

CAPWIC 2023

The ACM Capital Region Celebration of Women in Computing

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Keynotes

Lance Collins ([Virginia Tech](#)).

Inspiration from “hidden figure”, Dr. Gladys B. West, who made seminal contributions to the global positioning system (GPS).

Abstract. The Earth is not a perfect sphere. Indeed, it’s shape is far from round, and that complexity must be accounted for to achieve accurate GPS. My presentation chronicles the contributions made by Dr. Gladys B. West, an African American mathematician. Born in rural Dinwiddie County, Virginia in 1930, Dr. West studied mathematics at Virginia State University before joining the Naval Proving Ground in Dahlgren, Virginia, where she led the effort to accurately map the surface of the Earth, leading to centimeter precision in modern GPS systems. Her remarkable achievements against all odds are an inspiration to us all; however, this talk is not just a tale of individual exceptionalism, but rather a reminder of the lost opportunity incurred by society overlooking the talents that women and minorities can bring to the technological workforce. Indeed, this motivates our goal to make the Virginia Tech Innovation Campus the most diverse graduate tech program in the country.

Sandhya Dwarkadas ([University of Virginia](#)).

Computing Research Careers.

Abstract. In this talk, Sandhya will give you a glimpse into the challenges and rewards of academic, industry, and national lab careers in computing research, and the skills for success in each.

Anjali Mirchandani ([Hilton](#)).

Abstract. There is a whole big world of computing beyond the traditional technology companies that can lead to exciting careers. Through this talk Anjali gives us a glimpse of the technology that runs the international hotel chain giant and the endless opportunities it holds for women in technology. Anjali invites you to go over her journey at Hilton and share her personal experiences as a woman in technology and some compelling take aways to lead a fulfilling life.

Panels

Christina Burton ([University of Pennsylvania](#)). Sydney May ([Virginia Tech](#)). Daffney Myers ([Virginia Tech](#)). Chelsea LeSage ([University of Virginia](#)). Nusrat Mozumder ([University of Virginia](#)). Aparna Kishore ([University of Virginia](#)). Soumee Guha ([University of Virginia](#)). Stephanie Schoch ([University of Virginia](#)).

Pursuing Graduate School in Computing.

Abstract. Are you unsure if you want to attend graduate school? Not sure what it even means to go to graduate school or how it differs from undergraduate programs? Already in graduate school but want advice on how to succeed while there? Then this is the panel for you! In this panel you'll hear from four current graduate students in PhD and MS programs, to discuss their experiences and give advice on when/if to go to graduate school, and how to thrive once there. Our panelists include:

Sydney May, Master of Engineering student in Computer Science Applications and Computer Security, Virginia Tech Innovation Campus

Daffney Myers, Master of Engineering student in Data Analytics and Artificial Intelligence, Virginia Tech Innovation Campus

Chelsea LeSage, Master of Science student in Data Science, University of Virginia

Nusrat Mozumder, PhD student in Computer Science, University of Virginia

Aparna Kishore, PhD student in Computer Science, University of Virginia

Soumee Guha, PhD student in Computer Engineering, University of Virginia

Stephanie Schoch, PhD student in Computer Science, University of Virginia

Scott McCrickard ([Virginia Tech](#)), Joon-Suk Lee ([Virginia State University](#)), Chandani Shrestha ([James Madison University](#)) and Mohammed Seyam ([Virginia Tech](#)).

Designing Apps for Diversity: Building Bridges through Mobile and Web App Development.

Abstract. This panel session seeks to assemble researchers and educators with interests in education, gaming, science, art, history, and technology to explore design approaches for mobile and web apps that are sensitive to issues and concerns of underrepresented populations. During the 1990s and early 2000s, technology design lacked diversity, but recent efforts have sought to craft apps that are more sensitive to issues of diverse populations. The session will begin with a brief presentation of examples of mobile and web apps that facilitate knowledge sharing and interpersonal communication in ways that support underrepresented populations, and also mobile and web apps that discriminate and put minorities at risk by the panel organizer. Each panelist will discuss relevant aspects of diversity with respect to designing mobile and web apps: effective communication methods, ways for ensuring participant safety and comfort, and educational approaches. There will be ample time for questions and informal discussion focused on what it means to design apps with diverse populations in mind, and identifying and developing examples of these apps. The session will conclude with avenues for further engagement on the topic, to include opportunities for funding, publication, and dissemination. Our panelists include:

Joon-Suk Lee, Assistant Professor of Engineering and Computer Science, Virginia State University

Chandani Shrestha, Assistant Professor of Computer Science, James Madison University

Mohammed Seyam, Collegiate Assistant Professor and Experiential Learning Coordinator, Virginia Tech

Sharon Simmons ([James Madison University](#)). Elise Varblow ([Verizon](#)). Shelbi Smith ([Verizon](#)). Sydney Edwards ([Verizon](#)). Hermon Bindra ([Hilton](#)). Emma Macaluso ([Brightspot](#)). Megan Fraider ([Naval Surface Warfare Center Dahlgren Division](#)). Michelle Tooley ([Naval Surface Warfare Center Dahlgren Division](#)).

Choosing a Career in Tech.

Abstract. Are you interested in hearing about many different careers you could consider after earning a computing degree? Perhaps unsure what you want to do, or what various job titles even mean? Then this panel is for you! Join four women who are working in various aspects of computing to learn about what they do, how they got there, and what you should do to prepare for similar careers. This panel will also discuss the many different types of careers open to people with a computing degree. Our panelists include:

Elise Varblow, Data Scientist, Verizon

Shelbi Smith, Cyber Threat Intel Analyst, Verizon

Sydney Edwards, Principal Software Engineer, Verizon

Hermon Bindra, Hilton

Emma Macaluso, Software Engineer, Brightspot

Megan Fraider, Engineer, Naval Surface Warfare Center Dahlgren Division

Jessica Zeitz ([University of Mary Washington](#)). Kimberly Zeitz ([Naval Surface Warfare Center Dahlgren Division](#)). Cheryl Howard ([IBM](#)). Anjali Mirchandani ([Hilton](#)). Sharon Simmons ([James Madison University](#)).

Becoming a Tech Leader.

Abstract. What does it mean to be a leader in computing, and how does one become a leader? Whether you are ready to step into a leadership role yourself, or just curious about what these women do in their leadership positions or how they got there, this panel is for you! In this panel you'll hear from four women who are leading in four different types of roles. They'll share how they got to where they are today, what it means to be a leader and in the type of leadership role they are currently in, and answer your questions about leadership in computing. Our panelists include:

Kimberly Zeitz, Branch Head for Software Engineering & DevSecOps, Naval Surface Warfare Center Dahlgren Division

Cheryl Howard, Principal Data Scientist, IBM Technology Expert Labs

Anjali Mirchandani, Director of product delivery – Technology, Hilton Hotels Corporation

Sharon Simmons, Professor and Department Head of Computer Science, James Madison University

Research Shorts

Syeda Sabrina Akter ([George Mason University](#)) and Antonios Anastasopoulos ([George Mason University](#)).

Automatic Detection of News Media Framing.

Abstract. The study is centered on the concept of framing in political discourse and its influence on public opinion. The way in which political issues and events are presented to the public by various sources, such as media outlets and politicians, is referred to as framing. This research evaluates the effectiveness of classifiers trained using the Media Frames Corpus (MFC), a database of US news articles labeled with 15 distinct frame categories, through the use of large multilingual language models. The purpose of this study is to increase the accuracy in predicting the framing of a text through the use of pre-trained language models, such as BERT, that have been fine-tuned with the MFC. The results show that the current implementation has an accuracy of 63.78% on the immigration corpus, which is comparable to the baseline model in [1]. The ultimate goal of this study is to expand the capability to multiple languages and explore the economic and cultural factors influencing the global news. Further work involves training the model on multilingual training corpus.

Sarah Blevins ([University of Mary Washington](#)).

Accessibility in Web Design.

Abstract. Accessibility is an important aspect of web design. In computer science, we focus on how to write programs, how the workplace is going to be set up, and even computing theories. Some computer science courses discuss accessibility in computer science, this leads computer scientists to wonder about the protocols and procedures in place to ensure that the software being developed is accessible for the users. Sometimes the placement of buttons, words, or colors on a webpage make it hard for the user to understand and make the website not user friendly. There is research that based on the ideas that computing community has already carried out and provides computer scientists with more questions that can lead to further development of accessibility standards. The goal of this research is to provide guidance to a developer about website accessibility design.

Brooke Nixon ([Wake Forest University](#)), Lisa Kiang ([Wake Forest University](#)) and Nicole Guajardo ([Christopher Newport University](#)).

Detecting Digital Chameleons: How Phone Type and Personality Impact Likability of Texters.

Abstract. The chameleon effect refers to humans' subconscious mimicry of the behaviors and mannerisms of others. The phenomenon is linked to one's desire to be liked by those around them and to their level of empathy. The chameleon effect has primarily been studied in-person, with recent research indicating the presence of the phenomenon in human-computer interactions, including computer-mediated communications. This research short will explore a recent study that extends these previous findings by exploring how different phone types (i.e., iPhones versus Androids) may impact perceptions of mimicry, and explores how new behavioral variables (i.e., extraversion, agreeableness, concern for appropriateness, and cognitive/affective empathy) may moderate the relationship between mimicry and perceptions of texters. The background and results of the study as well as the implications for such work in artificial intelligence and digital working environments will be discussed.

Amber Oliver ([James Madison University](#)), Samy El-Tawab ([James Madison University](#)) and Nathan Sprague ([James Madison University](#)).

JACart: James Madison University Autonomous Cart - A Research Prototype.

Abstract. Autonomous vehicles are the future of transportation, but this technology is already a reality at James Madison University. The autonomous vehicle research goal is to create an autonomous shuttle system that improves the accessibility and safety of transit in a retirement community. Implementation of the JMU Autonomous Cart (JACart) allows individuals within the community to easily travel around the neighborhood, increasing their activity levels and social contact, ultimately making for a healthier individual and community.

The research started with transforming a regular golf cart into an autonomous golf cart, utilizing hardware and software developed for communicating with the power steering and the brakes. Once the cart was fully autonomous, the research shifted to increasing safety and enhancing the cart with features that directly benefit the elderly community. A LiDAR mounted on the top of the JACart detects objects and sends signals to the Robotic Operating System (ROS) that tells the cart to slow down or stop. Zigbee Technology is utilized as a network source that will allow the JACart to have a network connection from anywhere in the community. A large monitor that presents the user interface is installed on the cart, allowing users to choose their destination, track the cart's location, etc.

Lamia Salsabil ([Old Dominion University](#)), Jian Wu ([Old Dominion University](#)), Muntabir Hasan Choudhury ([Old Dominion University](#)), William A. Ingram ([Virginia Polytechnic Institute and State University](#)), Edward A. Fox ([Virginia Polytechnic Institute and State University](#)), Sarah M. Rajtmajer ([Pennsylvania State University](#)) and C. Lee Giles ([Pennsylvania State University](#)).

A Study of Computational Reproducibility using URLs Linking to Open Access Datasets and Software.

Abstract. Datasets and software packages are considered important resources that can be used for replicating computational experiments. With the advocacy of Open Science and the growing interest of investigating reproducibility of scientific claims, including URLs linking to publicly available datasets and software packages has become an institutionalized part of research publications. In this preliminary study, we investigated the disciplinary dependency and chronological trends of including open access datasets and software (OADS) in electronic theses and dissertations (ETDs), based on a hybrid classifier called OADSClassifier, consisting of a heuristic and a supervised learning model. The classifier achieves the best F1 of 0.92. We found that the inclusion of OADS-URLs exhibited a strong disciplinary dependence and the fraction of ETDs containing OADS-URLs has been gradually increasing over the past 20 years. We developed and share a ground truth corpus consisting of 500 manually labeled sentences containing URLs from scientific papers. The dataset and source code are available at <https://github.com/lamps-lab/oadsclassifier>.

Xinyu Wang ([Pennsylvania State University](#)) and Sarah Rajtmajer ([Pennsylvania State University](#)).

Inside the echo chamber: Linguistic underpinnings of misinformation on Twitter.

Abstract. Social media users drive the spread of misinformation online by sharing posts that include erroneous information or commenting on controversial topics with unsubstantiated arguments often in earnest. Work on echo chambers has suggested that users' perspectives are reinforced through repeated interactions with like-minded peers, promoted by homophily and bias in information diffusion. What is less clear are the ways in which these conversations are mediated through language use. Building on a long-standing interest in the social bases of language and linguistic underpinnings of social behavior, we study linguistic characteristics of discussions of highly charged topics where misinformation has been prevalent and their relationship to social interactive network structure. Through the implementation of linguistic metrics such as lexical diversity, discourse connectives, and in-/out-group cues, we quantify changes in language patterns within conversations around a number of polarizing topics such as anti-vaccination, QAnon, and Black Lives Matter. We explore whether such dynamics synchronize with the formation of social interaction clusters over time.

Susan Zehra ([Old Dominion University](#)).

Authenticating Truth in Motion: A Decentralized Framework for Identifying Fake Messages in VANETs.

Abstract. VANET stands for "Vehicular Ad Hoc Network." It refers to a type of wireless network that allows vehicles to communicate with each other and with infrastructure, such as road side units (RSUs). The main goal of VANET is to enhance road safety and improve the overall driving experience through real-time exchange of information and data. VANET can be used for various applications, including traffic management, road safety alerts, and navigation. The content of messages transmitted in VANET can influence drivers' behavior, leading to changes in the network topology. However, if a malicious user alters the message, the security of the network may be compromised. Ensuring the correctness of messages is crucial for the success of VANET, as fake messages can harm both individual vehicles and the overall trust in VANET technology. The inability to distinguish between true and false information poses a threat to traffic safety, human lives, and the credibility of VANET. This paper presents a novel framework for efficiently identifying fake messages in VANET. The framework divides messages into two categories, urgent and non-urgent, and handles them using a decentralized priority queue consisting of trusted Road Side Units (RSUs) that authenticate, analyze, and broadcast their decision on fake messages. The simulation results show that the framework is scalable and can efficiently identify fake messages while providing secure communication and guaranteeing the Quality of Service (QoS) requirements of safety-related VANET applications.

Student Posters

Ebtesam Al Haque ([George Mason University](#)), Angela Smith ([University of Texas, Austin](#)) and Brittany Johnson ([George Mason University](#)).

Towards Improving Access to Healthcare in Virginia : A Cross-Dataset Analysis.

Abstract. History has repeatedly shown that when it comes to healthcare, there exist significant disparities across different sub-populations. A part of this problem is challenges with access to adequate healthcare. In recent years we have seen solutions emerge that attempt to address this issue, namely telehealth. But little to no work has been done to glean insights into factors that contribute to lower access and whether telehealth is adequately supporting populations that struggle with access issues. In this paper, we present findings from an exploratory, cross-dataset analysis of healthcare access in Virginia. We found that income, transit and population density are strongly correlated with the number of acute general care facilities nearby. Our findings also show that there is no correlation between access to internet connection and access to healthcare facilities nearby. Therefore, solutions such as telehealth are not effective in bridging the gap. Despite the difficulties in accessing data related to patient experiences with the healthcare system, we were able to gauge the quality of care provided to patients across Virginia by analyzing reviews provided by patients and responses from the respective healthcare providers. Our work has implications for both research aimed at understanding healthcare access and practice that aims to derive solutions to close the healthcare access gap.

Tatiana Chakravorti ([Pennsylvania State University](#)) and Sarah Rajtmajer ([Pennsylvania State University](#)).

Hybrid Prediction Markets for Estimating Research Reproducibility.

Abstract. Despite its successes, Artificial intelligence (AI) still suffers from important limitations, particularly for complex tasks where common sense, creativity, and intuition are required, or when learning from limited data. The promises and challenges of AI have motivated work exploring frameworks for human-AI collaboration which may bring together human intuition and machine rationality to tackle today's grand challenges effectively.

In this research short, we will overview current work to develop hybrid prediction markets, building on our own and others' prior work proposing artificial (bot-populated) prediction markets as a novel machine learning algorithm and demonstrating the success of this approach on benchmark classification tasks. In an artificial prediction market, AI-trained agents buy and sell outcomes of future events. In the work we will overview here, these outcomes are the results of replication studies of published research. Classification decisions can be framed as outcomes of future events, and accordingly, the price of an asset corresponding to a given classification outcome can be taken as a proxy for the system's confidence in that decision. From a market theory perspective, the efficient markets hypothesis states that market price reflects the aggregate information available to participants at least as well as any competing methods.

The most exciting promise of artificial markets, we suggest, is the novel avenue they provide for human-AI collaboration. By embedding human participants in the markets alongside bot traders, we can bring together insights from both. We will overview experiments with prototype hybrid markets and lay out a vision for further research.

Jenny Park ([Massive Data Institute](#)), Lisa Singh ([Massive Data Institute](#)) and Ameeta Agrawal ([Massive Data Institute](#)).

Using Lexicon and Machine Learning-Based Models for Sentiment Analysis in Arabic to Predict Migration Routes.

Abstract. Currently, there are 89.3 million displaced persons in the world, including 27.1 million refugees. With such a high volume of movement and the often unpredictable nature of crises causing these people to move, many countries and INGOs are unequipped to process and host these migrants crossing their borders.

The goal of this research was to fill the gap left by traditional indicators of movement that were previously used to predict migration by leveraging data from more organic sources such as social media. Sources such as these can provide real-time information that creates a better picture of the changing variables in a region that cause people to move.

Using Natural Language Processing techniques, I labeled a dataset of ~23K Arabic tweets as having either a positive or negative sentiment. I began by developing a lexicon-based model, then a machine learning-based model. The results showed that the machine learning-based model produced more accurate results than the lexicon-based model. These results will serve as a baseline for the development of a neural network model which is expected to produce even more accurate results. This will become a valuable variable used to predict migration routes in the future.

Mia Pham ([Madison University](#)), Endre Szakal ([James Madison University](#)), Zhuojun Duan ([James Madison University](#)), Mace Bentley ([James Madison University](#)), Tobias Gerken ([James Madison University](#)) and Dudley Bonsal ([James Madison University](#)).

A Parallel Spatiotemporal Clustering Algorithm with MPI in Analyzing Ground-lightning Dataset.

Abstract. With over seven million warm-season, cloud-to-ground lightning flashes in Washington, DC to analyze, producing a clustering algorithm capable of resolving individual thunderstorm events completes an important step in the analysis and visualization of lightning data. The algorithm was calibrated using specific parameters aimed at discerning a wide temporal and spatial range of individual thunderstorm events from lightning detected by the National Lightning Detection Network (NLDN). Most of these datasets come with complex structures. To cluster these datasets, existing algorithms like K-means and DBSCAN (Density Based Spatial Clustering of Applications with Noise) cannot be applied directly because none of them can work for the datasets with both spatial and time dimensions. In our project, we adopted the Cellsearch algorithm to cluster spatiotemporal datasets. To improve the efficiency of the clustering process, we proposed a parallel Cellsearch algorithm, called MpiCells, which is based on the Message Passing Interface (MPI) framework. In detail, the dataset is distributed to multiple processes to run the serial clustering algorithm on and merge back the results from each process. The experimental study demonstrates that MpiCells performs with low overhead of time on large volumes of data sets.

Lillian Powell ([University of Mary Washington](#)).

Playlist Manager: Understanding Data Structures.

Abstract. This presentation will cover the importance of understanding existing data structures and the ability to create ones own. This will follow a playlist manager project written in Java. The playlist manager allows the user to store and manage a linked list of song objects, the linked list being created 'from scratch'. As programs and project goals become more complex, the importance to understand and create data structures becomes even more important. The flash talk will focus on building an algorithm/data structure to fit a goal, ignoring existing non-primitive structures.

Zahra Rizvi ([Grafton High School](#)).

Assessing the Effect of Urbanization on Water Quality in Chesapeake Bay: An Analysis with Geospatial Tools.

Abstract. Urbanization can negatively affect water quality due to the increase in pollutants resulting from population growth and land degradation. This research evaluates the impact of urbanization on water quality in selected water bodies of Chesapeake Bay using open source geospatial tools. The locations are identified using the Normalized Difference Built-Up Index (NDBI) obtained from satellite imagery, which differentiates urban areas from rural and natural areas. The NDBI is used as an index for urbanization because the NIR band is sensitive to vegetation and the SWIR band is sensitive to artificial surfaces such as buildings and roads. Concentrations of chlorophyll-a (Chl-a) and total suspended matter (TSM) were obtained from the Chesapeake

Bay Data Hub. The Chesapeake Bay Data Hub provides a centralized repository of data and information on topics such as water quality, land use, and biodiversity, among others. The aim of the study is to understand the impact of urbanization on water quality. An analysis in Python programming language was performed on Google Colab environment using the Open Data Cube (ODC) framework on the United States Geological Survey (USGS) Landsat-8 imagery available on Google Earth Engine's Cloud. The results suggest that urbanization can have a significant impact on water quality and that the increased use of impervious surfaces can lead to increased pollutants in waterways through runoff and erosion. This study has the potential to contribute to two United Nations Sustainable Development Goals (SDG): access to safe and affordable drinking water (SDG 6) and sustainable cities and communities (SDG 11).

Lauren Rousseau ([Marymount University](#)).

How do cybersecurity attack vectors affect our perception of personal data?

Abstract. In the wake of data breaches that affect up to one billion individuals per incident, U.S. citizens have expressed a growing concern for their data privacy. Discussions include ethical and practical applications, existing and proposed laws, breaches, and attitudes toward data privacy. However, the discussions omit a detailed analysis and concise definition of what U.S. citizens consider to be their private data.

The absence of studies about the term private data creates a gap in understanding how it relates to the term personal data. It is conceivable that the terms are synonymous, that private data is a subset of personal data, that the terms are dynamic, and that there is no consensus on the definition. Continued use of the undefined term private data yields opinions about the use, ethics, and protection of data without parties agreeing to the subject that they are studying and discussing. Moreover, the ambiguity prevents security practitioners from allocating resources to the intended data elements.

This research will investigate how individuals classify their private data, and it will explore the possibility that these perceptions may not be static to the individual or uniform across all citizens. Through a quantitative experimental design, the researcher will present side-channel attacks that exploit seemingly innocuous data elements. The researcher will then measure changes to the participants' perception of privacy for each data element. The findings will provide insights into definitions that may inform future data privacy discussions.

Neha Shijo ([University of Maryland, College Park](#)).

Determining the Factors that Contribute to the Retention of Women in Cybersecurity.

Abstract. The low representation of women is a well reported issue in the computing field, however more work needs to be done to evaluate the gender imbalance of the cybersecurity workforce in particular. This paper explores the factors that impact women in cybersecurity, specifically starting in 11-12th grade, through undergraduate education, and into early career. Participation in a high school cybersecurity summer camp was used as a standard factor between six interviewees to evaluate their career pursuits after an early exposure to the field. Using the Grounded Theory approach, this data was iteratively coded to shape the research theory over time, resulting in four key findings. The factors that affect whether a woman pursues cybersecurity are their perception of the cybersecurity community and their belonging in that community, the newness and innovation of the field, the professors and mentors encountered in the field, and the opportunities and career growth in the field. Analysis of these themes showed trends in women's interest in cybersecurity over time. Although all of the women were interested after exposure in high school, the lack of women among their professors, classes, jobs, and cybersecurity-related extracurriculars caused self-doubt and imposter syndrome. Due to these factors, many of the women decided not to continue pursuing cybersecurity, but even those who did eventually changed careers due to lack of promotion and growth opportunities. This research has the ability to understand and improve the experience of women in cybersecurity, and retain them in all stages, from high school to career.

Autumn Toney ([Georgetown University](#)) and Sara Abdulla ([Georgetown University](#)).

Parody, Joke, or Insanity? Retracted Publications Continue to Garner Attention.

Abstract. Especially in cases where articles are retracted due to flawed reporting or methods, it is useful to examine the nature of retracted papers, including the causes of retraction, who initiated retraction, and the authors' institutional affiliations and locations. We investigate the impacts of both research publication and retraction by measuring article citations and social media engagement on Twitter using the publicly available RetractionWatch (RW) dataset. In our analysis we compute citation and social media activity trends by publication country and field of study over time. We additionally perform sentiment analysis on tweets that reference retracted publications. We find that retracted papers tend to have more citations post-retraction than pre-retraction, as well as receiving more social media engagement post-retraction, although that engagement is largely negative. As retractions increase over time, it is important for authors to be wary of using papers that have since been retracted, in order to maintain a high-quality background research corpus. The future of retraction remains to be seen as publication and retraction norms change.

Flash Talk

Veronica Cagle ([University of Mary Washington](#)), Rachel Potter ([University of Mary Washington](#)) and Laman Aliyeva ([University of Mary Washington](#)).

Knowledge Graphs of TV Show Plots.

Abstract. Due to their numerous applications in knowledge discovery, knowledge graphs have become larger and more complex during the past several years. A knowledge graph captures and stores the relationships between events, people, objects, and situations. Named entity recognition in combination with relationship extraction plays a major role in capturing semantic relationships between entities and deriving knowledge graphs from given corpora. However, the task of efficiently extracting knowledge graphs from a given storyline remains a challenging problem.

The research aims to utilize natural language processing tools combined with deep learning strategies to capture graphs from plots of TV shows. Automated analysis of dynamic graphs gives an insight into how characters and their relationships evolve over the course of a television series. In this work, we explore and compare alternative machine learning techniques for knowledge graph extraction, and describe the special challenges that plot summaries present for this task.

Isaiah Freeman ([Virginia State University](#)).

Priam: A Solution for Handling Concerns of Virginia State University Students.

Abstract. At Virginia State University, there are many students with ideas and concerns that they would like for administration to know. However, due to copious emails, the potential inability to attend Town Hall meetings, and lack of anonymity, these may not be visible to the administration.

My solution is Priam; a web-based idea management center for the purpose of anonymously posting ideas and concerns, and tagging them with categories to make available for faculty. Through voluntary surveys, I have garnered feedback from students to support the need for the Priam application.

Eleanor Haas ([University of Mary Washington](#)).

AI Uses in Oil Transportation Infrastructure.

Abstract. This project examines the use of artificial intelligence (AI) and machine learning (ML) in the security of critical infrastructure, specifically the oil sector. This talk focuses on pipeline and transportation infrastructure for oil. Cyber-physical systems (also called Industrial Control Systems) are physical mechanisms that are run by computers and are often connected to the internet; an example would be a valve in an oil pipeline that automatically directs the flow of oil without human intervention. These devices are being used to create intelligent systems that are safer, more efficient, and more cost effective. These cyber-physical systems can be found in almost every industry today, as well as in our critical infrastructure. Unfortunately, while they provide convenience and efficiency, there is also an increasing risk of disruption to these systems, whether by cyberattack, faulty engineering, or natural disasters.

As we are seeing today, disruptions to these systems, and by extension the infrastructure they support, can have massive political, economic, and social consequences. The Colonial pipeline attack is a prime example; it caused long lines at gas stations, a lack of jet fuel for planes, and surges in prices. It is becoming more and more imperative that these critical systems both function properly and have robust security. This project examines the use of AI and ML in the cyber-physical systems of the oil sector to determine if it would be effective at detecting/preventing intrusions and ensuring the system runs properly.

Emil Hofstetter ([James Madison University](#)).

Designing Non-blocking Data Structures.

Abstract. When designing concurrent data structures, there are many things to consider; alas, one succumbs to one of the many pitfalls that come with multi-threaded programming. Not only is it important to ensure the safety and data-validity invariants of the data structure are upheld, but there also needs to be an assured liveliness of the system. Safety and data-validity in this context mean that bad things don't happen to our data, while liveliness usually states that something eventually happens to our data.

There are many different approaches one can take and in this flash-talk I will only cover one of them. I will walk over the design and implementation of a shared, concurrent, sequentially locking ring buffer in Rust. The seq-locking nature of the data structure, along with mechanisms that prevent writer-starvation, make for a queue that is quite fast, while not trading off any memory safety thanks to Rust's very expressive type system.

Sophia Stil ([University of Mary Washington](#)).

AI in the Next Generation of Networking.

Abstract. As technology evolves, so too does our ability to connect over networks. With the succession of each generation network comes improved speeds, higher capacities, and lower latency. This next generation of networking is proposed to invoke the use of the latest artificial intelligence (AI) and machine learning. The exciting new capabilities of these algorithms can improve assistance and create a more efficient network. Soon, we will see a seamless integration of very smart technology aiding our networking and beyond mobile technology. However, the integration of AI in networking does not come without foreseeable risks. AI has unique security risks that need to be further researched and considered before implementing within our networking structure. AI is vulnerable to data poisoning, tempering of categorization models, and backdoors that change the learning behavior of the system and can create huge issues. Not only that, but AI attacks that mess with the algorithm are very hard to detect and reverse engineer. These are a few of the problems that this research aims to address. Future AI in networking is inevitable but future security risks are likely and therefore, I will present proposals for future research.

Kennedy Toomey ([WillowTree, a TELUS International Company](#)).

Fighting Imposter Syndrome with your Authentic Self.

Abstract. Too often, we see people in our industry who love spending all their time, at work and after hours, on computers. That is not necessarily a bad thing; however, that lifestyle is not for everyone. Many people need to recharge by spending time in nature or with friends, but will that hurt their careers? It often leads to a case of imposter syndrome - feeling like they do not belong because their job is not their life or their only passion. Having outside interests does not make a person any less technically savvy. Diversity in interests and experiences is what makes many teams so successful. The question becomes how to use seemingly unrelated interests to help further career development. The key is to find opportunities to shine. In this flash talk, I will share how some of my interests, like football and crocheting, have led to new opportunities and how bringing my authentic self to work has helped me fight off imposter syndrome.

Xin Wei ([Old Dominion University](#)) and Jian Wu ([Old Dominion University](#)).

Visual Descriptor Extraction from Patent Figure Captions: A Case Study of Data Efficiency Between BiLSTM and Transformer.

Abstract. Technical drawings used for illustrating designs are ubiquitous in patent documents, especially design patents. Different from natural images, these drawings are usually made using black strokes with little color information, making it challenging for models trained on natural images to recognize objects. To facilitate indexing and searching, we propose an effective and efficient visual descriptor model that extracts object names and aspects from patent captions to annotate benchmark patent figure datasets. We compared two state-of-the-art named entity recognition (NER) models and found that with a limited number of annotated samples, the BiLSTM-CRF model outperforms the Transformer model by a significant margin, achieving an overall F1=96.60%. We further conducted a data efficiency study by varying the number of training samples and found that BiLSTM consistently beats the transformer model on our task. The proposed model is used to annotate a benchmark patent figure dataset.

Birds of a Feather

Jennifer Kay ([Rowan University](#)).

What does your [Women in] CS club do?

Abstract. Does your CS club [for women] having trouble attracting attendees? Or do you have popular events with big turnouts? Come share your best ideas and get some new ideas from fellow club members and leaders. This BOF is for a broad audience: students and faculty at all levels as well as professionals who participate in tech-focused groups.

Nargess Tahmasbi ([Penn State University](#)).

ChatGPT in the Classroom.

Abstract. The integration of Artificial Intelligence (AI) technology has revolutionized the education. The use of ChatGPT has gained widespread popularity in the classroom as a means of enhancing efficiency and improving the educational experience for students and professors alike.

In this group discussion we seek to explore the ways in which ChatGPT can be utilized in the classroom to support professors in their teaching tasks and transform the traditional teaching model to be more efficient and effective. I will share my own experience using ChatGPT in classroom and demonstrate its potential to significantly reduce the workload of professors while improving the quality of educational resources and student engagement.

ChatGPT has helped me provide instant accurate, and personalized responses to students' inquiries and provide feedback on assignments. It has freed up valuable time to focus on more complex tasks, such as preparing lectures, conducting research, and designing in-class activities to create a more dynamic and engaging learning environment for students.

We are hoping to reach a broad audience that includes faculty and students to get insights from both sides regarding the potentials of ChatGPT in increasing efficiency in learning and teaching. We also talk about drawbacks and challenges that come with this new technology.

Technical Workshops

Scott McCrickard ([Virginia Tech](#)), Morva Saaty ([Virginia Tech](#)) and Jaitun Patel ([Virginia Tech](#)).

Designing Mobile Games for the Outdoors: From Interesting Ideas to Working Games.

Abstract. This workshop presents guidelines for mobile game development, with a focus on ways to develop games for outdoor settings. It is open to people with interests in game design and development -- to include education, science, art, history, or just having fun -- who want to learn about and design games for outdoor settings. The workshop will begin with an overview of gaming on mobile devices, to include discussion related to games that are engaging, educational, and enjoyable for broad and diverse populations. There will be many examples of games that succeed in supporting diverse audiences and games that fail to do so, with opportunities for participants to identify additional games. The workshop organizers will discuss ways to generate interesting ideas for games, with a focus on ensuring a positive experience for diverse audiences. Tools and environments for game development will be described, including an in-depth demonstration of ways to create games with three tools for mobile and web platforms. Participants will have the opportunity to design and create a simple game on their own or with a team, using one of several sketching and drag-and-drop tools, as part of the workshop. The games generated by this project, and the lessons learned in creating the games, will be showcased online and at professional events with permission of the attendees.

Kendra Schmid ([WillowTree Apps](#)).

Agile Mindset through Games.

Abstract. Agile is a mindset that takes practice! This session is an extremely interactive experience that revolves around the Agile core values and principles that we will explore through challenges, games, and discussion. These values and principles underlay the meetings, ceremonies, and ways of working of the major Agile frameworks such as Scrum and Kanban. These frameworks are used in startups to major corporations with many customized flavors that are adapted through returning to the mindset as the guiding principle.

Technical Talks

Cheryl Howard ([IBM](#)).

Building Strong Foundations: An Introduction to AI Foundation Models.

Abstract. Foundation models use a new paradigm in Artificial Intelligence (AI) in which general-purpose models are built using self-supervised deep learning. These models capture knowledge about a broad domain such as text generation or image synthesis. The ChatGPT application, based on OpenAI's Generative Pretrained Transformer (GPT-3) large language model has received much recent attention for its ability to generate coherent, human-like responses to natural language prompts. Another OpenAI project, DALL-E, creates high-quality images in specified artistic styles based on user-provided descriptions.

The promise of foundation models is that they can be trained on massive data sets to acquire general knowledge in their broad area (e.g., language, imagery), and then be refined to address specific tasks in a narrower domain. This approach provides economies of scale over training new models from scratch for each specific application. It may be considered analogous to providing someone with a general education which then makes it easier to train them to do a specific task.

Although the current media buzz around foundation models might lead one to believe that general artificial intelligence has been fully realized, there remain significant challenges, both technical and ethical, that must be addressed before applying these models to real world scenarios. This talk will provide a technical overview, show examples of successes and failures, and discuss the promise and limitations of the approach.

*Note: The title of this talk was suggested by ChatGPT using the prompt: "What is a good title for an introductory talk on Foundation Models?" <https://chat.openai.com/chat>

Mona Rizvi ([James Madison University](#)).

Automated Attendance-checking System Using Bluetooth.

Abstract. Tracking students' attendance can be an important part of the educational process, since attendance directly affects students' academic performance. Despite the many advances in educational technology, attendance checking is still often done using manual methods such as calling out students' names or passing around an attendance sheet. These manual solutions can be time-consuming, distracting and prone to error. Technological methods, such as ID card scanning, are improvements, but can still be time-consuming for large classes.

We have developed a Bluetooth-based system that uses the proximity of each student's personal phone to a classroom's Bluetooth beacon at intervals throughout a class period to automatically check attendance. We suggest that our solution is simple, inexpensive and requires minimal student and instructor involvement. Some novel features of our system are a quick assessment at the end of each lesson and a real-time feedback mechanism for students that can provide instructors with richer data than simple attendance metrics. We will present the main components of the system and some anecdotal evaluation results.

Chandani Shrestha ([James Madison University](#)), Michael C. Stewart ([James Madison University](#)) and Deborah Tatar ([Virginia Tech](#)).

ThoughtSwap: Reinfracturing Classroom Discourse to promote Conscientious Discourse.

Abstract. Classroom discourse is difficult to hold for both facilitating instructors and participating students. It can be more challenging when we aim for a deeper and meaningful discussion. With a vision of inviting and implementing conscientious discourse, where the students partake in self-examination and reflection, and engagement with other people's ideas, we present an approach - reinfrastructure classroom discourse by offering students and instructors more information in the initial moments of discourse by using a tool we developed, ThoughtSwap. There are three primary key design elements to ThoughtSwap: 1) Contained Anonymity 2) Ephemerality 3) Swapping of thoughts. Students anonymously respond to a prompt shared by the instructor in real-time. The anonymity feature preserves authorial privacy, with only the people enrolled in the class able to respond. Contained anonymity allows a safe space to share authentic ideas while adding a layer of accountability and moderation. The responses in ThoughtSwap are not archived or saved, neither for students nor the instructors. Ideas can evolve as discussion proceeds. The distribution feature enables instructors to swap the submitted responses, i.e, a student receives a thought submitted by one of their peers. Swapping exposes students to an idea that may be similar or contrasting to their original one. Instructors then can use students' thoughts to scaffold discussion activities, rather than be the sole prescriber of ideas in the classroom. Strategies to teach with discourse supported by ThoughtSwap, offers instructors and students an opportunity to deepen the chances for learning in the instructional environment.

Lishan Yang ([George Mason University](#)).

Reliable Operation of Heterogenous Systems: Challenges & Opportunities.

Abstract. As an important computing component of heterogenous systems, Graphics Processing Units (GPUs) are becoming a de facto solution for accelerating a wide range of applications but remain susceptible to transient faults (soft errors) that can easily compromise application output. One of the major challenges in GPU reliability is to accurately measure general purpose GPU (GPGPU) application resilience to transient faults. This challenge stems from the fact that a typical GPGPU application spawns a huge number of threads and then utilizes a large amount of potentially unreliable resources available on the GPUs. As the number of possible fault locations can be in the billions, evaluating every fault and examining its effect on the application error resilience is impractical. Alternatively, fault site selection techniques have been proposed to approach high accuracy with less fault injection experiments. However, most of the methods in the literature only focus on one input.

In this talk, I will discuss how to perform input-aware resilience estimation and fortification on GPGPU applications. First, I will introduce an input-aware estimation methodology, SUGAR (Speeding Up GPGPU Application Resilience Estimation with input sizing), that dramatically speeds up the evaluation of GPGPU application error resilience by focusing on the effect of input size on the application resilience profile. Then, based on the observations from the estimation, I will present a fortification methodology that aims to map threads with the same resilience characteristics to the same warp and perform protection accordingly. Finally, I will elaborate on the future research directions that worth investigation.

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