fredrick, Maryland and, specifically, the way this National Park Service site serves both its' destination and local visitors. Using an Importance-Performance Analysis, segmented by visitors' county of residence, we demonstrate key differences in the visitor experience across visitor type. Following survey design with MONO managers and

approval from the U.S. Office of Management and Budget, onsite sampling occurred over 21 visitor contact days, stratified by day of the week and time of day, in summer and fall of 2021. 469 visitors were contacted across five high-use sites of interest identified by the park (Best Farm, Gambrill Mill, Thomas House, Worthington House, and the MONO Visitors Center). 445 visitors agreed to participate in an online survey, yielding an acceptance rate of 94.9 percent. Surveys were conducted online and completed by visitors following their visit. 287 visitors completed more than 50 percent of the survey yielding a 61.2 percent response rate. Emerging results suggest key differences in the visitor experience across visitor type, as well as potential areas importance shared by diverse visitors to MONO. Results allow the park to use data-driven decision making to plan and manage across visitor type and add to the evolving understanding of how recent recreational trends impact park and historic area management.

Virtual Circuit Lab Simulation

Pauline Delacruz (Mentor: Dr. Yuzhong Shen)

Engineering

Circuit simulations have often been performed within the traditional classroom setting such as a physics lab. Within these labs, students usually experiment with series, parallel, RC, and RLC circuits utilizing various tools. However, due to the ongoing global pandemic of COVID-19, many students are unable to experiment in person and find it difficult to understand these concepts. They lose the hands-on experience gained from circuit experimentation to see the system in real time. Having the equipment at home does not solve the problems as not all students will have access either by expense or by distance. To remedy this problem, virtual physics labs will be developed for students to either use to prepare for the in-person labs or to perform the labs through distance learning. They will be able to access the lab through an application developed in Unity. Within these virtual labs, students will be able to create various circuits and utilize the same equipment that is found within the physics labs. They will be able to measure the output of the circuits and analyze the data created using various tools in the virtual lab. This includes an analog trainer, an oscilloscope, and a multimeter. Other models such as a voltmeter and an ammeter will be made available to the students. The virtual environment that will host the circuit lab will be modeled to resemble a similar scene reflecting the classroom experience. Here, the development of these models, scenes, circuit simulations and how they will be utilized will be discussed.

Movement Controlled Snake Game

Porter Doughty (Mentor: Dr. Ayman El Mesalami)

Sciences

A small, portable device that plays the game "Snake" using a camera and tracking your body to move the snake. It uses a raspberry pi and is stored in a self contained, convenient, and easy to move device. The unit can be connected to a monitor using a mini-HDMI cord. The storage device for the raspberry pi will also act as a physical user interface for the player of the game, displaying in game info and reacting to events in game.

Access to Nitrogen Heterocycles via Borrowing Hydrogen Catalysis

Robert P. Reynolds, Kellen P. McGuire, Conor T. McCormick, Kyle M. Lambert (Mentor: Dr. Kyle Lambert)

Sciences

Nitrogen heterocycles are ubiquitous motifs which occur as the core structure of several alkaloid natural products exhibiting inherent biological activity against an array of bacteria, fungi, viruses, and cancer cell lines. These azacycles serve as key synthetic building blocks for medicinal

chemists to access more structurally complex and diverse compounds with tunable biological properties. A synthetic approach to these valuable motifs employing intramolecular borrowing hydrogen catalysis has been developed. The utility of the developed chemistry will be applied to synthetic efforts towards the recently isolated Cylicomorphins A-E.

Assessing Near Duplicity and Document Linking Fidelity of the Semantic Scholar Open Research Corpus
Ryan Hiltabrand (Mentor: Jian Wu)
Sciences

Scholarly big data is the rapid growth of scholarly papers placed into digital repositories and libraries. Recently, the Allen Institutes for Artificial Intelligence released the Semantic Scholar Open Research Corpus (S2ORC), one of the largest open-access scholarly big datasets with more than 130 million scholarly papers. Like many other scholarly big datasets, S2ORC contains automatically extracted metadata, which was further used for (1) disambiguating near-duplicate papers – papers that were written in different versions towards the same submission and (2) linking documents to external digital library databases. The imperfection of these quality metrics could impact downstream research such as citation analysis, citation prediction, and link analysis. In this project, we assessed (1) the near-duplicity quality of the S2ORC dataset and (2) the document linking fidelity using S2ORC metadata. We found that the data linking of S2 quality is high but not perfect. The accuracies range from 0.91 to 0.99 depending on subject domains and data curation methods. The near duplicity of this corpus is also imperfect. We identified up to 6000 near-duplicate articles in 150,000 randomly selected samples using different curation methods. Given that there are 200 million paper records in S2, data users should be aware of these caveats when performing data coverage and network analysis between S2 and other databases.

Germination of Orchid Seeds With Different Plant Media Components
Sarah Granderson, Lisa Wallace (Mentor: Lisa Wallace)
Sciences

Plant germination is the starting growth of a seedling. Depending on the type of genus, requirements must be met for germination to occur. For this research, our lab focused on the soil components required for a native orchid known as bog candles, Platanthera dilatata, to germinate. Soils for orchids contain general chemical components at different concentration levels and various pH values that contribute to the germination and growth of orchids. These components are what our research is focusing on. Inside a lab, media is a substitution for soil as it contains nutrients normally given to the soil by fungi and mycorrhizae. Media can be used to see plant germination from the naked eye. Different types of media can be experimentally changed to determine how various chemicals and pH influence germination and may reflect variation in germination ability of plants in different soils. For this research, seeds were collected from orchid plants in various soil compositions in Alaska. Orchid seeds are tested with four media types. Seeds were watched over an 8-week period and then placed under a microscope to count the number that had germinated along with taking information on the structure, growth, and size of germinated seeds. Future experiments will include further component testing of pH, nitrogen, phosphorus, potassium, and calcium in different media types to determine their effects on the germination of the seeds. This research is important as it can provide ways to germinate bog candles without fungi and in soils that contain the right soil components.

Autonomous observations of light and temperature under the arctic ice pack from a buoy deployed on March 2015

Sofia Baez, Kate Draa, Rachel Bowser (Mentor Dr. Victoria Hill)

Sciences

As part of the Arctic Observing Network, an ice-tethered buoy was deployed in first year sea ice in the spring of 2015. The buoy measured light, temperature, salinity and phytoplankton biomass within and under the ice through the spring. The buoy captured the complex light field that developed during the spring ice melt, as well as increased phytoplankton in the water column that represented the spring bloom. The data from the buoys provides unprecedented observations of the upper water column under current ice pack conditions, increasing in our understanding of the physical, biological and chemical impacts of a thinner and more fractured ice pack.

Accessing Biologically Important Imines and Nitrogen Heterocycles Using an Organocatalyst

Stephonda G. Lewis (Mentor: Kyle Lambert)

Sciences

Nitrogen-containing heterocycles play a prominent role in a variety of biological systems and drug-like molecules. Imines play an important role in the formation of these heterocycles and commercially available starting materials include alcohols and amines and a direct oxidative transformation to form imines is highly valuable. Bobbitt salt, a bench-stable and environmentally benign oxidant, can be employed to access imines in a one-pot oxidation. Our developed method affords moderate to high yields of the desired imine product and can be further functionalized to highly valuable nitrogen heterocycles. Optimized reaction conditions allow for an environmentally safe and cost effective method to accomplish this transformation.

Lateral Flow Assay for Prostate Cancer Diagnosis

Taryn Amos, Alexis Moody, Gymama Slaughter (Mentor: Gymama Slaughter,Alexis Moody)

Sciences

Approximately 34,000 men in the United States lost their lives to prostate cancer (PCa) in 2021 according to the National Institutes of Health's Cancer Institute. Making prostate cancer the second leading cause of death in American men. Prostate cancer diagnosis, often occurring in the later stages where survival rates are lower, is achieved with a core needle biopsy. This invasive procedure that tests for the prostate specific antigen, an antigen that when elevated is indicative of cancer, has a significant number of PCa false positives. Gold nanoparticles (AuNPs) selectivity and biocompatibility makes them ideal candidates for prostate cancer diagnosis. Here a lateral flow biosensor (LFB) assay is developed using AuNPs to diagnosis PCa. This LFB tests for oncogenic and tumor suppressor PCa-associated miRNAs. The developed LFB produced visual and numerical data to decrease the false positive rates in prostate cancer testing. This LFB has the potential to enable earlier diagnosis of prostate cancer and ultimately save lives.

Climate Change in the Arctic: What everyone should know about the Arctic in our world today

Victoria Hill, Elizabeth Smith
David T. Gauthier (Mentor: David Gauthier)

Sciences

Recent years show unprecedented change in the ice-covered Arctic Ocean, however, many peoples' understanding of this system is limited. OES 395 is a topics course called Arctic Climate Change and aims to provide an introduction to Arctic science, how the Arctic is changing and the impact those changes may have on us. Through traditional lectures, and hands-on data

analysis, students will explore the Arctic ocean, ice and atmosphere system; Arctic ecosystems from the "charismatic megafauna" (polar bears and more) to the (not so charismatic?) microbes that exist inside the matrix structure of sea-ice; and how humans interact with the Arctic system. Students consider how the components interact, how they are changing, what the future may hold. The course is offered to interest both those considering a major in science and those who seek a career in many non-science fields, including education, government advising, and Arctic-relevant industries.

The highlight of the course will be a week-long "field trip" in early March 2022 to Utqiagvik, AK on the edge of the Arctic Ocean. This will be a unique opportunity to travel to an incredibly remote region of the earth, and learn techniques for collecting samples from the sea ice and the ocean beneath. Students will learn how to core sea ice, measure snow cover, and collect temperature, salinity and light measurements under the ice. The data will be analyzed in the lab, and is being presented here for the first time.

Authentic field experiences like this are important in helping undergraduates develop their curiosity and interests, and in motivating them to learn more! The students will also visit the NOAA, atmospheric baseline observatory, Iñupiat Heritage Center, and the Utqiagvik archeology lab.

Whole genome assembly of the Gulf Coast Tick Amblyomma maculatum

Yazid Al Akash, Bhavana Bhavanam, Catharine Cipriano, Stevie Cleeton, Isabella Gay, Emily Killian, Viki Martinez, Joanna Tricia Mascarinas, Niaylah Means, Tequail Spencer, Rebecca Ferrara, Bethany Norris, David T. Gauthier (Mentor: David Gauthier)

Sciences

Course-based Undergraduate Research Experiences (CUREs) involve classes of students addressing real-world research questions without pre-defined outcomes. BIOL380/381, Research in Pathogen Biology (RiP-Bio), was designed as an advanced CURE for 300-level Biology students at ODU. In this cycle of RiP-Bio, we are sequencing and assembling the whole genome of Amblyomma maculatum, the Gulf Coast tick. The current assembly of the genome is incomplete, as we have only short Illumina reads that do not fully assemble. We are using published mRNA sequences from the A. maculatum transcriptome to scaffold the incomplete assembly, and create primers for gap closure of important genes. Assembled genes will be deposited for use by others in Genbank.

Gaze-based Drone Navigation

Kayla Pineda & Sampath Jayarathna (Mentor: Sampath Jayarathna)

Sciences

This project aims to develop a novel drone navigation activity that would allow an operator of a drone to immerse in alternate realities, called Gaze Augmentation (a partial immersion), for drone proximity navigation. In particular, the drone operator would be able to control the point-to-point navigation by moving their gaze position to a series of desired target waypoints in a visual field. We propose using eye-tracking via PupilLabs Core eye tracker (sampling frequency of 200HZ) to control a drone point-to-point navigation. We utilize ArUco markers to designate a waypoint in the visual field. An ArUco marker is a synthetic square marker composed by a wide black border and an inner binary matrix which determines its identifier. Before controlling the drone using eye-tracking, we create a simple navigation plan for the drone using gaze-guided waypoints via ArUco markers (the operator will create an initial navigation plan by creating a gaze position map via designated ArUco makers in the visual field). From there, we plan to use the data points to get the initial drone rotation angle, then moving towards the ArUco markers.

In the evaluation, the drone makes an initial rotation, then detects and flies to an ArUco Marker position. Once the navigation towards the marker is successfully detected, it will get another rotation and detect the next waypoint marker and so on.

Family Diabetes Camp during COVID: Impacts and Outcomes

Kalleigh West, Bethany Arrington, Rowan Williams, & Karrie Hobbs (Mentor: Eddie Hill)

Education

Family diabetes camp provides immune-compromised children the ability to take part in a unique recreational experience. While attending the camp, both children with type 1 diabetes and their families have the opportunity to participate in educational programs. The camp is also unique because it allows campers and their families to come together and share experiences with their diagnoses. The pandemic has drastically halted the opportunity for children to participate in social activities, so it was essential to provide campers who may already feel isolated due to their illness with a chance to socialize with other families with diabetes. Analyzing the impact of camp is crucial in developing unique ways to program and evaluate recreational experiences. Guided by the self-determination theory, the purpose of this study was to assess the impact of medical specialty camps on camper outcomes of independence and perceived competence and examine family feedback on evolving program changes during COVID-19.

Data were collected at a Mid-Atlantic medical specialty camp for youth with type-one diabetes during May 2021. Forty-five campers and parents participated. Independence and perceived competence were measured using the ACA-Youth Outcomes Battery Basic Version. Results included 37 youth and 22 parents who provided insight. Parent data showed that 81% of families were satisfied with the programming, and over 95% of respondents felt that the camp helped increase their knowledge on diabetes. Lastly, 95% of parents believed the camp was operated successfully.

The Impact of Lactation on Resting Metabolic Rate

Da'Zha Q. Loney, Kayla Powell, Joel E. Harden, Hannah M. Twiddy, Patrick B. Wilson, Leryn J. Reynolds (Mentor: Leryn Reynolds, Patrick Wilson)

Education

Introduction: Studies demonstrate that breastfeeding women have higher resting metabolic rates (RMR) than women who are not breastfeeding. However, whether a single bout of lactation increases RMR is unknown. This study's purpose was to determine if a single bout of lactation acutely increased RMR. Methods: RMR was assessed at baseline, 1 hour and 2 hours following breast milk expression for 17 lactating women (Age: 32±0.86, BMI: 28.7±1.8). Fourteen non-lactating women (Age: 26±1.79, BMI: 26.5±1.6) served as time controls with RMR measured at baseline, and following 1 and 2 hours of sitting. Results: RMR was unchanged following a single bout of lactation (Lactating Women: Baseline: 1409 ± 48; 1hr: 1399 ± 71; 2hr: 1407 ± 38 kcals/day) ($p>0.05$). Additionally, there was no statistically significant group or time effect of RMR in the lactating and non-lactating women (Non-Lactating women: Baseline: 1410 ± 55; 1hr: 1438 ± 46; 2hr: 1441 ± 48 kcals/day) ($p>0.05$). RMR was not significantly correlated to the average amount of milk produced per day ($r=-0.03$, $p>0.05$) or the number of times breast milk was expressed daily ($r=-0.05$, $p>0.05$). However, RMR was significantly, positively correlated to body mass ($r=0.78$, $p<0.001$) and percent body fat ($r=0.60$, $p=0.01$) in the lactating women ($p<0.05$). Conclusions: A single bout of lactation doesn't significantly increase RMR in women,

but RMR in lactating women shows more correspondence to body mass or body composition in the post-partum period.

Oxidation of Thiols to Disulfides using an Environmentally "Green" Organocatalyst and New Mechanistic Insights
Kosta V. Vlasakakis, Olivia M. White, Robert P. Reynolds, Shayne M. Weierbach, Shannon M. Weaver, Ramsey T. Ritter, Nishi H. Patel, Eric C. Hayes, Sydney Dunmire, & Kyle M. Lambert, (Mentor: Kyle M. Lambert)
Sciences

The selective oxidation of thiols to disulfides is an area of great importance in the areas of materials and medicinal chemistry research. The production of polymers, rubber, pharmaceuticals, and the folding of proteins in biological systems all rely on the formation of disulfide bonds. Herein, we introduce a stoichiometric and electrocatalytic method for the oxidation of various pharmaceutically and biologically relevant thiols into their respective disulfides in more environmentally benign solvents such as water and alcohol solvents. The scope of the transformation was evaluated and a detailed mechanistic study involving control experiments, experimental kinetic studies, and computational investigations led to new insights into how the oxidation takes place via an unusual anionic process.

Oral Session 1

1:00-2:00 PM

Art History 1: The Art of Transformation

Botticelli's Primavera: A Gateway Drug into the World of Pagan Imagery
Ashlee Aubree Webb (Mentor: Dr. Anne H. Muraoka)
Arts & Letters

Sandro Botticelli's 1477-82 *Primavera* is a tempera on panel painting that depicts a garden encapsulating nine figures representing mythological Roman gods and goddesses and was originally in one of the Medici family's palaces. Scholars primarily focus on the roles and identities of the figures pictured within the painting, the painting's function as an illustration of poetry or as an allusion to the Roman calendar. This paper argues that Sandro Botticelli's *Primavera* ushered in spring and the acceptance of pagan imagery that was socially acceptable in a time of religious restraint. This thesis explores the contextual understanding of *Primavera* as an allegory for a woman's role in the Catholic sacrament of matrimony. By examining humanist influences, an understanding of the work's correlation to the Catholic Religion emerges. Botticelli's *Primavera* allowed the symbolic nature of gods and goddesses of antiquity to become an acceptable means of expression in the Catholic Religion. The opportunities allotted to this artist created the perfect situation to take the popular humanist text and influences of the past and combine them with the Catholic Religion, thus opening Pandora's box.

Metamorphosis: Examining Parmigianino's 'Self-Portrait in a Convex Mirror'
Kayla Cochran (Mentor: Dr. Anne Muraoka)
Arts & Letters

In the year 1524, Italian painter Francesco Mazzola, also referred to as Parmigianino, created *Self-Portrait in a Convex Mirror*. According to Giorgio Vasari, the self-portrait was a gift for Pope Clement VII during Parmigianino's travel to Rome. In Genevieve Warwick's article, "Looking in the Mirror of Renaissance Art," the process behind Parmigianino's painting is discussed. The composition of the self-portrait entices the viewer to think about production, and the process of viewing and making art. In 1997, Norman E. Land wrote the article "Parmigianino as Narcissus," in this article Land suggests that Parmigianino's *Self-Portrait in a Convex Mirror*, is both a portrayal of Narcissus and a representation of the vice Vanity. Land explains that Narcissus was the first painter and compares his attempt to embrace his reflection on the surface of the water to Parmigianino's desire to embrace nature. In addition, Land argues that the mirror within the composition is attributed to the representation of Vanity and self-obsession. With the concept of Vanity in mind, this paper argues that *Self-Portrait in a Convex Mirror* depicts Parmigianino's transformation as an artist, from being the allegorical embodiment of Vanity, to that of Prudence. Parmigianino depicts his transformation from vice to virtue through symbolism attributed to alchemy, a practice that later consumed his life. By closely examining the composition of the self-portrait, the iconography embedded within the work, and the rise in alchemical traditions in Italy at the time, this paper will prove how Parmigianino transformed from Vanity to Prudence, and mercury to gold.

Pieter Bruegel the Elder's Series of the Months: A Celebration of Dutch Humanity Amidst Religious Turmoil

Kayla Bruce (Mentor: Anne Muraoka)

Arts & Letters

Pieter Bruegel the Elder was one the most influential Flemish painters to come out of the Northern Renaissance. He is best known for his impact on genre painting; particularly those focused on the Flemish landscape and the daily lives of peasants. In 1565, Bruegel executed a series of paintings as a commission for the merchant Niclaes Jongelinck, titled the *Series of the Months*. Five of the paintings in the series are known, *Hunters in the Snow*, *Gloomy Day*, *Haymaking*, *The Harvesters*, and *Return of the Herd*. The series is based on a medieval tradition of painting the Labors of the Months as calendar illuminations although it has been traditionally regarded as secular in nature. Upon closer examination of each painting, religious imagery begins to emerge in the details. Not only can imagery of Christianity be found, but also aspects of rural Paganism and Neostoicism can also be found. Embedded as they are within a larger landscape, these aspects are somewhat hidden as Bruegel, conscious as he was about the Reformation and Counter-Reformation, avoids giving any of them an overt role. These small details, the viewpoint of the paintings, as well as the role the series played in Jongelinck's home all encourage engagement with the viewer. The iconography within the paintings, however, when examined against the backdrop of the Counter-Reformation all show that the *Series of the Months* functioned as visual aids to spiritual ends and highlighted the Netherlands connection to both local folklore and Christian religions.

Museum Demographics: Food for Thought

Kayla Cochran (Mentor: Jared Benton)

Arts & Letters

According to Cynthia Robinson's article, "Into the Future: Adult Professional Groups and the 21st Century Museum," the majority of museum visitors are over the age of 50, white and female. This statistic rings true even for museums situated on college campuses, surrounded by young adults. The Barry Art Museum (BAM) at Old Dominion University is no exception.

Moreover, the institution's demographic data reveal that most of its visitors are over the age of 50, and white, despite a younger and more diverse student body. I set out a research agenda to find out why that is, and to guide museum policy to become more attractive to younger people. I created a poll for my peers to answer on social media, asking "what makes you want to visit a place." The responses were overwhelming food related. As an intern at the Barry Art Museum in the Summer of 2021, I designed a project with the goal of attracting young adults to the museum, and paying homage to the museums founder, Carolyn Barry, and her passion for cooking. In general, I advocate for more eclectic – and frankly food related – events alongside the traditional exhibition, but I also organized a BAM Cookbook. The BAM Cookbook is a compilation of recipes inspired by artwork found within the BAM. This paper will present the data from my questionnaire, some possible new directions for culinary innovation at museums, and potential economic opportunities for museums in creating food and art related content, such as the BAM Cookbook.

College of Sciences UG Research #1

COVID-19 Classroom Occupancy Detection System

Stephanie Trusty (Mentor: Ayman Elmesalami, Soad Ibrahim)
Sciences

The classroom occupancy detection system aims to limit the spread of COVID-19 and support mitigation efforts advised by national and international health organizations by enforcing social distancing in classroom environments. Utilizing the RaspberryPi computer and its compatible camera module, the system accomplishes this by capturing an overhead image of a classroom and assessing the image for violations. Here, violations are defined as the presence of adjacent occupied seats. As such, for an acceptable state to be detected, there must be at least one vacant seat between all students seated in the classroom. The system communicates the classroom's state with two light-emitting diode circuits, illuminating a green LED to denote an acceptable state and a red LED to denote one or more violations. System performance was evaluated under three test case scenarios with a simulated classroom environment. The test case results revealed that the system can accurately detect acceptable conditions, as well as the presence of one or more seating violations. However, the inability to account for human behaviors and complex seating layouts limits the system's real-world functionality. Despite its current limitations, this project suggests that image processing techniques may be a feasible solution to support social distancing in the classroom.

A Field Study In An Urban Area: Examining Distracted Pedestrian Unsafe Crossing Behavior

Emma Hood (Mentor: Bryan E. Porter)
Sciences

A field study examining distracted pedestrian unsafe crossing behavior in an urban area. The study is among the first to contribute knowledge to environmental alterations impact on crossing behavior. Portions of the abstract are a part of a manuscript that will be submitted to Psi Chi Journal of Psychological Research for undergraduate students.

Two-Stage Transfer Learning for Facial Expression Classification in Children

Gregory Hubbard, Megan Witherow, & Khan Iftekharuddin (Mentor: Khan Iftekharuddin)
Engineering

Studying facial expressions can provide insight into the development of social skills in children and provide support to individuals with developmental disorders. In afflicted individuals, such as children with Autism Spectrum Disorder (ASD), atypical interpretations of facial expressions are

well-documented. In computer vision, many popular and state-of-the-art deep learning architectures (VGG16, EfficientNet, ResNet, etc.) are readily available with pre-trained weights for general object recognition. Transfer learning utilizes these pre-trained models to improve generalization on a new task. In this project, transfer learning is implemented to leverage the pretrained model (general object recognition) on facial expression classification. Though this method, the base and middle layers are preserved to exploit the existing neural architecture. The investigated method begins with a base-packaged architecture trained on ImageNet. This foundation is then task changed from general object classification to facial expression classification in the first transfer learning step. The second transfer learning step performs a domain change from adult to child data. Finally, the trained network is evaluated on the child facial expression classification task.

Monarchs Maximizing Access to Research Careers #1

Synthesis, characterization, and biomedical uses of cobalt(III) complexes with 1,10-phenanthroline and salicylaldehyde and its derivatives as ligands

Lindsay C. Days, Michael J. Celestine, Criszcele M. Tano, Elizabeth A. Tonsel-White, Chloe B. Smith, Duaa R. Alajroush, Stephen J. Beebe, Alvin A. Holder (Mentor: Dr. Alvin Holder)
Sciences

Triple-negative breast cancer (TNBC) presents considerable therapeutic challenges due to disease heterogeneity, absence of established therapeutic targets, and aggressive metastatic potential with higher rate of distant recurrence. In addition, TNBC is most common in younger patients (before age 40), especially in African American women, often leading to significant disease progression and poor prognosis. The limited efficacy of current treatments for advanced breast cancer has served as an impetus for a concerted effort to identify chemo-preventive agents for treatment. This process has often involved the use of cisplatin, which is widely used for the treatment of many cancers despite its high toxicity, undesirable side effects, and problems with drug resistance in primary and metastatic cancers. Biomedically relevant cobalt-containing compounds have provided promising results for cancer treatment. Novel cobalt(III)-based complexes have been synthesized and characterized in order to develop an improved treatment for TNBC with the hope that they can be used while decreasing the side effects involving the use of cisplatin. The novel complexes $[Co(phen)_2(salH)](PF_6)_2$ (where phen = 1,10-phenantroline and salH = deprotonated salicylaldehyde) and $[Co(phen)_2(F\text{-}azo\text{-}sal)](PF_6)_2$ (where F-azo-sal = (E)-5-((4-fluorophenyl)diazenyl)-2-hydroxybenzaldehyde) were synthesized from the starting material, anhydrous $[Co(phen)_2(H_2O)_2](NO_3)_3$. Both complexes were characterized by elemental analysis, followed by ^{1}H NMR and FTIR spectroscopies, and will be further characterized by high resolution mass spectroscopy (HRMS), ^{59}Co NMR and UV-visible spectroscopies, and X-ray crystallography, where appropriate. In vitro studies will be conducted with the human TNBC cell lines, MDA-MB231 and HCC1937 to determine the IC_{50} values of the complexes. The human breast epithelial tissue cell line MCF-10A is the control non-cancerous cell line.

Anticancer studies of a Cu(II) complex in a Triple Negative Breast Cancer cell line

Chloe Smith, Duaa R. Alajroush Mrs., Novia Mann Mrs., Alexis Fletcher Ms., Brittney Ruedlinger Dr., Stephen J. Beebe Dr., Alvin A. Holder (Mentor: Alvin Holder, Stephen Beebe)
Sciences

Triple negative breast cancer (TNBC) is an aggressive form of breast cancer negative for estrogen, progesterone, and human epidermal growth factor (HER2) receptors. Hormone treatment of breast cancer involves one of the three receptors TNBC is negative for, thus leaving TNBC without an established treatment. Cisplatin is a commonly used chemotherapy in breast cancer patients, but many TNBC patients acquire cisplatin resistance. The objective is to synthesize and characterize new chemotherapeutic agents that can be used combat cisplatin resistance. Copper-containing complexes are known for inhibiting topoisomerase, breaking DNA strands, and intercalating DNA in cells. **The hypothesis is treating MDA-MB-231-VIM-RFP cells with a copper(II) complex with the ligand, (*E*)-*N*-ethyl-2-[1-(thiazol-2-yl)ethylidene]hydrazinecarbothioamide will induce cell death with a low inhibitory concentration at 50% of cell viability (IC_{50} value).**

To test this hypothesis, we plated 15,000 cells in 96 well plates, treated MDA-MB-231-VIM-RFP cells using increasing concentrations of the copper(II) complex and incubated cells for 72 h; then utilized cell counting kit (CCK-8) cell viability assay to determine the IC_{50} value. The copper(II) complex had an IC_{50} value of 5.33 ± 0.9 µM.

Flow cytometry determined time points at which cells reached apoptosis, and whether the cells activated caspase 3/7 or reactive oxygen species (ROS) after treatment. Flow cytometry showed that caspase 3/7 and ROS were activated between 22 and 33 h after treatment. It was determined that 20% of cells died before 22 h, suggesting more than one cell death mechanism. Future studies will include DNA binding studies and determining gene expression after treatment.

Determining Trigger Bonds in High Energy Density Materials with Catenated Nitrogen Compounds

Daja Goodrich, Craig A. Bayse (Mentor: Dr. Craig Bayse)
Sciences

Originally used to assist in mining purposes, explosives are now also used for military, engineering, and even aeronautical purposes. Common explosives such as 2,4,6-trinitrotoluene (TNT), and 1,3,5-trinitro-1,3,5-triazacyclohexane (RDX) release harmful products into the air such as NO_2, CO, and CO_2. With the attempt to decrease the number of hazardous products in the air, the idea of 'greener' explosives formed. Replacing the carbon backbone of high energy density materials (HEDMs) with catenated nitrogen chains could not only increase the stability of HEDMs but generate nitrogen gas instead of harmful by-products. HEDMs are proposed to include trigger bonds that break to initiate explosive decomposition. Azo compounds could break at the azo bridges to release N_2, but molecules with extended nitrogen chains could have more complicated decomposition mechanisms. By determining which bond is the weakest and most likely to break first (trigger bond), one could predict the products of the detonation. The rapid rates of reaction for HEDM detonation limits the applicability of experimental methods. Instead, computational methods such as the density functional theory (DFT) and Wiberg Bond Index (WBI) analysis would be used to identify the trigger bond by comparing the WBI of a potential HEDM to a reference molecule. The bond with the lowest relative WBI is assigned as the trigger bond in that molecule.

College of Education UG Research #1

The effect of physical activity on polychlorinated biphenyls: A Pilot Study

Ashley Middleton, Leryn Reynolds Ph.D., Joel Harden (Mentor: Leryn Reynolds, Joel Harden)
Education

Polychlorinated Biphenyls (PCBs) are associated with an increased risk of cardiovascular and metabolic disease. PCBs are sequestered in adipose tissue and exercise stimulates lipolysis.

However, whether PCB concentrations are altered in habitually active individuals is not well understood. Thus, the purpose of this study was to examine if individuals who participate in high levels of moderate to vigorous physical activity (MVPA) have altered levels of PCBs compared to individuals who participate in low levels of MVPA. Data from the National Health and Nutrition Examination Survey (NHANES) (2003-2004 years) was used 2,697 individuals (Age: High MVPA: 38.67 ± 0.540, Low MVPA: 50.99± 0.618) and BMI: High MVPA: 26.6212 ± 0.23447, Low MVPA: 28.9185 ± 0.25464) were included in the analysis which represents 114,536,287 Americans. MVPA was measured via accelerometry and was divided into high (44.2889 ± 0.80263 mins/day) and low (9.1269 ± 0.19560). PCBs were measured from blood collected at the mobile examination center. After controlling for race, ethnicity, gender, BMI, and weight loss within the past year, , PCB 153 (High MVPA: 0.255± 0.013 vs. Low MVPA: 0.223±0.009ng/g), PCB 170 (High MVPA: 0.049± .003 vs. Low MVPA: 0.077±0.002, ng/g), PCB 172 (High MVPA: 0.010±0.001vs. Low MVPA: 0.009±0.0003, ng/g), PCB 178 (High MVPA: 0.015 ±0.001 vs. Low MVPA: 0.012±0.001, ng/g), PCB 180 (High MVPA: 0.217± 0.009 vs. Low MVPA: 0.181±0.007, ng/g), PCB 183 (High MVPA: .020 ±0.001 vs. Low MVPA: 0.017±.001, ng/g), PCB 194 (High MVPA: 0.048 ±0.002vs. Low MVPA: 0.042± 0.002, ng/g),were significant. Thus, it appears that PCB 153, 170, 172, 178, 180, 183, 194 are significantly higher in individuals with higher levels of physical activity; although the clinical implications of such a small difference remain unknown.

Quantifying cell adhesion strength with a novel flow assay

Antra Patel, Venkat Maruthamuthu (Mentor: Venkat Maruthamuthu)

Engineering & Technology

Quantifying the level of adhesion of cells to the extracellular matrix (ECM) is vital in efforts to understand complex biological functions. Cell adhesion to the ECM involves multiple cell surface proteins binding to components of the ECM. The ECM consists of collagen fibers, proteoglycans, and other matrix components, all of which are produced by cells themselves. Fluid flow in microfluidic channels has previously been used to quantify the fluid shear forces required to disrupt cell-ECM adhesion. Enzymatic digestion of cell-ECM adhesion components by the enzyme trypsin has also been used qualitatively. Here, we combine elements of these two methods to develop an accessible alternative. We flowed 0.25% trypsin through a microfluidic channel to rupture the adhesion between single Madin-Darby Canine Kidney (MDCK) cells and collagen I. The fraction of cells that stayed adherent to the collagen surface precipitously dropped at higher flow rates. The channel allowed cell adhesion rupture events to be spatially resolved via time lapse imaging. Our setup enables the use of different extracellular matrix properties as well as cells in different biochemical states to model cell adhesive states relevant to healthy and diseased tissues. Our approach has a large dynamic range – i.e., the assay can quantify the adhesion strength of very weak as well as very strong cell adhesive contacts. Thus, it is of relevance to the study of cell physiology in a multitude of normal as well as diseased states like cancer.

Oral Session 2

2:15-3:15 PM

Art History 2: New Research Commemorating the 450th Anniversary of Caravaggio's Birth

Caravaggio's Inspiration of Saint Matthew: A Lesson in Penance

Kim Hardy (Mentor: Dr. Anne H. Muraoka)

Arts & Letters

Relatively unknown at the time, an early-Baroque painter named Michelangelo Merisi received his first public commission to adorn the Contarelli Chapel of San Luigi dei Francesi, the French National Church in Rome. The high-profile project launched this Lombard artist, now, better known as Caravaggio, to fame. Two lateral paintings, *The Calling of Saint Matthew* (1599-1600), *The Martyrdom of Saint Matthew* (1599-1600), and an altarpiece, *Saint Matthew and the Angel (*1602), which was rejected by church officials, have been thoroughly analyzed by historians. *The Inspiration of Saint Matthew*, painted to replace the first altarpiece, has garnered scant critical attention. In fact, typically, historians address it only briefly, treating it as a foil to better understand the rejection of its predecessor. However, an examination of the iconography of this second version (which is still *in situ*) reveals how the communication of a major objective of the post-Tridentine Catholic Church may be discerned by a singular detail: the stool. As a cipher for sin, the stool is the key to understanding that *Inspiration* conveys to believers and heretics alike the magnitude of the Catholic Sacrament of Penance, positioning it squarely within the context of Caravaggio's established program for the Contarelli Chapel and at odds with the Protestant notion of justification.

Interpreting the Divine Magdalene: Caravaggio's 'Martha and Mary Magdalene'

Kayla Cochran (Mentor: Dr. Anne Muraoka)

Arts & Letters

In the year 1598, Caravaggio created *Martha and Mary Magdalene* (also referred to as *The Conversion of the Magdalen*). According to a will dated from 1606, the painting was originally acquired by one of Caravaggio's patrons, Ottavio Costa. Painted in oil and tempera on canvas, *Martha and Mary Magdalene* is said to depict the exact moment of Mary Magdalen's conversion. She is seen leaning against a convex mirror, which reflects an illuminated window behind her sister Martha. The two women seem to be in deep conversation as Martha, who is in shadow, is counting off her finger. Traditionally, scholars agree that *Martha and Mary Magdalene* depicts the exact moment of conversion of Mary Magdalene. However, if we compare this painting to Caravaggio's 1597 painting of *Penitent Mary Magdalene* where the identification of Mary's conversion is clear, the moment captured in *Martha and Mary Magdalene* is altogether different. This paper argues that the 1598 composition of *Martha and Mary Magdalene* is not portraying the scene of Mary's conversion, but a moment afterwards. Caravaggio depicts a post-conversion Mary in order to communicate the two types of Christian beliefs during the Counter-Reformation: one of good acts, and the other of spiritual love, which are represented by the two women seen in the composition. It is through the examination of the formal and iconographic elements of the painting and other Magdalene paintings against the backdrop of the Counter-Reformation that a new interpretation emerges.

Caravaggio's Faith and Good Works: A New Interpretation of Saint Jerome Writing, and its Implications About the Artist

Louis Berbert (Mentor: Dr. Anne Muraoka)

Arts & Letters

Over the past one-hundred years, much effort has been given to the analysis and interpretation of the many paintings produced by Michelangelo Merisi da Caravaggio during his short lifetime. Unfortunately, many of the artist's works have gone vastly understudied, such as his *Saint Jerome Writing*, completed in 1606. Several scholars have touched on the painting briefly over the years, such as Howard Hibbard, who suggests in his 1985 monograph, *Caravaggio*, that the piece touches on the transiency of life, as well as Sybille Ebert- Schifferer, who adds in her 2009 book, *Caravaggio: The Artist and His Work,* that the painting appears to be unfinished. John T. Spike also argues in his revised, 2010 monograph, *Caravaggio*, that *Saint Jerome Writing* marks a significant shift in style for Caravaggio, noting a looseness to the brushstrokes that was not present in the artist's previous works. Individually, each of these assertions do not amount to much, however, like many of Caravaggio's other paintings, deeper intimations can often be divulged. This paper, through the use of previous scholarship, formal analysis, biographical content about the artist, and information regarding the painting's conception, serves to put forth the notion that *Saint Jerome Writing* is not as straightforward as art historians currently seem to believe. In fact, this paper argues that Caravaggio's *Saint Jerome Writing* is meant to not only promote Counter-Reformation ideas surrounding faith and good works, but to take viewers on a journey into the mind of the artist, revealing his deep identification with Jerome.

Abnegated Atonement: Caravaggio's The Beheading of Saint John in Malta

Timothy Cline (Mentor: Dr. Anne H. Muraoka)

Arts & Letters

A new interpretation of a classical masterpiece, this paper examines Italian Baroque painter Caravaggio's Beheading of Saint John in Malta in situ, and uncovers key details that postulate a new understanding of the most ambitious work of Caravaggio's career.

Monarchs Maximizing Access to Research Careers #2

The Association between Childhood Trauma Experiences and Eating Disorder Behaviors: Risk Factors and Racial Differences

Lauren Butler, Kelly Romano, Kristin Heron (Mentor Kristin Heron)

Sciences

Childhood trauma is a risk factor for eating disorder (ED) symptoms. However, less common ED symptoms remain understudied, and little is known about how trauma-ED symptom associations differ across racial groups. Thus, the present study aimed to examine whether associations between childhood trauma and multiple understudied ED symptoms (e.g., maladaptive muscle building behaviors, restricting) differed between adults who identified as Black vs. White. Participants were 128 Black and 163 White college students who completed measures assessing childhood trauma (traumatic sexual experience, violence, extremely ill/injured, death of a close friend/family member) and ED symptoms (binge eating, purging, restricting, excessive exercising, maladaptive muscle building behaviors). Regression analyses examined whether race moderated associations between trauma and the five ED symptoms and simple slopes analyses probed significant interactions. Results indicated that experiencing illness/injury during childhood was associated with greater maladaptive muscle building and violence was associated with more restricting and maladaptive muscle building, but not purging, binge eating, or excessive exercising. Simple slopes analyses indicated that experiencing childhood violence was associated with greater maladaptive muscle building among Black, but not White, participants. Traumatic sexual experiences and death of a close friend/family

member were not associated with any ED symptoms. Collectively, these results suggest specific types of childhood trauma may be risk-factors for certain understudied ED behaviors (restricting, maladaptive muscle building). Given that childhood violence was associated with more maladaptive muscle building among Black individuals, but not White, future research should investigate factors that contribute to this higher risk among Black young adults.

Reduction of the plasmid vector backbone length enhances reporter gene expression
Aislin West, Anna Bulysheva (Mentor: Dr. Anna Bulysheva)
Engineering

A scientific abstract for the paper "Reduction of the plasmid vector backbone enhances reporter gene expression"

Accessing Biologically Important Imines and Nitrogen Heterocycles Using an Organocatalyst
Stephonda G. Lewis (Mentor: Kyle Lambert)
Sciences

Nitrogen-containing heterocycles play a prominent role in a variety of biological systems and drug-like molecules. Imines play an important role in the formation of these heterocycles and commercially available starting materials include alcohols and amines and a direct oxidative transformation to form imines is highly valuable. Bobbitt salt, a bench-stable and environmentally benign oxidant, can be employed to access imines in a one-pot oxidation. Our developed method affords moderate to high yields of the desired imine product and can be further functionalized to highly valuable nitrogen heterocycles. Optimized reaction conditions allow for an environmentally safe and cost effective method to accomplish this transformation.

College of Sciences UG Research #2
Synthesis of bacteria nanocellulose for wound dressing.
Fenny Chaudhary (Mentor: Slaughter, Gymama)
Sciences

2% of the United States population suffers from chronic non-healing wounds. While 2% might not seem like a large number but that number converts to 6.7 million people and this number is increasing. Chronic wounds affect the aged population and also affects individuals with these conditions: Diabetes, cancer and other long-term medical conditions. It is estimated that chronic wound management has an annual cost of $25 billion in the US. Thus, smart bandaging can be used to better help manage chronic non healing wounds as they use sensors in wound monitoring to reduce the costs for wound treatment/management. In this work, we propose bacteria nanocellulose (BNC) as an ideal dressing material for the development of smart bandages. BNC is synthesized by the bacterium *Gluconacetobacter Xylinus* (*G. Xylinus*). *G. Xylinus* is cultured in 6-well culture plates and incubates for 5 days. On the fifth day, formation of a basal BNC pellicle is realized. Upon subsequent feeding with fresh media once every week for six weeks, additional pellicles were formed. The BNC pellicles are then extracted in 0.5 M NaOH at 90 oC to denature proteins and bacteria. The synthesized BNC sheets are flexible thin film that is thermally and mechanically stable. They are also inert, biodegradable, and easy to sterilize. The development of smart bandages using BNC from *G. Xylinus* has the potential to provide a more cost-effective approach to wound monitoring and healing.

Hybrid Genome Assembly of the Gulf Coast Tick Amblyomma maculatum
Bethany Norris, David T. Gauthier (Mentor: Dr. David T. Gauthier)
Sciences

Amblyomma maculatum, also known as the Gulf Coast tick, is an ectoparasite historically found throughout much of the southeastern United States. Over the past 2 decades, new invasive populations of Gulf Coast ticks have expanded north, including into eastern Virginia. Range expansions of human-biting ticks present serious public health concerns because of the pathogens they can carry. The Gulf Coast tick is a principal vector of *Rickettsia parkeri* which can cause disease in humans, and *Hepatozoon americanum* which can infect canines. No genomic resources for the genus *Amblyomma* are currently available. In this present study, we aimed to sequence and perform hybrid assembly of the entire *A. maculatum* genome. A genome is the complete set of genes in an organism.The gulf coast tick has 10 autosomal chromosome pairs and 1 sex chromosome, with a total sequence length of around 2.4 billion base pairs. To assemble the complete genome, we utilized Illumina and Nanopore sequencing technologies. We used the longer Nanopore fragments to scaffold the Illumina fragments, which were smaller but offered a much higher accuracy than Nanopore.The completed genome will be foundational for further research regarding the Gulf Coast tick. Scientists can use the genome to better understand gene location, find potential genetic basis for disease transmission, and examine how different gene variants may be selected in new emerging populations. The genome can be used for comparative genomic studies with other tick species, including species outside the *Amblyomma* genus.

Interdisciplinary Research #1

AM Radio Receiver Using the RTL-SDR

Dan Burzek (Mentor: Dr. Otilia Popescu)

Engineering

Software-defined radios are a modern method that removes the reliance on hardware to demodulate radio signals. One of the versions of these software-defined radios is the RTL-SDR. These devices have limitations on the frequencies that they are capable of modulating. The AM radio frequencies are part of this bandwidth that is inaccessible to the SDR to utilize without additional circuitry. To make these frequencies available to the RTL-SDR, a frequency upconverter will be designed and built to shift the AM radio signal into a high enough frequency for the RTL-SDR to demodulate the signal. After the AM frequencies are shifted into a usable range, MATLAB's Simulink program will then be used to convert the signals into audio.

Semantic Segmentation of Flooding for Flooding Detection

Stephen Lamczyk (Mentor: Khan Iftekharuddin)

Engineering

Among all natural disasters, flooding occurs frequently around the world, causing significant harm to humans, livestock and property. The overall goal for this project is to establish a real-time flood detection system that can warn motorists of flooding in relevant areas. Semantic segmentation of water is naturally required to build such a flood detection system. In this work, we present a semantic segmentation model trained to segment water in images and videos of flooding. We first train it on a unique combination of all preexisting semantic segmentation datasets with water and perform manipulations and mappings to these datasets to prepare them for training. Afterwards, we perform a grid search to find the most optimal neural network and corresponding loss function for the prepared dataset. The result is a neural network that can efficiently and accurately detect water in images and videos of flooding. Our model converged to a binary accuracy of 87%, mIOU of 56%, F1 score of 67%, F2 score of 70%, precision of 70%, and recall of 76% on our prepared dataset. These statistics translate well into reality as indicated by the video linked here with blue representing flooding and red

representing not flooding:
https://www.youtube.com/watch?v=UIAW1r1Zqco&ab_channel=StephenLamczyk

Friendship and Fun: Piloting a Medical Specialty Tween Day Camp

Taylor Harvey, Bethany Arrington, Rowan Williams, Eddie Hill (Mentor: Eddie Hill)

Education

In August 2021, 10 campers who all have Type One Diabetes, ages 10-15, participated in two days of programming from 9am-4pm on a Mid-Atlantic college campus. This study partnered with the Lions Club International Foundation (LCIF) to 1) pilot test a new diabetes camp on campus model, 2) use new evaluation metrics for replication across the country, 3) and determine the effectiveness of diabetes camp on glycemic variability.The program was grounded in self- determination theory, programming for camp included a combination of physical, educational, and art-based activities such as biking, rock climbing, walking, swimming, tie- dye, and crafts. To assess the effectiveness of camp in glycemic range, parents of campers completed the survey assessing glycemic variability the day before the camp and two completed the survey assessing glycemic variability the day of the camp. Ten youth aging from 11 to 15 (30% male and 70% female) completed both the pre- and post-test versions of the questionnaire in summer Tween/Teen Diabetes Day Camp. The purpose of this study was to pilot test a new diabetes camp model and evaluation metrics. Findings suggest the value of peer-support for adolescence living with T1D, which can help prevent further health complications. The new LCIF camp measure needs further testing with larger samples. Our results add more substantial support for the continued development of medical specialty camps approach to educate and facilitate autonomous environments for youth living with chronic illnesses.

Oral Session 3

3:30 PM – 4:30 PM

Art History 3: Through the Eyes of Women

Madonna of the Long Neck and Elena Tagliaferri as the Virtuous Wife of Deceased Francesco Tagliaferri

Hannah N. Austin (Mentor: Dr. Anne H. Muraoka)

Arts & Letters

Francesco Mazzola, also known as Parmigianino, painted *Madonna of the Long Neck* for Elena Tagliaferri in honor of her late husband Francesco in 1534. The Virgin is displayed rather large in scale, with an elongated neck, holding the sleeping Christ Child and sitting beside angels, one of which is holding an urn with a cross on it. In the background, one can observe a figure, likely Saint Jerome, holding a scroll. To the left of him is an inscription stating that the artwork went unfinished, and to the right of him are the feet of a figure inferred to be Saint Francis of Assisi. Although visually similar to the *Madonna of the Rose*, scholarship on *Madonna of the Long Neck* emphasize the importance of style and anatomy in the representation of the Madonna as a sacred and virtuous figure, yet make no suggestion of allusions directly to Elena. By carefully examining the social and religious circumstances of Elena Tagliaferri, the *paragone* between this painting and Petrarchan poetry alongside Parmigianino's studies and drawing process of the Christ Child and Madonna, it will become clear that Parmigianino's *Madonna of the Long Neck* functioned dually as a source of comfort in Elena's grief and as a personal devotional piece. Therefore, expanding on the argument that the *Madonna of the Long Neck* connects the sensual and beautiful to the divine and spiritual, this paper argues that this painting displays Elena Tagliaferri's devotion to her husband and to God.

Rubens and the Disembarkation at Marseilles: Display of Female Power in Patriarchal France

Andrew Marlowe-Cremedas (Mentor: Dr. Anne Muraoka)

Arts & Letters

In 1621 Peter Paul Rubens received an ambitious commission by Marie de' Medici, former Queen Consort and Regent of France. The large-scale work is known as *The Medici Cycle*, which would commemorate her life and that of her late husband King Henry the IV. The creative and political motivation for this commission was Marie's return from exile in 1618. Most of the scholarship regarding this work has focused on Marie de' Medici's intention behind the cycle's creation, as well as the allegorical framework which is important when studying this work. In "Dissimulation and the Art of Politics in Marie de' Medici's Cycle" Sara Galletti discussed the interest in dissimulation throughout the cycle, which gave the work flexible interpretations depending on who it was shown to by the Queen. Another scholar Sara Cohen in "Rubens' France: Gender and Personification in the Marie de' Medici Cycle" has explored the gendered meaning of the painting cycle, concluding that Marie was represented by male and female personifications as a means of aligning her with powerful attributes. This paper will specifically address the *Disembarkation at Marseilles* in the in the Medici Cycle, while also interpreting the entirety of the cycle. My thesis will show how Rubens used opposing forms of Christian and Pagan mythology to present Marie de' Medici as virtuous and heroic in *The Disembarkation at Marseilles*. By exploring various methodologies such as formal qualities, biography, and mythology, this paper will prove how *The Disembarkation at Marseilles* served as propaganda to elevate Marie de Medici among the great monarchs of France.

Art Outside the Museum: Researching the Lochhaven Garden Club's Beautification of Norfolk, 1920 to 1970

Debra Dowden-Crockett (Mentor: Dr. Agnieszka Whelan)
Arts & Letters

Throughout their one-hundred-year history, the Garden Clubs of Norfolk had an immense influence on the pastoral areas of Hampton Roads and on the gardens in the community. Under the leadership of some of the most prominent women in Norfolk's history such as Mrs. Florence Sloane, founder of the Lochhaven Garden Club, the exclusively female members believed that outdoor spaces should be available to all and they should be just as beautiful as the artwork they themselves collected and made available to the public. The Lochhaven Garden Club produced yearly scrapbooks, but their study presents a challenge for the researcher. The documents focus exclusively on the matters of social and political engagements of their members, hardly ever referencing the gardening design or theory. The presentation proposes that the reform spirit of the garden clubs developed from the ideas, aesthetics and the gardens of the Arts and Crafts Movement in the United States and Britain and which remained dominant until the first decades after the World War II.

College of Sciences UG Research #3

Segmentation of Protein Secondary Structure from 3D Cryo-EM Images Using Deep Convolutional Neural Networks

Thu V. Nguyen, Jing He (Mentor: Jing He)
Sciences

Deep learning is a subset of machine learning that has long been implemented in image processing and classification. One of the popular deep learning networks is deep convolutional neural network (CNN/ConvNet). We have seen applications of deep convolutional neural networks in every aspect of life. Some of them are facial recognition (FaceID, visual search), personalized advertising and health analysis. In parallel with the development of CNNs, cryo-electron microscopy is a Nobel Prize-winning technology that is a critical technique to detect and predict protein secondary structure. Protein structure determines its functionality, thus understanding of the structure is a crucial step to further findings in bioinformatics fields and the search for medicine, vaccines and health treatments. However, building an accurate structure from 3D Cryo-EM images still remains a challenge. A number of methods were proposed using deep convolutional neural networks, including DeepSSETracer (Mu, Sazzed, Alshammari, Sun and He), Emap2sec+ (Wang, Alnabati, Aderinwale, Subramaniya, Terashi & Kihara, 2020), EMNUSS (He & Huang, 2021), and Haruspex (Mostosi, Schindelin, Kollmannsberger, Thorn, 2020). These bundles/softwares are used for segmentation of protein structure from 3-dimensional images. They adopted deep convolutional neural network architecture to classify images and predict the structure of a protein. One of the goals of this project is to gain understanding of deep learning principles and to apply them in the secondary structure detection problem. Another goal is to compare the performance of different deep learning methods and identify their strengths and weaknesses.

Diabetic Foot Exam System

Stephanie Trusty (Mentor: Ayman Elmesalami, Soad Ibrahim)
Sciences

The diabetic foot exam system aims to perform certain aspects of the dermatological and musculoskeletal assessments that are typical to a 3-minute diabetic foot exam. Utilizing the RaspberryPi computer and camera module, the system seeks to capture a series of images of

the patient's foot. It then evaluates these images for calluses, blisters, and three types of deformities: claw toe deformities, hammertoe deformities, and bunions. This evaluation is performed using a trained TensorFlow image classification model, which categorizes the image as a callus, blister, or deformity. The system was tested using six different images: four callus images, a hammertoe deformity image, and a claw toe deformity image. One of the callus images and the hammertoe image were correctly classified. The remaining images were incorrectly classified with high confidence levels, suggesting that there is overfitting in the model. These results emphasize the need for a larger, more diverse dataset for training and validation, as well as additional image processing techniques such as background subtraction, to improve system functionality.

Exploring Parallelization with a Raspberry Pi Cluster
Taylor Powell (Mentor: Ayman Elmesalami, Soad Ibrahim)
Sciences

In this work, I introduce an affordable and scalable project to explore parallel computing concepts for undergraduate STEM students. A cluster computer composed of Raspberry Pis is presented along with a specific use case to explore the performance of the Pi cluster and examine the consequences of unbalanced task distribution across the cluster. The performance of the cluster is tested using both simple numerical integration and adaptive integration methods. In the case of simple integration, results show that the cluster provides speedup in accordance with expectations due to the equal time-complexity of individual computations. Adaptive integration serves as a use case to examine the importance of equitable task management across the cluster since the tasks assigned to individual threads may be of different time-complexities.

Flooding Detection in Hampton Roads
Gabriel Del Razo
Sciences

A vision system controlled by the Raspberry Pi. The system automatically detects the flood levels of low, moderate, and severe. Image processing concepts and how digital devices interpret an image, extract information from the image, and make a decision.

College of Arts & Letters UGR #1

Books and Bars: Expanding Community Ties Through a Bookstore By and For Lesbians
Catharine Cipriano (Mentor: Cathleen Rhodes)
Arts & Letters

Bookstores are consistently involved in building community, connecting people, and expanding awareness and knowledge. Bad Habits, located inside the lesbian hangout Hershee Bar, was a prime example of these efforts. As part of this project on Bad Habits, I conducted archival research in Our Own Community Press, other regional gay newspapers, and local city directories. Bad Habits was a bookstore run by and for lesbians and feminists. Though the bookstore was only open for about four years in the 1990s, Bad Habits became nationally recognized. It was mentioned in the Feminist Bookstores Catalog published in Austin, Texas, as well as in Naiad Press' list of the top one hundred booksellers in 1994. Bad Habit's owners felt it was extremely important to give back to their community. They often worked with Norfolk's lesbian organizations and legal defense funds, and took part in Breaking the Ice, Old Dominion University's yearly winter pride festival. In addition, I researched the historical context of LGBT-friendly bookstores as well as bookstores attached to or located within bars, and why these

were important to their communities. Bookstores, especially for marginalized groups, are essential for community building, and Bad Habits' proximity to the lesbian-centric Hershee Bar made it easy for both businesses to have clientele cross over to the other.

Fa'amatagi: From Whence the Wind Blows
Annette Roberts (Mentor: Margaret Konkol)
Arts & Letters

Fa'amatagi: From Whence the Wind Blows is a love letter to the people and culture of my parents. This is a documentary poetics project that draws upon research of the Mau Movement, archives from the New Zealand government, and personal ethnographies with my own parents who are both of Samoan descent. I curated several pieces of art from book collector Alexander Turnbull and photographer Alfred J. Tattersall. This project delves into the effects of colonialism on a previously isolated people. It explores the act of civil disobedience and what comes of it versus the long-lasting damage of compliance towards a more dominant society. The importance of women in society becomes a concern for the project as I reclaim and retell an absent center, an obscured archive of women's lives in Samoan history. In the 1930's, the tide of the Movement turned towards victory, in part, due to mothers, daughters, sisters and wives of the Mau and their efforts to aid the ones who defied and evaded capture of the New Zealand government. My project enters into dialogue with recent work on Caribbean and Pacific Island cultures. The use and preservation of native language is also examined and gives rise to my project's engagement with linguistics and its relationship to the erasure of indigenous populations, one "yes" at a time.

Dignity Norfolk: How One Tidewater Group Enabled Gay and Lesbian Catholics to Form Long Lasting Friendships and Chosen Families
Chelsea Lembert (Mentor: Cathleen Rhodes)
Arts & Letters

In the past decade, research has been conducted to look into the history of the Queer Community of the Tidewater Region. Students and community volunteers have conducted interviews and gathered documents connected to the queer community to grow the study and breadth of available information for future researchers. However, more in-depth knowledge of community connections and familial ties within the queer community in the Tidewater Region was needed. Through research into Our Own Newspaper, local historical background information, and in-person interviews, I pieced together first-hand accounts of life through the eyes of a gay man or lesbian woman living in the Tidewater Region between 1970 - the present day. I found that the connections and emotional bonds made years ago have stayed strong, similar to those of a biological family. This research opens up the possibilities for future researchers to find more information, connect the lives of many others within the Tidewater Community, and save the history of the queer community who lived and thrived in the Tidewater Area before the primary sources have passed on.

College of Arts & Letters UGR #2
On Faith & Dignity: Uncovering Local Gay Catholic History
Gabriela Igloria (Mentor: Cathleen Rhodes)
Arts & Letters

Relying mainly on research extracted from the archives of Our Own Community Press, Norfolk's gay newspaper established in 1976 and run until 1998, and from an oral interview, this presentation seeks to increase the visibility of local queer history, especially in relation to religious

institutions. Beginning as part of a class project in partnership with the Tidewater Queer History Exhibition, the presentation explores the queer history of Norfolk's Sacred Heart Church in the 1980's, during which time Reverend Vincent Connery was the parish priest. Though the gay and lesbian religious group, known as Dignity Norfolk, that was housed under Sacred Heart's roof no longer exists, it is important to understand its origins and the real, tangible consequences of the group's disbandment that impact the LGBTQ community to this ay. Beyond its connections to local queer history, Sacred Heart's brief existence as an openly safe space for the gay community speaks to national and international conversations on the fight for gay rights during a time when the AIDS crisis was prominent, and complicates the narrative of an exclusively anti-gay Catholic culture when condemnation of homosexuality was--and continues to be--formally endorsed by the Vatican.

Wittgenstein and Hume on Miracles
Samuel Wheeler (Mentor: Dr. James Van Dore)
Arts & Letters

In this paper, I intend to contrast the positions of Ludwig Wittgenstein and David Hume on miracles. While Hume holds that miracles are violations of laws of nature which can never be probable, Wittgenstein would reject this definition. Instead, he takes a broader stance on miracles and holds that many events which are not transgressions of laws of nature can be seen as miraculous. And the point of this is to highlight the vastly different events we call miracles. Contra Hume, Wittgenstein thinks that even some of our greatest certainties can call up in us a sense of absolute wonder and awe, and thus, be thought of as miracles.

History of The Wildcats Motorcycle Club
Rachel Mannetta-Torres (Mentor: Cathleen Rhodes)
Sciences

History of The Wildcats Motorcycle Club will be presented by Old Dominion University student Rachel Mannetta-Torres.

College of Arts & Letters UGR #3

1% left of 100: Taino History and Puerto Rican Identity
Alanis Gonzalez Torres (Mentor: Dr. Margaret Konkol)
Arts & Letters

1% left of 100 is a documentary poetics research project exploring the confluence of identity, family, and language. Crafted in a hybrid format that mixes Spanish and English according to my personal idiolect, which is itself a product of my heritage as a Puerto Rican, Africa, native Taino American, this poem engages with exciting new approaches to thinking about race which liberate us from talking about physical features and takes us instead toward race as a social fact, a product of culture, history, and family. I seek to intervene in a narrative of American history that, though it teaches about first contact for Africans, and Spanish and Caribbean peoples, seldom offers the voices of the natives who have occupied the islands before their arrival. I ask: who were those who self-identified as Taino? Where are the Taino? Can a people be erased? In similarity to Theresa Hak Kyung Cha's Dictee, a memoir-poem about the Japanese occupation of Korea, I see to claim a feminist genealogy. I argue that language is part of going back to mother and grandmother and generations farther back. How have my mothers and their mothers spoken Spanish---the third most spoken language in the world. There are 90,000 words in its vocabulary, yet only 300 words originate from Taino's native speech. Again, I argue against the outsized lament for purity, for Pure Taino people who are "extinct." Instead, with my project I

try to demonstrate that no one person can truly claim to be purely indigenously Taino. To hold a part of history isn't only for DNA to choose for us. Who we are can be a cultural claim in body and soul. This project draws on historical archives as well as personal familial archives to tell a new kind of historical race narrative. 1% left of 100 integrates Taino and Puerto Rican history with my family language and history. I present early memories woven with digital images from family photo albums as I also integrate critical sources and historical documents. Telling my ancestors' story as well as my own offers up a poetics of witness. The war of the Taino existence is stuck to repeat itself within me now. Connecting life to picture to archive is the linkage to making 1% left of 100.