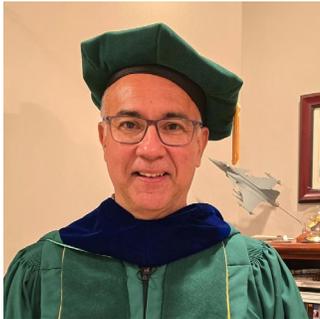GEORGE MASON UNIVERSITY

Senior Design Projects

2023-2024

Cyber Security Engineering (CYSE) 492/493

April 2024

May 3, 2024

The CYSE 492/493 Senior Advanced Design Project or "capstone" is a year-long endeavor with challenging real-world projects for our CYSE students. We are very proud of their effort and grateful for the sponsors, subject matter experts, mentors and faculty who support this rewarding experience.

These projects are the culmination of the final experience for our Bachelor of Science in Cyber Security Engineering (BS CYSE) graduating class. Students work with a sponsoring organization using the skills they have sharpened during their curriculum.

Our industry partners have provided a multitude of inspiring and useful projects that have challenged our students to solve open-ended technical problems with their significant contribution and guided by our faculty mentors and subject matter experts. We are pleased to acknowledge how fortunate we are to have sponsorships from MITRE, CGI, Federal Communications Commission, Zeus Technologies, Navy Federal Credit Union, AVINT LLC, Northrop Grumman, United States Army Special Operations Command, and Faculties from James Madison University and George Mason University. In addition to the senior design projects, most of these organizations are represented in the CYSE Industry Advisory Board (CYSE IAB). The CYSE IAB provides guidance for our programs and our curriculum.

Each organization supplied not only the project but guidance throughout the year. They provided both contacts and subject matter experts for the projects. We would like to thank each of them. The success of the projects was very much driven by their expertise and commitment to our students.

We would also like to acknowledge Professor Mingkui Wei for his efforts as the instructor for the Senior Advanced Design Project. He has brought expertise and rigor to the projects and has facilitated a rich and lasting experience for our students. Also, thanks to our university faculty, Christine Alonzo Yee, Neil Johnson, Lenbert Shropshire, Mohamed Morsy, Jair Feldens Ferrari, Brett Berlin and Lance Sherry. They have provided support and insight in very technical projects. We have achieved tremendous growth in class size and increased the number of sponsorships from 6 in our inaugural year to 18 this year.

The Senior Design contributes to a graduating class that will make an impact on our society. Many already have employment in commercial and government jobs. Others are continuing their education through the pursuit of a Master of Science degree, including our rapidly growing MS in Cyber Security Engineering. All of our students are pioneers in a difficult but rewarding field.

We are proud of our students and want to congratulate them for their dedicated efforts and all the hard work that it has taken to reach this milestone. Thanks again to our industry sponsors, subject matter experts, mentors and faculty for their tremendous support in this endeavor.

Paulo Costa, Ph.D.

Chair and Professor,
Department of Cyber Security Engineering
Director,
Center of Excellence in C5I
Professor,
Systems Engineering and Operations Research
Department

Peggy Brouse, Ph.D.

Associate Chair and Professor,
Cyber Security Engineering Department
Professor,
Systems Engineering and Operations Research
Department

Thank you for being part of our industry-sponsored Senior Design course!

After two challenging semesters, we are celebrating the achievements of 101 students who worked on a diverse collection of 18 academic, government, and industry sponsored cybersecurity projects.

The goal of Senior Design is to provide students with "real-life" working experience during their senior year. Student teams work with sponsor organizations that provide customers and subject matter experts to drive projects. Each project is managed exactly as if the students were just hired by an organization and placed on an engineering team. Students are responsible for making proposals and implementing their proposed designs.

Throughout the two semesters, they are guided in technical areas by the subject matter experts and mentored by CYSE faculties in a host of professional and business skills, such as project management, communication, teamwork, ethics, professionalism, and business metrics. By working in a team, they develop leadership skills and learn to function as effective teams as they manage requirements and schedules. Student teams are responsible for managing customer relationships and addressing unforeseen challenges that arise on all projects.

This program is only possible with the devotion of our sponsor organizations who provide subject matter experts to interact with and guide the students. Thank you for engaging with our program and helping to educate students who will secure our cyber infrastructure now and in the future.

The instructor team of Christine Alonzo-Yee, Mohamed Morsy, Jair Ferrari, Neil Johnson, Lenbert Shropshire, and Brett Berlin brings a wealth of experience that provides students with a wonderful source of guidance and engineering expertise.

Great thanks to Dr. Paulo Costa, the Department Chair, and Dr. Peggy Brouse, the Associate Chair, for their great support through the two semesters, making it a pleasant and enjoyable experience.
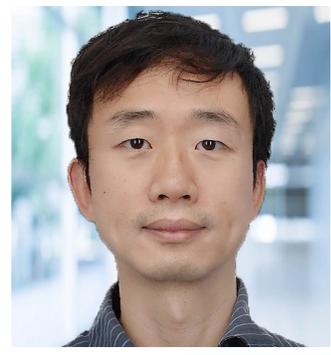
Finally, we want to thank our amazing students, who were brave enough to try something new. You stepped out of your comfort zones and worked hard on challenging projects. We wish you all the best as you pursue your engineering aspirations.

Sincerely,

Mingkui Wei

Mingkui Wei, Ph.D.
Lead Instructor, Cyber Security Senior Design

Sponsors

We greatly appreciate their dedicated support

Avint LLC.

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FCC Federal Communications Commission

GEORGE MASON UNIVERSITY | Systems Engineering and Operations Research

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Project Leadership

This class is only possible because of the commitment, dedication, and spirit of the following customers, subject matter experts, and faculty mentors. Thank you!

Project title	Sponsor	Customer Contact	Subject Matter Expert	Mentor
Émpistos: Trusted Embedded Processing and Optimizations for Edge AI Security	GMU CYSE	Md Tanvir Arafin	Md Tanvir Arafin	Lenbert Shropshire
Explainable AI (XAI) using Decentralized Distributed Ledger Technology (DLT) versus Centralized Non-Relational Database	CGI	Shadman Hossain	Gary Jackson	Brett Berlin
Friendly Force ID	AIRC (DOD)	AIRC (DOD)	AIRC (DOD)	Brett Berlin
LLM as an IDS: Leveraging Large Language Models to Detect Cyber Attacks	NGC	Phyllis Schneck	Alejandra Diaz	Brett Berlin
LLM Goat: A System that Deliberately Exhibits Large Language Model Vulnerabilities	NGC	Phyllis Schneck	Aaron White	Lenbert Shropshire
Machine Learning Modeling of Association between Qualitative Configuration Data and Cybersecurity Frameworks to develop attack surface exposure insights	NavyFed	Manuel Cintron	Scott Miller	Neil Johnson

Project Leadership

This class is only possible because of the commitment, dedication, and spirit of the following customers, subject matter experts, and faculty mentors. Thank you!

Project title	Sponsor	Customer Contact	Subject Matter Expert	Mentor
Machine Learning Models: Cyber Data Matching and Outlier Detection Prototype	CGI	Paul Douthit	David Crawford	Neil Johnson
Measuring Cybersecurity Regulatory Harmonization	FCC	Jeff Goldthorp	Greg Heladjian	Mohamed Morsy
Pressure Sensor modeling using Machine Learning Techniques to identify voice recognition - In Support of a Covert Channel Threat Model	GMU CYSE	Anomadarshi Barua	Anomadarshi Barua	Mohamed Morsy
Real-time ADA Compliance on GMU Campus	GMU SEOR	Lance Sherry	Lance Sherry	Jair Ferrari
Secure Chat Application to be used by teams for operational security.	Zeus Technologies	Paul Hamman	Paul Hamman	Jair Ferrari
Securing Robust Multi-Robot Systems in Dynamic Environments	GMU CYSE	Md Tanvir Arafin	Md Tanvir Arafin	Jair Ferrari

Project Leadership

This class is only possible because of the commitment, dedication, and spirit of the following customers, subject matter experts, and faculty mentors. Thank you!

Project title	Sponsor	Customer Contact	Subject Matter Expert	Mentor
Security Assessment of Vehicle-to-Vehicle Communication Protocols	GMU CYSE	Moinul Hossain	Moinul Hossain	Mohamed Morsy
Software Security During the Rise of AI	MITRE	Rock Sabetto	Rock Sabetto	Christine Alonzo-Yee
STIG2CVE Mapping	AVINT	Marcie Nagel	Imran Ali	Neil Johnson
Threat Modeling Simulation of Cyber Attacks of Smart Stadium Using STRIDE and DREAD – In Support of First Responders	JMU	Edna Reid	James Imanian	Lenbert Shropshire
Zero Trust Architecture (ZTA) Group Project	CGI	Christopher Smith	James Beegen	Christine Alonzo-Yee
Zero Trust Design Using Cloud Native Computing Foundation (CNCF) Landscape	MITRE	Rock Sabetto	Rock Sabetto	Christine Alonzo-Yee

Project Teams

Émpistos: Trusted Embedded Processing and Optimizations for Edge AI Security

AlRaheeq AlMaktum Al Rawas

Maximilian Karen

Zack Wagner

Anay Gulati

SMEs: Md Tanvir Arafin, Assistant Professor

CHALLENGE

Our project aims to solve the challenge of training deep-learning algorithms within ARM TrustZone's limited computing capacity. To achieve this, our approach revolves around developing a Python front-end library by merging embedded systems knowledge, security fundamentals, and low-level programming to provide security for learning algorithms on edge devices.

AlRaheeq AlMaktum Al Rawas

Muscat, Sultanate of Oman

Aspiration: I aspire to be part of a positive change, aiming to contribute to impactful projects that, regardless of size, have the potential to better protect our connected digital world.

Class Comment: Participating in this class reinforced my belief that impactful change requires a collective effort, offering me invaluable experiences in working alongside others towards common goals. Additionally, it provided me with exposure to contemporary technologies that I wouldn't have otherwise explored, significantly enriching my knowledge and skill set for the modern world.

Zack Wagner

Fairfax, VA

Aspiration: I aspire to create technologies that others can use, build off and contribute to for years to come. I enjoy embedded systems and seek to create small, helpful, secure and useful devices.

Class Comment: This course has helped me learn to work with a client's vision when working on a project and how to properly and professionally communicate what will and will not work when it comes to the desired features.

Maximilian Karen

Fairfax, VA

Aspiration: My career goal is to be a security software tester/developer due to my combined interest in security and programming.

Class Comment: This course has helped me learn more about work and expectations in a professional setting and how to overcome obstacles and new requirements as a team.

Bradford Williams

Fairfax, VA

Aspiration: I hope to further my knowledge of Network and Cloud security so that I can better the world around me and keep data safe.

Class Comment: This course has helped me learn how to work directly with a client and how to propose solutions or ideas in a professional setting.

Anay Gulati

Fairfax, VA

Aspiration: I aspire to continue my work in cloud devsecops and master the growing cloud security field. I wish to implement this new form of data storage and management in antiquated companies.

Class Comment: This class has taught me how to work in a professional environment while collaborating with intelligent individuals who delegate each task.

Project Sponsor: Dr. Tanvir Arafin

GEORGE MASON UNIVERSITY | Cyber Security Engineering

Émpistos

Explainable AI using Decentralized Distributed Ledger Technology

Noah Korzak

Gael Abboud

Mihir Kulkarni

Pratamaneesh Gavaravarapu

Richa Aryal

Harshya Gavaravarapu

SMEs: Shadman Hossain

CHALLENGE

Current AI models operate as a "black box", obscuring the decision-making process from users. In response to this issue, we developed a decentralized Explainable AI model, tightly integrated with blockchain technology. Our solution mitigates bias, increases user trust, and is tamper-evident. Additionally, the integration with a distributive ledger provides users the ability to handle and monitor their personal data.

Noah Korzak
Fairfax, VA.

Aspiration: Once I obtain my Master's degree, I aspire to work in the public sector with an emphasis on protecting the nation's critical infrastructure from digital threats.

Class Comment: This course allowed me to practice leading a team of talented individuals, while simultaneously sharpening my skills in both research and in creating and maintaining an Artificial Intelligence model.

Gael Abboud
Fairfax, VA

Aspiration: I aim to become a Linux System Administrator with a deep understanding of network security and server management.

Class Comment: The project work allowed me to apply theoretical knowledge to real-world scenarios, bridging the gap between learning and doing. By constructing a server environment from the ground up and integrating AI tools, I've gained invaluable insights into the technical nuances and the practical aspects of system administration.

Richa Aryal
Fairfax, VA

Aspiration: In the cybersecurity field, I'm motivated by an interest to constantly learn and contribute my expertise. My passion lies in safeguarding digital environments, and I aspire to a career that continually challenges me. I aim to innovate and stay ahead of evolving threats, not just working in cybersecurity but actively improving it. My goal is to become a vital asset, mastering new skills to develop stronger security measures and protect essential digital information.

Class Comment: The class is great. It allows me to gain practical experience through a hands-on project for a real company. I'm excited to learn new skills while contributing to a company's goals.

Mihir Kulkarni
Fairfax, VA.

Aspiration: I would like to become a cyber security professional and work in the intersection between AI, Cyber Security, and Cloud.

Class Comment: This project exposed me to topics outside of just cyber security and gave me experience with the research and development process. I also appreciated the experience of taking on a longer-term project with a team.

Harshya Gavaravarapu
Fairfax, VA

Aspiration: After completing my Master's degree, I hope to have a career in cybersecurity as a cyber analyst specializing in threat intelligence. I aspire to continuously learn and expand my knowledge in cybersecurity.

Class Comment: This class has helped me gain more knowledge about artificial intelligence and the importance of understanding how it works. I enjoyed working with this group of people and learning more about new technologies.

Pratam Gavaravarapu
Fairfax, VA.

Aspiration: I would love to pursue a career in cybersecurity specifically that entails threat hunting and mitigation. I would love to expand my knowledge and overlap cybersecurity into upcoming fields like AI. I aspire to make an impact in various sectors of the cybersecurity field and educate future generations on the same

Class Comment: It was a privilege for me to work with a talented group in a significantly complex project. This class has made me push my boundaries as a student and rising professional. I gained an important insight in the cybersecurity field along with Artificial Intelligence, preparing me for my future in the profession.

Friendly Forces ID

Vincent Fanelli

Kevin Vu

Billy Battles

Caleb Hughston

Noah Farley

Megan Anhalt

SMEs: Dr. Brett Berlin

CHALLENGE

The goal of this project is to create a tamper and spoofing proof identification mechanism. This infrastructure utilizes peer-to-peer mesh-based communication through LoRa frequencies and the open-source software Meshtastic. Various modulation and encryption mechanisms are in place to ensure confidentiality, integrity, and availability within the network. Applications of this technology can range from disaster response to off-grid communications.

Vincent Fanelli
Fairfax, VA.

Aspiration: My aspiration is to lead a fulfilling career within the Information Security landscape. Currently I have been preparing myself to enter the sphere of network security.

Class Comment: This project has provided me valuable experience in systems engineering, team leadership, AGILE development and secure RF design. Additionally, this project has shown me an entry within the world of government contracting.

Caleb Hughston
Ashburn, VA

Aspiration: In the short-term, I seek to hone my skills in tools used for network analysis and security. Long-term, I intend to enter the IT and Data professional fields as a competent individual that is ready to learn even more.

Class Comment: This project has afforded me the opportunity to see where I can improve myself in order to meet the expectations and standards of those in similar fields as our sponsor. Furthermore, the opportunity to create connections through this project is invaluable to my success in the future.

Megan Anhalt
Fairfax, VA

Aspiration: Set on becoming a leading female-figure in cybersecurity engineering. I hope to advance my career through continuous growth and development, confident that I will achieve substantial progress along the way.

Class Comment: This project has provided me with valuable insights enhancing my skills and capabilities, while also familiarizing myself with knowledge in hardware security. In addition, my ability to engage with clients in a professional setting has strengthened.

Kevin Vu
Fairfax, VA

Aspiration: To continuously improve my knowledge and skillset through my future career in the military as a Cyberspace Operations Officer. I want to protect our digital infrastructure against evolving risks in any way possible.

Class Comment: Working closely with my classmates turned the project into what felt more like a mini job than a traditional class, which I really enjoyed. This teamwork helped me identify both my strengths and areas for improvement. Additionally, the project provided us a glimpse into the kinds of challenges we could face in the real world.

Billy Battles
Springfield, VA

Aspiration: I aspire to empower individuals and organizations to take proactive steps towards enhancing their cyber security posture, providing guidance, resources, and support to help them navigate the growing complexity of security in the digital space safely and confidently.

Class Comment: This project has taught me the importance and power of a team oriented environment when facing complex problems. That communication is critical to the success of a project through peers and stakeholders. The project has also helped me to grow as a security professional by challenging my skills in hardware and wireless security.

Noah Farley
Leesburg, VA

Aspiration: I want to improve my competency and knowledge in Cybersecurity by learning new hardware components and software tools to keep up with the ever-evolving field of Cybersecurity.

Class Comment: This class prepared me for the real world by simulating the Cybersecurity hardware and software pipeline tailored to fulfill clients' requirements.

LLM as an IDS: Leveraging Large Language Models to Detect Cyber Attacks
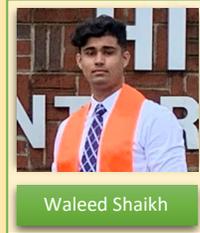

Jeremy Allen

Dominick Roderiguez

Kevin Dwyer

Armin Elyaderon

Bobby Kestyn

Waleed Shaikh

SMEs: Alejandra Diaz

CHALLENGE

Traditional Intrusion Detection Systems (IDS) have been an essential tool for flagging malicious network traffic. However, they have become fragile due to their narrow scope of relying on rulesets. Thus, they have limited knowledge of emerging threats, making them ineffective against new attack patterns. Large language models (LLM) are AI models capable of understanding and generating text at a large scale. This project aims to design a system that leverages both traditional IDS and LLMs to analyze data for meaning and better detect cyber attacks.

Dominick Roderiguez
Fairfax, VA.

Aspiration: My current aspirations and career goals focus on becoming a cybersecurity engineer in the industry. I look forward to applying my knowledge in the field and continue to learn about the newest threats and techniques.

Class Comment: This class has provided me the opportunity to conduct hands on research and development in an academic setting while collaborating with industry leaders.

Kevin Dwyer
Fairfax, VA.

Aspiration: My current aspirations focus on starting my new job in application security and pursuing the continued development of my career in cyber security.

Class Comment: This class has taught me a lot about working with AI and how to integrate it into systems to utilize the advantages that it can bring.

Bobby Kestyn
Fairfax, VA.

Aspiration: My career goal is to become a cybersecurity engineer focusing on system security and resilience. I hope to learn even more on the job and become a well-rounded cybersecurity expert.

Class Comment: This class has broadened my horizons on what cybersecurity can do and has allowed me to learn knowledge surrounding AI, LLMs and cloud services.

Jeremy Allen
Fairfax, VA

Aspiration: My current aspirations and career goals are to focus on my new role as a cyber security consultant and sharpening my knowledge within the field better.

Class Comment: This class has offered me the opportunity to learn and growth with fellow scholars to complete a project that could help the overarching cyber security landscape.

Armin Elyaderon
Fairfax, VA.

Aspiration: My career goal is to become a cybersecurity engineer. I would like to apply the knowledge I have gained from GMU to make an impact and protect digital assets.

Class Comment: This class gave me the unique opportunity to gain hands-on experience with emerging technologies and collaborate in a professional environment.

Waleed Shaikh
Fairfax, VA.

Aspiration: My goal/aspirations are to deepen my understanding of cyber security, aiming to work as a cyber security engineer. Eventually, I hope to channel this knowledge into founding my own business.

Class Comment: This class has enhanced my understanding of teamwork, research, and development. It has also equipped me with new tools and knowledge in the field of cybersecurity.

Project Sponsor: Phyllis Schneck

NORTHROP GRUMMAN

LLM Goat: A System that Deliberately Exhibits Large Language Model Vulnerabilities

CHALLENGE

LLM Goat seeks to address the gap in understanding the novel risks associated with Large Language Models (LLMs).

It is a vulnerable and educational toy application that simulates real-world LLM vulnerabilities based on the recently-released 'OWASP Top 10 for LLM Applications.'

By offering an interactive learning experience in a Capture the Flag (CTF) format, LLM Goat trains users on LLM vulnerabilities through hands-on engagement in a gamified setting.

SMEs: Aaron White

Siddharth Ganesh
Ashburn, VA

Aspiration: I am hoping to my start my career as a cyber analyst and eventually transition into threat intelligence. I hope to use the information that I learn to protect an increasingly digital world.

Class Comment: This class has taught me so much about working as team, and greatly helped with professional development. In additional, I learned very marketable technical skills.

Brycen Kirschner
Springfield, NJ

Aspiration: My end goal is to become a penetration tester. I am currently trying to gain as much exposure to different sections of the industry as possible to solidify my foundation and understanding of organization infrastructures, weaknesses, and overall cybersecurity.

Class Comment: This class has brought me a strong mentor for technical and professional improvement, experience with handling real-world projects, and an intelligent team to work alongside.

Zaid Osta
Fairfax, VA

Aspiration: I want to apply my acquired cyber skills to challenging modern-day problems.

Class Comment: Liaising with the sponsor, learning from our mentor, and working with my team across several months was a valuable experience. My specific project exposed me to new and relevant topics (LLMs and their associated vulnerabilities) which are key as the LLM space continues to grow.

Steven Ly
Annandale, VA

Aspiration: I am currently working as an intern learning how to become a SOC Analyst.

Class Comment: CYSE at GMU allowed me meet my wonderful team.

Owen Hicks
Fairfax, VA

Aspiration: I am hoping to be a part of the AI revolution that the world is currently going through. I want to help bridge the gap between machine-learning capabilities and the cybersecurity problems that continue to grow.

Class Comment: This class has helped teach me how to act professionally and has prepared me to enter the workspace. Getting the chance to interact with our class mentor and sponsor has been invaluable to my learning.

Ammar Salam
Sterling, VA

Aspiration: I would like to work as a cyber analyst or intelligence analyst dealing with CYINT in the intelligence or law enforcement realms. With my cybersecurity skills learned in this major and through other ventures, I seek to apply my knowledge in the real world and make a significant impact in the digital age we live in.

Class Comment: This class taught me a lot about working on a project in the real world and everything that comes with it. Working in a group in a professional environment was something I did not have a lot of experience with, but now I feel well-equipped to handle team tasks in a corporate setting.

Project Sponsor: Phyllis Schneck

NORTHROP GRUMMAN

Machine Learning Modeling for Attack Surface Insights

Manroop Dhanoa

Liza Ugryumova

Nicolas Lorenzo

Zavian Sider

Sufian Abdalla

Taaha Ikram

SME: Scott L Miller

CHALLENGE

The main goal of this project includes accurately correlating NIST 800.53 security settings with CIS Benchmarks, which requires an intricate understanding of both frameworks. Developing a machine learning model that can effectively interpret these frameworks demands expertise in security protocols and AI methodologies. Integrating Python-based machine learning libraries with a SQL server for efficient data management presents technical complexities. Validating the model's accuracy against real-world configurations and maintaining its relevance to evolving security standards while ensuring stakeholder satisfaction are additional hurdles to overcome for successful implementation and deployment.

Liza Ugryumova
Ashburn, VA

Aspiration: I hope to work in threat and malware analysis, becoming a leader in the Cybersecurity industry. I will continue improving my skills and learning about emerging cyber threats.

Class Comment: This class allowed me to get real-life work experience that we would not usually be able to get in a classroom setting. I learned a great deal about teamwork and overcoming obstacles.

Nicolas Lorenzo
Woodbridge, VA

Aspiration: I hope to receive a full time position after my internship, which deals with Software Testing and Application Security for the DSS department of Fairfax County Public Schools. I would like to switch after a couple of years to the field of threat intelligence.

Class Comment: This class and project with Navy Federal has given me the ability to gain real-world experience with my desired field. I have learned how to utilize many new platforms and features such as SQL, SQL Databases, and Machine Learning Modeling techniques.

Zavian Sider
Springfield, VA

Aspiration: My dream is to eventually be a CISO or CIO at a FAANG company. But until that happens, I want to pursue red teaming and penetration testing as a hobby, while I work in a blue team environment.

Class Comment: This class helped me understand machine learning models and how to apply them to cybersecurity topics. Research and testing really simulate a working environment

Manroop Dhanoa
Manassas, VA

Aspiration: My goal is to become a Security Engineer and gain critical knowledge in the industry to work my way up and get to a leadership position at a reputable firm.

Class Comment: This class has allowed me to learn valuable communication and management skills for working in a team environment. Working with industry professionals has helped me gain a greater perspective about the Cyber Security industry.

Sufian Abdalla
Manassas, VA

Aspiration: I hope to work as Cybersecurity Engineer and explore the avenues of engineering industry in the security field and become a team lead in the future.

Class Comment: The class gave me the opportunity to work in a team environment where I gained many important skills that I can utilize at my job and how to apply myself in the best way possible.

Taaha Ikram
Herndon, VA

Aspiration: In the future, I want to work a job that incorporates both my cybersecurity and coding skills. I hope to become either a Secure Software Engineer or an Application Security Engineer.

Class Comment: This class helped me understand the relationship between a company and a customer. I was also able to practice my coding skills and do work with Machine Learning and AI models.

Project Sponsor: Manuel Cintron

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COAST GUARD
VETERANS

Machine Learning Models: Cyber Data Matching and Outlier Detection Prototype

Kiet Hoang Nguyen

Faris Issa

Arman Markar

Shaho A Ahmed

Beni Mahato

SMEs: **David Crawford**

CHALLENGE

The objective of this project is to utilize supervised learning techniques in AWS SageMaker to create a model capable of correlating software inventory data obtained from various cyber security tools with a curated dictionary of "known" software products. The aim is to enhance the efficiency and accuracy of software inventory management within cybersecurity frameworks.

Kiet Hoang Nguyen
Fairfax, VA.

Aspiration: I am commissioning into the United States Army National Guard as a cyber officer.

Class Comment: This class is fun because we get to work with industry partners and learn hands-on experience.

Arman Markar
Manassas, VA

Aspiration: I aspire to become a lead cybersecurity risk analyst to prevent unwarranted cyber attacks to companies and businesses. This way I can apply all my cyber education to real world practices.

Class Comment: This class was extremely interactive, and it was my first chance at experiencing a real cyber project within the workforce. The CGI team was fantastic.

Beni Mahato
Fairfax, VA

Aspiration: Secure a federal job where I can apply my expertise to protect critical digital infrastructure and contribute to national security efforts.

Class Comment: This class was very helpful, gave me a taste of working in the professional world. It taught me teamwork, communication, time management, meeting deadlines, and researching. I really enjoyed this course.

Faris Issa
Alexandria, VA

Aspiration: My dream career is working as a Malware Analyst or Security jResearcher where I can apply both my computer science and cyber security skill sets to defend against the latest cyber threats.

Class Comment: This class served as a taste of what a professional project would be like in my career field. I truly enjoyed the real-world experience gained from working with CGI and my colleagues in a collaborative environment.

Shaho A Ahmed
Fairfax, VA

Aspiration: My ideal job would be as a security researcher or malware analyst, where I could use my expertise in cyber security and computer science to protect against the most recent online dangers.

Class Comment: This course gave me an idea of what a professional project in my line of work would entail. Working in a collaborative atmosphere with CGI and my colleagues allowed me to obtain real-world experience, which I really loved.

Project Sponsor: Paul Douthit

CGI

Measuring Cybersecurity Regulatory Harmonization

Daniel Chambers

Kanishk Jawdekar

Blake Lainhoff

Neha Koteru

Jasmeet Pandher

SMEs: Jeffery Goldthrop

CHALLENGE

The objective of the project is to create a method that can identify relevant public federal regulations related to cyber risk reduction, develop functional requirements for an algorithm to measure the harmonization of these regulations, implement the algorithm, and test it on a set of public regulations to measure the National Cybersecurity Strategy's impact.

Daniel Chambers
Gainesville, VA

Aspiration: I aspire to work as a penetration tester within the private or government sector.

Class Comment: This course was a positive experience for me to develop my skills across several different cybersecurity disciplines and gain a ton of experience working as a team as well. Getting the opportunity to work as a team alongside a professional who has tons of experience and insight within the industry has provided a phenomenal foundation for me to understand the profession and be prepared for any potential career opportunities in my future.

Blake Lainhoff
Fredericksburg, VA

Aspiration: I aspire to work in a cyber incident response role, or to work with network security architecture

Class Comment: This course has impacted me positively, as it's given me experience working in an area of cybersecurity that I wouldn't have otherwise gotten the opportunity to explore as deeply. It's also been nice to be able to work together with a team to all develop a product.

Jasmeet Pandher
Ashburn, VA

Aspiration: My career aspirations are to be a Cybersecurity Consultant or a Cybersecurity Analyst. In the near future, I want to obtain my masters in CYSE.

Class Comment: This class has given me the opportunity to learn a lot of different skills and strengthen my leadership skills. It was a great way to experience the structure of real-world projects and gain professional experience.

Kanishk Jawdekar
Culpeper, VA

Aspiration: I aspire to become a Cloud Security Engineer, SOC Analyst, or Cybersecurity Consultant so I can work on many cyber topics/projects.

Class Comment: This course has been a positive experience for me as it showed me the project management side of projects that a traditional classroom setting isn't able to provide. On top of that, this project has solidified the skills I've learned and expanded it as well thanks to the challenge we had to overcome.

Neha Koteru
Ashburn, VA

Aspiration: I aspire to be a security consultant or analyst so I can challenge myself with complex problems every day while making a direct impact by improving security measures for organizations.

Class Comment: This course has helped me gain hands-on experience in the cybersecurity field and allowed me to work on real-world problems. This project helped improve my technical skills and working with a team for a long period of time allowed me to enhance my communication and management skills.

Project Sponsor: Jeff Goldthorp

FCC — Federal Communications Commission

Pressure Sensor Modeling using Machine Learning Techniques

Nicolas Ammann
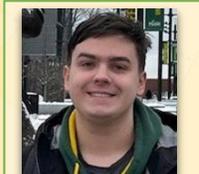
Nathan Hodum

Ibrahim Komora

Nathan Polizzi

SME: Anomadarshi Barua

CHALLENGE

Differential Pressure Sensors are found in many rooms where sensitive information is discussed such as Negative Pressure Rooms. Due to their construction, these sensors can pick up audio data which means they have the ability to open a new covert channel.

Our challenge was to develop a way to sample audio signals from these sensors and create a dataset of these signals to be analyzed and classified by a natural language processing machine learning technique.

Ibrahim Koroma
Fairfax, VA.

Aspiration: Apply my abilities as a cyber security engineering in the world of cloud computing to protect and solve cloud storage data problems and safeguard against any threats.

Class Comment: In this course, I have learned many ways and techniques to complete certain tasks in a team environment for overall better results.

Nathan Hodum
Fairfax, VA

Aspiration: To help others understand the complexities of cyber security and understand why security matters and how it affects them.

Class Comment: In this course I have sharpened my coding skills and learned lots on developing a Machine Learning model

Nicolas Ammann
Louisville, CO

Aspiration: To use the skills and tools I've learned to help protect people.

Class Comment: This course has taught me the relationship between teams and clients and how to do research for a purpose.

Nathan Polizzi
Chicago, IL

Aspiration: Apply my engineering skills to develop products that solve complex problems in order to benefit the lives of people in the United States and worldwide.

Class Comment: Throughout the duration of this course I have come to understand the importance of good project management and system requirements.
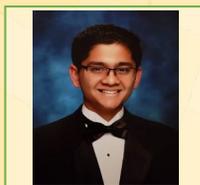
Project Sponsor: Anomadarshi Barua

GEORGE MASON UNIVERSITY

Real-time ADA Compliance on GMU Campus

Nuzhat Saleh
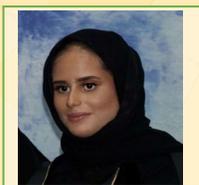
Aldur Almaknoon Al Rawas

Om Karambelkar

Mariam Khan

Beth Haessler

Osama Abdulmajid

SMEs: Dr. Lance Sherry

CHALLENGE

On George Mason University's Main Campus there are many, everchanging hazards to mobility accessibility. We are developing a Command-and-Control Center (C3) that will provide the users with real time updates to the accessibility around campus, to help users overcome dynamic hazards appearing on campus.

Nuzhat Saleh
Gainesville, VA.

Aspiration: My career goal is to contribute to protecting personal information and vulnerable systems in an age of constant cyber attacks. I am excited to transition into my role as Cloud Support Associate at AWS after graduation.

Class Comment: I appreciate the opportunity to work with other Cyber Security Engineering students at GMU and learn valuable technical skills such as application development and system modeling, in addition to soft skills such as time management and leadership abilities, which I will take into my career.

Mariam Khan
Herndon, VA.

Aspiration: My goal is to become a digital forensics analyst specializing in intrusion detection. After graduation, I intend to obtain a master's degree in digital forensics.

Class Comment: This project has allowed me to work on a project with real world implications. I have improved my systems engineering and application development skills and value the connections I have made with my teammates.

Osama Abdulmajid
Vienna, VA.

Aspiration: I aspire to work with a company that specializes in maintaining automatic authentication systems, for example, those that authenticate users identity based on computer interactions like keystroke speed (behavioral biometrics).

Class Comment: I have been grateful to work with a great group of people & be exposed to a project that could really make a positive difference to the community. Figuring out how to apply cyber concepts to this project has been an interesting challenge.

Aldur Almaknoon Salim
Abdullah Al Rawas
Muscat, Sultanate of Oman

Aspiration: With a heart full of dreams, I aspire to journey through a world of knowledge, to cross paths with those who illuminate the way, and to make a profound impact wherever my path leads me.

Class Comment: I found the class to be invaluable. It provided me with essential project management skills and a real-world perspective on implementation in Cyber Security.

Om Karambelkar
Ashburn , VA.

Aspiration: My primary career aspiration is to learn more about defensive security and become a SOC analyst. I want to defend my organization from cybersecurity threats and work with penetration testers to discover weaknesses, vulnerabilities, and threats. I also want to obtain certifications and solidify my foundational knowledge in cybersecurity.

Class Comment: This class taught me that large projects like this one require strenuous amounts of planning, executing, and improving. You find yourself constantly searching for new ways to improve and optimize workflow to meet an end goal.
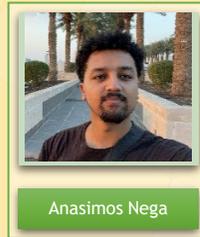
Beth Haessler
Moneta, VA

Aspiration: My career goals are to help develop secure systems and in doing so learn how systems may be broken. With this knowledge I would like to go into cyberlaw, ethics and investigation.

Class Comment: This class challenged what I have learned working in the field and helped me understand how to apply it to different contexts and projects. I am grateful for the opportunity to work with my peers and further develop my skills and talents/

GEORGE MASON UNIVERSITY

Secure Chat Application to be Used by Teams for Operational Security

Ryan Thai

Tanner Leventry

Anasimos Nega

Ryan Chalhoub

Samantha Barry

SMEs: Paul Hamman

CHALLENGE

When breaches occur within an organization, there are little to no communication platforms that provide a secure and efficient environment for security teams to discuss the matter. Our team was tasked with creating and deploying a chat application using AWS that meets all the minimum-security requirements of the NIST 800-53 r5 framework and OSI model. This application would also provide the most automation processes possible with minimal sacrifices to security compliance testing.

Ryan Thai
Alexandria, VA

Aspiration: I aspire to become a cyber systems engineer as I continue to educate myself on systems resiliency and compliance.

Class Comment: This class was a great experience as I learned how to work in a professional setting with a team and mentor. I learned new viewpoints in system architecture and compliance that helped me understand the fundamentals of system security practices.

Tanner Leventry
Fairfax, VA

Aspiration: I aspire to work in digital forensics and continue learning more about the overall field of cyber security while working.

Class Comment: The work I did in this class was a great experience and helped me learn what the workforce is like. Being able to work with a team towards a common goal was very helpful in preparing me for after I graduate.

Anasimos Nega
Alexandria, VA

Aspiration: I aspire to find a meaningful position within the Cyber industry and contribute to the betterment of our field and the people I am tasked with helping.

Class Comment: The class was very informative and helpful in facilitating an environment where we can collaborate with peers and work towards a desired goal. I had a great experience working with teammates, SME's and mentors.

Ryan Chalhoub
Falls Church, VA

Aspiration: I aspire to eventually run my own cyber company using all the skills I will learn during my journey.

Class Comment: The work I did in this class taught me how working in a team at the professional level would likely be like. It also helped with understanding the compliance aspects of cyber on a more fundamental level.

Samantha Barry
Fairfax, VA

Aspiration: I hope to help the cybersecurity industry grow through consulting or as a Digital Forensics examiner.

Class Comment: The project we completed in this class helped me experience what tackling a larger team project would be like in a professional setting. I was able to learn more advanced computer programming skills that can help me better understand how users and systems communicate and how those communications are protected.

Project Sponsor: Paul Hamman

ZEUS TECHNOLOGIES

Securing Robust Multi Robot Systems in Dynamic Environments

Blake Todorowski
Harris Laing
Anosh Mian
Kirthan Gaddam

CHALLENGE

The objective of our project is to design a multi robot system (MRS) with live ROS robotics while bringing to light the security concerns that arise from multi robot systems. This was conducted using Turtlebot3 robots operating on an OS named ROS1 (Robotic Operating System) and our knowledge of Python and C++ to develop MRS solutions for live demonstration.

Blake Todorowski
Pittsburgh, PA

Aspiration: I plan to use my knowledge that I gained here at Mason and expand upon it through future work and experience.

Class Comment: This project allowed me to get outside of my comfort zone and explore cyber security in a more "real-world" setting.

Rohit Eagala
Gainesville, VA

Aspiration: I want to be able to use my college knowledge and what I learn in the future to make contributions in the cyber security world.

Class Comment: It was rewarding working on a project that allowed for more academic freedom compared to other courses.

Michael Fox
Chesterfield, VA

Aspiration: I would like to further developing my cyber security skills with hands on experience.

Class Comment: Over the last year I enjoyed learning how to work with physical components for hardware security and working with my team to develop security solutions.

Kirthan Gaddam
Richmond, VA

Aspiration: My goal is to expand my knowledge and have a meaningful contribution.

Class Comment: This course has helped me by letting me see what its like to work with robotics and learn new skills in the process.

Harris Laing
Fairfax, VA

Aspiration: I want to secure systems against attackers and help the lives of many.

Class Comment: This class has allowed me to work in the field of cyber physical systems which I was completely new to.

Anosh Mian
Ashburn, VA

Aspiration: I would like to have a career in DevSecOps where I make meaningful contributions to the field.

Class Comment: I enjoyed working with the turtle bots and my team mates to produce something tangible.

GEORGE MASON UNIVERSITY

Security Assessment of Vehicle to Vehicle Communication Protocols

CHALLENGE

Shayan Eghtessad

Rohan Puvvada

The objective of this project is to understand the current Vehicle to Vehicle network technologies and landscape. Using the information we learn, we are then tasked with identifying a flaw or vulnerability within the C-V2X technology, which we should be able to demonstrate through a simulation. Lastly, we are tasked with creating mitigations for the identified vulnerability, all of which should be summarized in an IEEE format research paper to be published.

SMEs: Dr. Mohamed Morsy

Shayan Eghtessad
Loudoun, VA.

Aspiration: I aspire to become a successful and impactful cybersecurity specialist with a cyber job I truly enjoy. My Cybersecurity Engineering major at GMU has equipped me with the skills and knowledge to achieve this goal. I'm excited to leverage my education to safeguard the digital world and make a real difference.

Class Comment: This senior design project working with CV2X networks has been a great experience working with all aspects of cybersecurity. It was challenging but also rewarding and it provided a great overview of what the future will hold once I move on from GMU and into the real world.

Kidus Workneh
Springfield, VA

Aspiration: Though I have not decided what specific avenue in cyber security to pursue, I aspire to be a well-respected and competent cyber specialist.

Class Comment: This project has been very challenging at times but because of that I've been able to grow so much as not only as a cyber security specialist but also as a person. I am truly grateful to have had such a great mentor, sponsor, and groupmates to help me along my journey.

Moojtaba Haidary
Springfield, VA

Aspiration: I aspire to use the information I have gained over my 4 years at Mason in order to improve the security and mentality of the organizations I work for.

Class Comment: This class has helped me understand how to approach a project from the base level, teaching me how to properly conduct research, create a product, and utilize my academic writing and verbal skills in a STEM field.

Turan Hasanli
Fairfax, VA

Aspiration: My aspiration is to make cyber world a safer place by being a Cybersecurity specialist. My interest in Cybersecurity is in maintaining security in transportation systems, especially with maintaining safety of new generation of vehicles.

Class Comment: The senior design project provided me with a great insight to the future of transportation systems, I learned about the wireless communication requirements of our future vehicles to make our roads a safer place.

Alexander Keller
Springfield, VA

Aspiration: I dream to finish my accelerated master's degree in Digital Forensics so that I can work with a federal agency to investigate and fight cyber-crime.

Class Comment: This project has introduced me to an interesting but underdeveloped field in cybersecurity. I gained a lot of experience in both complex development across a team of people and going through the research process.

Rohan Puvvada
Reston, VA

Aspiration: Using the skills and knowledge acquired from my time at GMU, I hope to be able to contribute to the ever-evolving cybersecurity landscape, by being able to master the relevant technologies and improving my security design mindset.

Class Comment: This senior design project has given me new insight into an emerging field (Vehicle to Vehicle Communication), shown me how to properly conduct and write about a research topic, and helped improve my general approach to problem solving and system understandings.

Project Sponsor: Moinul Hossain

GEORGE MASON UNIVERSITY

Software Security During the Rise of AI

Andrew Feijoo

Rayan Issa

Richard Huynh

Solomon Pamie-George

Ethan Trinh

Keenan Vu

SMEs: Sruthi Chavali, Sujay Kandwal

CHALLENGE

Research likely AI-enabled use cases and methods that threat actors will employ.

Suggest countermeasures (AI-based or traditional), resources, and skills for organizations and security professionals to better protect themselves from AI-enabled threats.

Andrew Feijoo
Fairfax, VA

Aspiration: I aspire to strengthen my knowledge of cybersecurity through experience in order to better safeguard systems and networks.

Class Comment: This project has been an amazing experience and journey. It has really taught me a lot about the importance of teamwork and trust within group efforts.

Rayan Issa
Fairfax, VA

Aspiration: My overall goal is to be able to gain technical and non-technical cybersecurity skills so I can be able to safeguard systems and make a meaningful impact within the cybersecurity sector.

Class Comment: This project has prepared me for the workforce by providing invaluable exposure to a real-world challenge and the collaboration with a group of peers and a sponsor. Additionally, delving into the realm of AI and its implications for cybersecurity has truly been eye-opening.

Richard Huynh
Fairfax, VA

Aspiration: Dedicate my career to safeguarding our society's most essential services by specializing in cybersecurity within the critical infrastructure sector.

Class Comment: This capstone project has been a fun deep-dive into open-source AI. I am excited to share our results and hope you find it as exciting as we all did.

Solomon Pamie-George
Fairfax, VA

Aspiration: Given the growing importance of protecting digital systems and data, I envision myself working in roles such as Cybersecurity Analyst, Penetration tester, Security consultant or engineer after graduation.

Class Comment: This has been an empowering professional experience for me as I navigate the intricate landscape of software security and AI integration. My heartfelt appreciation goes to our Sponsors, Mentor, and the CEC for their unwavering commitments and support to our project.

Ethan Trinh
Fairfax, VA

Aspiration: To gain a wide range of experience and knowledge in the cybersecurity field in order effectively protect systems and data. Physical pen-testing has always peaked my interest, but I have a strong drive to explore new concepts, learn new things, and apply them to securing systems.

Class Comment: It was fun exploring the capabilities of AI while gaining experience on how the workforce will operate. Collaborating with sponsors, meeting their challenges, and working with a great team.

Keenan Vu
Fairfax, VA

Aspiration: I would like to gain a wide variety of experiences and skills during my career, and be the kind of person who is reliable for a variety of tasks.

Class Comment: The project for me has been an excellent team experience and really makes me feel prepared to join the workforce. I feel like I've gained a better understanding for the future of AI and cybersecurity.

Project Sponsor: Rock Sabetto

MITRE

STIG - to - CVE Mapping

William Leppert
Bhavesh Ala
Ali Nadhaif
Ethan Furtado

CHALLENGE

This project seeks to leverage Python's Open Data Science Stack and sPacy NLP techniques to map DISA STIG Checks to Vulnerabilities(CVEs), aiming to enhance risk calibration by integrating software flaws and configuration weaknesses. Through the utilization of machine learning-driven NLP methods and assessing similarity measures like COSINE and Levenshtein distance, the project aims to streamline vulnerability remediation efforts and mitigate confusion resulting from the separate treatment of vulnerabilities and misconfigurations.

SMEs: Suresh Subbaratinam, Imran Ali

William Leppert
Bristol, VA

Aspiration: I would like to work the duration of a project, from discovery to deployment, the research and development of tools surrounding threat hunting, risk enumeration, and machine learning in IT and OT systems. Tools geared towards the automated integration of threat intelligence to design a solution in a CI/CD, DevSecOps, and human/user centric development environment.

Class Comment: The topic of STIG to CVE mapping for risk enumeration is no simple feat. Use of language, layers of abstraction, scope, and scale found in the cross referencing of configuration to vulnerability have necessitated the use of LLM processing. The lack of Cyber LLM pertinent to this particular case has further necessitated the generation of custom LLMs for a multi pronged approach to vectorization and similarity comparison of multiple points of interest found in the frameworks of STIG and CVE. This class has given me the unique opportunity to exam each of these subjects in greater detail!

Bhavesh Ala
Aldie, VA

Aspiration: I want to become a penetration testing expert and be able to create my own software to find flaws within an organization's network.

Class Comment: This class has introduced me into a project management style of working. This has introduced me towards a job mentality and ready to work.

Ethan Furtado
Ashburn, VA

Aspiration: I want to work as an incident responder. Problem-solving is a passion of mine and the challenges of analyzing security breaches and formulating response strategies are what appeal to me.

Class Comment: This class has helped in creating an environment where I can learn with other people on a project that I have no experience with. Throughout this project, I've been interested in using many different tools and working with a team to discuss ideas and solutions. I am glad for this experience and hope to use it once I go into the working field.

Ali Nadhaif
Centreville, VA

Aspiration: I am deeply committed to pursuing a career in Robotics and A.I., driven by a passion for continual learning and innovation. My goal is to specialize in A.I. development, creating software solutions that harness the power of artificial intelligence to drive advancements and address complex challenges.

Class Comment: This project has been instrumental in facilitating my self-study and deepening my understanding of a particular subject from scratch. It has also provided invaluable insights into real-world project management processes, including brainstorming, research, design, and problem-solving, thus equipping me with practical skills essential for navigating professional challenges.

Project Sponsor: Marcie Nagel

Avint LLC.

Threat Modeling Simulation of Cyber Attacks of Smart Stadium
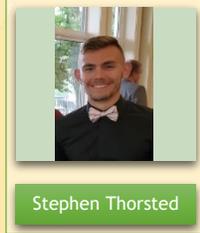
Soham Patel

Khang Nguyen

Noor Mohammed

Sonia Shaukat

Stephen Thorsted

Peter Turnbull

SME: James Imanian

CHALLENGE

The primary aim of this project is to explore potential cyber threats in smart stadium environments and develop a simulation tool to facilitate a comprehensive understanding for first responders. The endeavor necessitated grappling with future attack methodologies, assessing their execution pathways, and formulating effective mitigation strategies. Identifying and addressing these challenges were fundamental in advancing our preparedness for emergent cyber threats in such contexts. Our project focus on cyber attack on Smart Traffic Light, Electric Vehicle and communication between Electric Vehicle and Electric Vehicle Charging Station.

Soham Patel

Brambleton, VA

Aspiration: I would like to pursue career as a Cyber Security Engineer and would like to concentrate on Application Security due to variety of challenges and career growth.

Class Comment: This course helped me gain insight on real-world work experience. Throughout the course, I've learned about the importance of teamwork, documentation, time management, and work ethics.

Noor Mohammed

Gainesville, VA

Aspiration: I would like to focus on learning more about web development. My interest in this field is my desire to understand the complexities of how web applications are built and secure them against any threats.

Class Comment: This course has helped me with hands-on experience in working on real-world projects. It taught me the importance of teamwork and time management.

Stephen Thorsted

Fairfax, VA

Aspiration: become a cyber security penetration tester and obtain as many pen testing certificates as possible

Class Comment: I enjoyed learning how to work as a team and working with a sponsor in a professional setting.

Khang Nguyen

Fairfax, VA

Aspiration: I would like to learn a lot more about Malware Analysis, especially anything that comes to computer viruses and such as it was also a fun topic to learn about ever since I was young when my father taught me about it.

Class Comment: This class/course has taught me a lot about hardships, team building, and communication in a possible real-world environment, things that I will remember when working in the future.

Sonia Shaukat

Woodbridge, VA

Aspiration: To become a cybersecurity specialist focused on threat intelligence and incident response. I am driven to develop cutting-edge strategies and technologies to protect organizations from evolving digital threats.

Class Comment: This class enhanced my cybersecurity skills, focusing on threat intelligence and incident response. The hands-on exercises and real-world case studies provided valuable insights into detecting and mitigating complex cyber attacks. I am now equipped to effectively safeguard organizations from evolving digital threats.

Peter Turnbull

Fairfax, VA

Aspiration: Aspiring Cybersecurity Practitioner looking to leave a positive mark on the world.

Class Comment: The Class has been a pleasant experience, I enjoyed working closely with our sponsors.

Project Sponsor: Dr. Edna Reid

JMU

Zero Trust Architecture (ZTA) Group Project

CHALLENGE

Our team was tasked to research and develop a Zero Trust Architecture (ZTA) that ensures that no user can be trusted. After performing this research, we were assigned a mock scenario to discuss how our proposed technologies would work against the it. The scenario was to determine how the ZTA technologies would function when Application X is required to run a vulnerability scan on a trusted system.

SMEs: James Beegen, Christopher Smith

Nisita Chavva
Ashburn, VA

Aspiration: I plan to continuously improve and hone my technical skills and stay up to date with the constantly evolving cyber threats and cybersecurity industry.

Class Comment: This course has given me hands on experience to develop my technical skills as well as enhance my understanding of cybersecurity fundamentals within a real-world perspective.

Shiksha Khadka
Manassas, VA

Aspiration: My goal is to gain and optimize my knowledge for better opportunity advancement with special interest in the field of cyber security.

Class Comment: This course has helped me gain a deeper understanding and comphreshive insights of cybersecurity fundamentals.

Mikyle Fayyaz
Annandale, VA

Aspiration: I plan to continue learning in the field of cybersecurity, specifically focusing on sharpening my threat analysis skills.

Class Comment:. I have benefited from this course by researching new cybersecurity concepts and gaining an understanding of real-world applications.

Yonas Kebede
Fairfax, VA

Aspiration: In regard to my career, I aspire to one day leave an impact in the development of cyber security.

Class Comment: Though this course I have benefited by adapting a new mindset to cybersecurity.

Matthew Clark
Winchester, VA

Aspiration: My goal is to further research into Zero Trust Architectures and to increase my skills while working within Zero Trust Architecture.

Class Comment: This course increased my researching skills and helped me work in a collaborative and challenging environment.

Sean Walker
Waverly, NY

Aspiration: My goal is to further improve my skills within cyber security and focus on strengthening my knowledge on Zero Trust Architectures.

Class Comment: This course has helped develop my skills in a collaborative and interactive environment while also gaining exposure to a problem-solving technical capstone that I had not gained from other courses.

Project Sponsor: Christopher Smith

CGI

Zero Trust Design Using Cloud Native Computing Foundation (CNCF) Landscape

Ibrahim Alduhaish

Ryan Garr

Abdul Almasri

CHALLENGE

The main challenge of our project lies in navigating the complex landscape of integrating Zero Trust Architecture (ZTA) within the Cloud Native Computing Foundation (CNCF) landscape. This involves understanding and implementing various CNCF tools such as Envoy, Hashicorp's Vault, and SPIFFE/SPIRE in a coherent manner to establish robust security measures. Additionally, ensuring compatibility and scalability within a simulated cloud environment on the Azure platform with Ubuntu virtual machines presents technical hurdles. Moreover, devising an affordable ZTA model that aligns with market trends and offers a viable alternative to costly commercial solutions poses a significant challenge. Despite these obstacles, our project aims to overcome them through meticulous research, experimentation, and collaborative effort.

SMEs: Rock Sabetto, Joseph Walter, Maxwell oliver dueltgen

Abdul Almasri
Arlington, VA.

Aspiration: My aspiration is to establish a distinguished career as a cybersecurity engineer, leveraging my current role as an IT Consultant at the World Bank. Drawing upon my background in development, I am committed to identifying and addressing critical challenges within the cybersecurity domain. Furthermore, I endeavor to contribute to the advancement and broader applicability of open AI and machine learning technologies within the field.

Class Comment: This course has afforded me the invaluable opportunity to acquire expertise in gathering requirements, conducting thorough research, and exploring Azure cloud security tools which helped us showcase (ZTA) zero trust architecture on cloud environments.

Ryan Garr
Herndon, VA

Aspiration: I am pursuing a career as a Splunk Consultant and data analytics professional services specialist upon graduation. As an individual with a development background, I aim to identify issues within this sector of the industry and eventually develop and sell my own proprietary solutions that address these issues.

Class Comment: This class has provided me with the opportunity to learn how to gather requirements, research, and develop a solution tailored to the needs of a project sponsor. These are skills that will be invaluable once we begin working in the industry.

Ibrahim Alduhaish
Riyadh, Saudi Arabia

Aspiration: My goal is to pursue a career as a cybersecurity engineer, focusing on the prevention and protection of infrastructures against cyber threats.

Class Comment: This course provided me with the invaluable opportunity to immerse myself in the professional work environment alongside industry experts. Through practical experience and theoretical knowledge gained, I've acquired valuable insights directly relevant to my future endeavors in the cybersecurity industry.

Reema Almalki
Riyadh, Saudi Arabia

Aspiration: I aspire to become a cybersecurity engineer and eventually establish my own cybersecurity firm. By pursuing this career path, I aim to contribute to the security and resilience of digital infrastructure while fostering innovation in the field of cybersecurity.

Class Comment: This class has provided me with invaluable real-life experience, instilling in me a sense of responsibility and accountability towards managing and executing projects effectively.

Ziyue He
Herndon, VA

Aspiration: I would like to become a cyber security engineer dedicated to preventing and protecting infrastructures from cyber threats.

Class Comment: This course gave the opportunity to experience the work environment with professionals in the field. It has taught me valuable lessons which directly apply to my future in the industry.

Farid Dehghanian
Sterling, VA.

Aspiration: My goal is to make an impact in the field of cyber security, particularly within the arena of cloud security. I am currently studying cyber security engineering at George Mason University, where I am dedicating my efforts to learn Zero Trust Design in alignment with the Cloud Native Computing Foundation (CNCF) Landscape. I am driven to uncover and innovate solutions that ensure robust digital defenses, propelling my vision to the forefront of cybersecurity excellence.

Class Comment: The senior design class project was a pivotal experience in my education at George Mason University. It allowed me to explore real-world applications of cloud security, particularly through our focus on Zero Trust Design using the CNCF Landscape. The project honed my skills in problem-solving and research, laying a foundation for professional practice. Collaborating with my team, I gained new perspectives that have profoundly influenced my approach to cybersecurity challenges. I am grateful for this experience as it has significantly contributed to my growth as an aspiring cybersecurity professional.

Project Sponsor: Rock Sabetto

MITRE

Class Instructor

Class Instructor manages the A-to-Z operation of the senior design project, including projects selection, budget management, and the coordination among sponsors, mentors, and students. They play a key role to ensure the two-semester course runs smoothly and seamlessly .
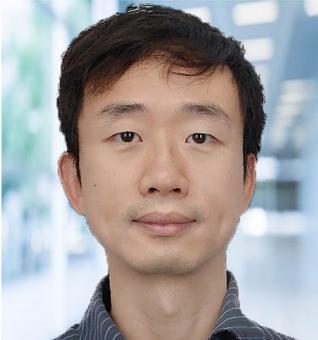
Mingkui Wei, Ph.D

Dr. Mingkui Wei is the lead class instructor of the 2023-2024 CYSE492 / CYSE 493 course. He is an Associate Professor of Cybersecurity Engineering Department at GMU and has conducted researches in a variety of aspects in cybersecurity, including computer networks, digital forensics, smart power grids, and smart vehicles. His current research interests focus on layer-7 security, especially on web securities. His research has resulted in a number of top tier conference and journal publications, such as ACM CCS, Usenix Security, IEEE Transaction on Networking, etc.

Dr. Wei completed his Ph.D in Computer Engineering at NC State University in 2016 and worked in as an Assistant Professor in Computer Science at Sam Houston State University, where he conducted researches and taught courses in digital forensics. During his tenure at SHSU, he also collaborated with faculties in Forensics Science Department at SHSU and Houston Forensics Science Center on a crime scene investigation project.

He joined the Cybersecurity Engineering Department in the Spring 2021, since then has taught graduate and undergraduate classes covers several topics. He built several classes from the ground up including CYSE 230 Computer Networking, CYSE 421/521 ICS Security, CYSE 550 Cyber Security Engineering Fundamentals, and CYSE 610 Networks and Cyber Security.

He is honored to assume the role as the class instructor for the CYSE senior design and enthusiastic about making this last CYSE course a nonmemorable experience for the senior students.

Class Mentors

Class mentors leverage their expertise to ensure the delivery of a sound project. More importantly, they provide valuable guidance on the whole lifecycle of the project and prepare students for the next step in their engineering careers beyond graduation.

Christine Alonzo-Yee

Christine Alonzo-Yee is the Sr. Director of Defense at KeyLogic. She is a systems engineering and technology consultant serving across various defense, intelligence, and federal agencies. She was with Booz Allen Hamilton for 19 years, starting her career in military satellites, migrated to radar technologies, and then to cybersecurity technologies, focusing on the protection of government networks. She has served as a chief engineer, focusing on the strategic investment, growth, and ideation of differentiated engineering technologies, such as resilient position, navigation, and timing. She currently focuses on the business development and growth of the DoD portfolio within KeyLogic, delivering advanced analytic and data management capabilities. She received a B.S. in electrical engineering from The Pennsylvania State University and a M.S. in electrical engineering from Johns Hopkins University.
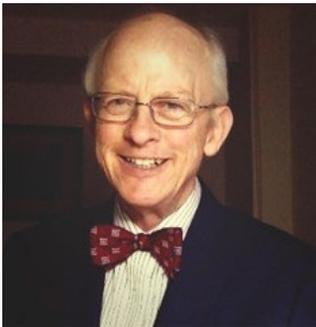
Brett Berlin

F. Brett Berlin brings over 50 years of mission-focused digital transformation by innovative computational systems and architectures, problem solving, technology competitiveness and innovation policy experience; to his passion for new value creation, which he has applied in his roles as computer scientist, executive advisor, strategist, policy entrepreneur and professor/mentor. His current vision-forward focus is on value creation policy vision for the next generation computing competitiveness vision; and the daunting yet worthy emergent challenges of ethical, responsible & explainable AI emergence at scale requisite to deliver trusted human partnership and value creation.

Class Mentors

Class mentors leverage their expertise to ensure the delivery of a sound project. More importantly, they provide valuable guidance on the whole lifecycle of the project and prepare students for the next step in their engineering careers beyond graduation.

Jair Ferrari, PhD

Dr. Jair Ferrari is a former Brazilian Air Force Officer (Colonel), Maritime Patrol Pilot, Electronic Warfare (EW) Specialist, Portfolio Manager of Aeronautical and Defense R&D Projects. He was an EW Instructor and Course Coordinator from basic to postgraduate courses. He has an Electronic Warfare short course from 2 weeks to a formal specialization course that became a MSC and PhD programs in the Aeronautics Technology Institute (ITA) – Sao Paulo, Brazil. Dr. Ferrari was a researcher in the Department of Mechanical, Industrial and Aerospace of Concordia University (Optimization of Aerial SAR Operations Studies) as well as in the C4I & Cyber Center of GMU (UAS Detection Systems Simulation and Optimization). He is currently the professor of Systems Engineering Principles (SYST205), Unmanned Air Systems Security course (CYSE499/685) and Mentoring (CYSE492/CYSE493). Dr. Ferrari received his PhD in Industrial Engineering (Optimization of Aerial and Naval SAR Operations) – Concordia University (Montreal, QC); MSc in Systems Engineering (Electronic Warfare Specialization) – U.S. Naval Postgraduate School (Monterey, CA); MSc in Business Administration (Quantitative Methods for Quality Evaluation) – Brasilia University (Brazil).

Neil F. Johnson, PhD

Dr. Neil F. Johnson is a Cyber & Forensics Research Scientist with Pacific Northwest National Laboratory. His career has spanned various defense, intelligence, and federal agencies. He was a Research Scientist and the Associate Director of the Center for Secure Information System (CIS) at George Mason University (GMU) until 2002. He established a digital forensics laboratory as the lead analyst and researcher for over 12 years. He served as the Science & Engineering Technical Advisor for IARPA and DARPA programs including Media Forensics (MediFor) and Semantic Forensics (SemaFor) programs driven by his passion for digital forensics and developing capabilities to help accomplish mission objectives. He loves teaching and never fully left academia. His teaching career spans over 20 years and includes being an Adjunct Professor at George Washington University in the Masters in Forensic Science and Masters in High-tech Criminal Investigation programs (2003-2017), an Adjunct Professor at George Mason University teaching cryptography under the Cyber Security Engineering (CYSE) and Electrical & Computer Engineering (ECE) departments in the Volgenau School of Engineering, a Professor and Cyber Concentration Lead in Cyber Intelligence & Data Science Department at the National Intelligence University Oettinger School of Science & Technology Intelligence. He has guest lectured at numerous universities and conferences. He is also an instructor for an industry-wide media forensics course teaching best practices and critical thinking. He received his BBA concentrating in Decision Support Systems and Operations Research from James Madison University and his MS and Ph.D. from George Mason University.

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Mohamed Morsy, PhD

Dr. Mohamed Morsy is an Associate Professor of the Cybersecurity Engineering Department at GMU. Before joining the Department of Cyber Security Engineering at George Mason University as an adjunct faculty in 2022 then as full-time Associate Professor in 2023, Dr. Morsy served at various locations as senior system engineer and senior research scientist. He served as part-time faculty in electrical engineering and applied science at George Washington University (2002-2004), then as Department Chair of Electronics & Communications at ITT (2004-2016). He also served as a member of the ITT National Electronics Curriculum Committee (2005-2016). From 2009 to 2023 he was an adjunct Professor with the Department of Computer Information Systems, Fairfax University of America (formerly Virginia International University). Dr. Morsy has authored/coauthored several technical journal articles and conference papers (cited in the web IEEE). He received numerous teaching performance awards and certificates of appreciation from the IEEE Communications Society. Dr. Morsy is a Senior Member of the IEEE. He is an Editor of the International Journal of Research Publications (IJRP). He received his Doctor of Science degree (D.Sc.) in Electrical Engineering and Communications from George Washington University, Washington DC.

Lenbert "Shrop" Shropshire

Shrop is a senior Lead Technologist with Booz Allen Hamilton. IO Psychology, Mechanical Engineering and a George Mason MBA inform his perspective on practical education. Shrop supports warfighter-based initiatives developing and integrating disruptive technologies in areas such as Human Machine Teaming. His teams develop tactical edge computing payloads for autonomous (robotic) payloads.

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Expert Guest Speakers:
Ali Latif (Capital One)
Katie Jones (Booz Allen Hamilton)
Devesh Agarwal (MITRE)
Sujay Kandwal (MITRE)
Rock Sabetto (MITRE)