



DIRECTOR'S REPORT

2023-2024

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ABOUT THE CENTER

HISTORY

The Center for the Advancement of Cybersecurity at Cedarville University was established in 2018 by Cedarville faculty who recognized the need to equip young men and women for Christ-centered cybersecurity service marked by excellence while also enhancing the emerging field of cyber education in the academy. On campus, the Center advances cybersecurity by providing students, faculty, and staff with cybersecurity expertise. Off campus, the Center serves society by promoting cybersecurity best practices. Ultimately, the Center exists to advance Christ's Kingdom by equipping His ambassadors for influence in the increasingly vital domain of cyberspace. From its humble origins in the basement of the Engineering and Science building to its current home in the Scharnberg Business & Communication Center, the Cyber Center, as it is affectionately known on campus, is uniquely positioned not only to address the problems of the ever-evolving field of cybersecurity but also to provide leadership in its growth.

MISSION

The Center for the Advancement of Cybersecurity at Cedarville University will advance cybersecurity in our nation by developing tomorrow's cyber leaders in the classroom, shaping cyber education in the academy, and promoting cyber awareness in society.

VISION

The Center for the Advancement of Cybersecurity at Cedarville University, with the clarity, conviction, and character that arise from our Christian faith and values, will advance cybersecurity to the benefit of society.



The Cyber Center Challenge Coin is awarded by the Director or a Fellow with the Director's approval to an individual who has performed a distinguished service or accomplished a noteworthy achievement for the cyber program. Distinguished visitors often receive this coin as well.

MEET THE DIRECTOR



Dr. Seth Hamman joined the faculty at Cedarville in 2012, bringing real-world experience to the classroom from having worked in the tech industry, both as an employee of a startup dotcom and as a consultant. Today, he directs Cedarville's Cyber Center where he led the creation of Ohio's first Cyber Operations BS degree program. In addition to his Introduction to Cybersecurity and Cyber Defense courses, he co-leads the National Security Agency's National Centers of Academic Excellence in Cyber Operations Community of Practice while also aiding the National Cyber Curriculum Task Force and the Cybersecurity and AI Task Force. Dr. Hamman is passionate about shaping the growing discipline of cybersecurity education and developing the next generation of cybersecurity leaders.

DIRECTOR'S REMARKS

The Center for the Advancement of Cybersecurity seeks to advance cybersecurity in three core areas: developing cyber leaders in the classroom, shaping cyber education in the academy, and promoting cyber awareness in society. By growing these three areas, and with the clarity, conviction, and character that arise from our Christian faith and values, we benefit society by making cyberspace more secure for all. Every year since our inception in 2018 we have continued to expand our influence. This has created an exceptional educational atmosphere for our students as attested to in this year's report. The Lord continues to send us exemplary young men and women who are serious students and passionate about serving Him in cyberspace. They and our outstanding and devoted faculty make our cyber program one of the best in the nation. We ultimately advance God's kingdom by loving our neighbor through our service in cyberspace and to God be all the glory.



The Director's Challenge Coin is awarded solely by the Director to personally recognize those who have performed exemplary service in advancing the University's cybersecurity program.



FACES OF THE CENTER



David Gallagher, Ph.D., Lt. Col., USAF, Ret.
Head of Program for Computer Science & Cyber Operations
Senior Professor of Computer Science



Seth Hamman, Ph.D
Cyber Center Director
Professor of Cyber Operations and Computer Science



Nick Parry, M.S.
Cyber Center Deputy Director
Assistant Professor of Cyber Operations



Keith Shomper, Ph.D., Lt. Col., USAF, Ret.
Cyber Center Faculty Fellow
Senior Professor of Cyber Operations and Computer Science



Patrick Dudenhofer, M.S.
Cyber Center Faculty Fellow
Associate Professor of Cyber Operations and Computer Science



George Landon, Ph.D.
Professor of Computer Science



Eric Knoerr, B.S.
Instructor of Computer Science



David Reid
Chief Cyber Student Fellow
'25 Cyber Operations & Computer Science



Kaicheng Ye
Cyber Student Fellow for Cyber Exercises
'25 Cyber Operations & Computer Science



Anna Kauffmann
Cyber Student Fellow for Public Affairs
'25 Cyber Operations & Computer Science

STUDENTS

116 Computer Science (CS)

41 Cyber Operations (CY)

36 Computer Science & Cyber Operations Double Majors (CS & CY)

TOTAL: 193 students



CS:
123 males
29 females



CY:
67 males
10 females



CS & CY:
32 males
4 females

STATISTICS

The combined Computer Science and Cyber Operations majors rank as the **fourth** most popular major at Cedarville and reside in the School of Engineering and Computer Science, which is the largest school on campus.

1st Nursing with 426 students

2nd Mechanical Engineering with 216 students

3rd Psychology with 210 students

4th Computer Science and Cyber Operations with 193 students

5th Management with 159 students

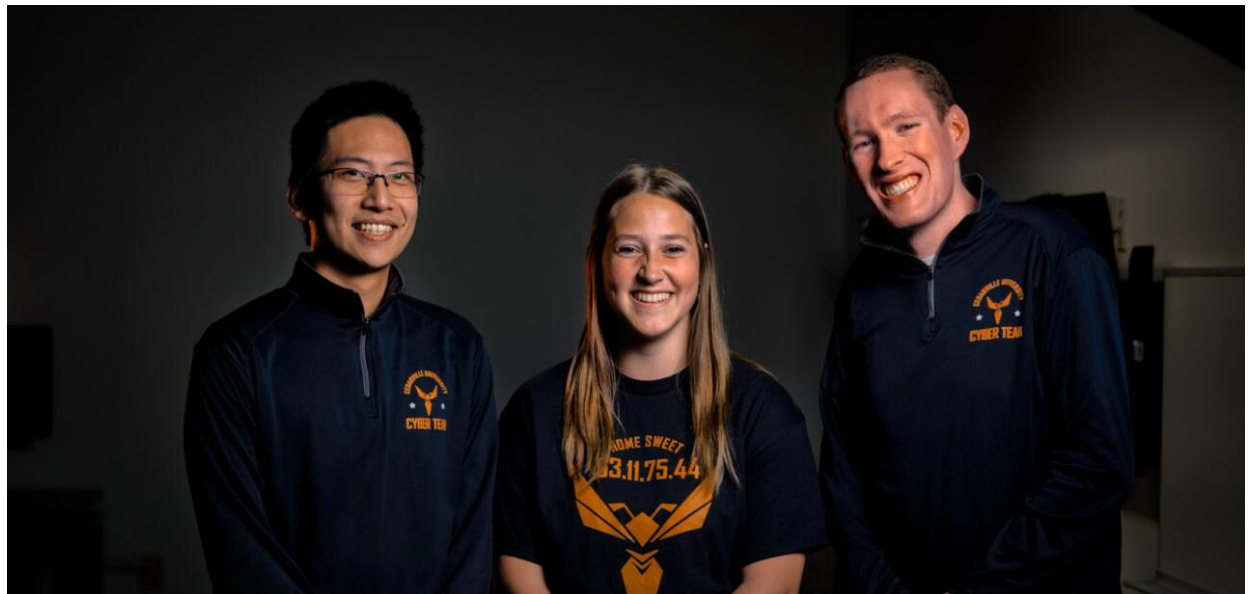
STUDENT LEADERSHIP

Developing capable, technical leaders is one of the missions of the Cyber Center, and the Center is fulfilling that mission as demonstrated by the student leaders who volunteer their time to run various aspects of the Center for their peers. This past year, the Center had three student fellows, three Women in Cyber Security (WiCyS) officers, and several cyber team captains, each contributing to make the Cedarville undergraduate cyber experience the best it can be.



The student leadership team pictured in front of the future Cyber Center.

From left to right: Anna Kaufmann, Lydia Bingamon, Sam DeCook, Emily Wollschlager, David Reid, Gabi Mallack, & Kaicheng Ye.



The Center's Student Fellows.

Anna's shirt displays the internet protocol address of www.Cedarville.edu. Type 163.11.75.44 in any web browser to see for yourself!

FACILITIES

Students and faculty enjoyed newly renovated spaces for classes and competitions this year. The renovations opened the floorplan and reversed the stale, secluded milieu of the previous space. Students now receive a glimpse of campus via a new window but can remain focused due to the window's honeycomb circuit frosting. Fresh tables, comfortable seating, larger monitors, and TV screens all increase the productivity of the space. Perhaps the most popular upgrade is the docking station installed at every terminal, providing student personal laptops charging power, ethernet connectivity, and screen projection capabilities. Collectively, these changes reimagine the computer science labs and enhance the student learning experience.

Next year, the program will gain additional facilities in the Scharnberg Business and Communication Center, namely four faculty offices, two research rooms, a large study space overlooking the lake, a cyber lab, and a conference room. The Cyber Center will move into the new space in Summer 2024.



The renovated computer science labs.



CYBER EVENTS IN REVIEW

To further the undergraduate experience, the Center plans numerous cyber events every year. This past year saw many new and exciting guests and presentations.

Annual Cyber Briefing - 8/29

To start the academic year, the Cyber Center hosted its annual kickoff event. While new and old students alike demolished 25 pizzas, student leadership introduced the Center, explaining cyber student involvement and the beloved cyber competitions slated for the coming term. Students received information on numerous extracurricular offerings before socializing afterwards.



Students in attendance at the Annual Cyber Briefing.



David encourages students to follow the rules of engagement during cyber exercises.



In the front row, Sam and Kaicheng smile while getting their picture taken.

Business School Distinguished Speaker Series – 9/14

The Robert W. Plaster School of Business generously invited us to their Distinguished Speaker Series in the Jeremiah Chapel which featured Mr. Burke E. “Ed” Wilson, a retired U.S. Air Force Major General with an impressive service record including an assignment as Commander of Air Forces Cyber. He spoke on the relevance of cyber in the world and how cybersecurity will only matter more and more in the future.



Mr. Wilson speaking in the Jeremiah Chapel.

Student and Faculty Picnic – 9/29

While temperatures were still warm outside, the Computer Science and Cyber Operations majors hosted a picnic at the Cedarville park. This event provided the opportunity for students to interact with faculty outside of an academic setting, as well as for students to spend time with each other. Students and faculty shared a meal, talked, and played games like volleyball and nine square.



Students and faculty share a meal under the park's pavilion shelter.

ChatGPT, AI, and the Biblical Story - 10/3

As part of the Association of Christians in the Mathematical Sciences (ACMS) Brabenec Lectureship, Dr. Derek Schuurman came to Cedarville to speak on the implications of the Biblical story on artificial intelligence (AI). Selected as the ACMS Brabenec Lecturer for 2023-24, his discussion detailed how Christians should view recent developments such as ChatGPT and the AI boom from a Biblical mindset.



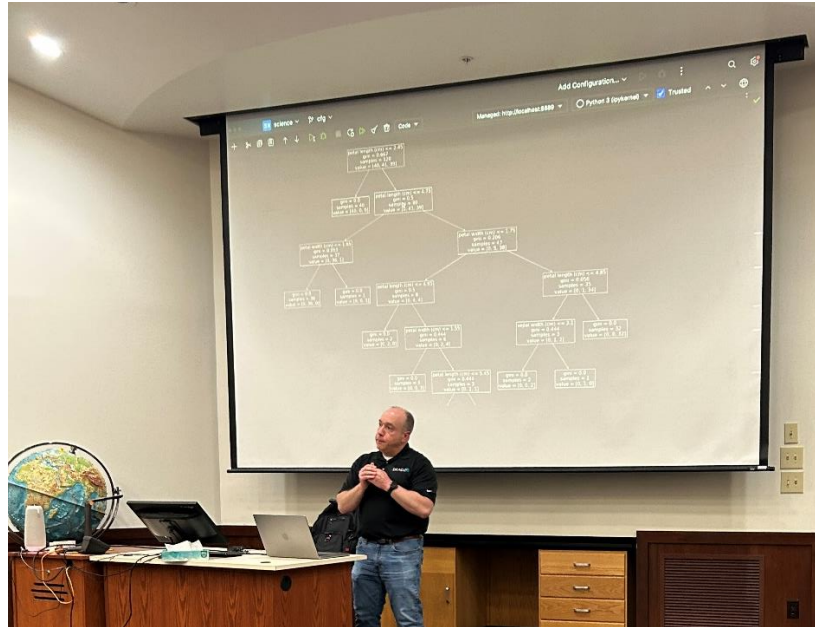
Dr. Schuurman concludes his presentation to take questions.

Control Flow Subversion - 10/10

A Lockheed Martin employee, Christopher Blackburn, gave a technical talk discussing techniques for control flow subversion and their applications. Specifically, Blackburn guided the students through some introductory techniques on x86 Windows such as DLL hijacks, IAT hooking, x86 binary instrumentation, and how to use Windows detours. Basically, there was a lot of hacking going on!

Introduction to Machine Learning - 10/24

Given the significant developments in AI this year, the Cyber Center invited Dr. Thomas Dube to speak on machine learning. The talk presented a high-level introduction to machine learning and demonstrated the training of a decision tree model for classifying a dataset. Dr. Dube analyzed how the model works internally and showcased adversarial methods that could be used to introduce error into the solution. The talk was designed to spark interest and promote understanding of machine learning and its related field of adversarial machine learning.



Dr. Dube explaining a decision tree.

Cybersecurity Discussion Panel - 10/30

As part of National Cybersecurity Awareness Month, the Center hosted a discussion panel, open to the entire Cedarville campus with refreshments provided by Cedarville's Information Technology department. Mr. Adam Dyer, a Cedarville Information Technology security analyst, answered questions about personal cybersecurity.



The panel fielding questions about cybersecurity best practices for individuals and families.

Tour of the Future Cyber Center - 11/8

Mrs. Lynne Clark, the head of NSA's Centers of Academic Excellence program, visited campus to see Cedarville's cyber program firsthand. The University stands as one of only 21 schools in the country to hold NSA's Center of Academic Excellence in Cyber Operations designation. The Center's leadership team took Mrs. Clark on a tour of the new Scharnberg Business and Communication Center, which will also be the home of the new Cyber Center in the fall of 2024.



Mrs. Clark and Center leadership stand in front of the future Cyber Center.



Mr. Reid points to the current Cyber Center from the pavilion of the future one.

Warfare in the Digital Age – 11/17

As part of the Center’s efforts to provide cybersecurity expertise to the campus, Dr. Hamman and Mr. Reid were able to support Cedarville’s Alexander Hamilton Society (AHS) during their political science talk titled, *Warfare in the Digital Age*. A week before the event, Mr. Reid briefed the AHS members on the U.S. military’s current warfighting doctrine in cyberspace while Dr. Hamman facilitated the main event’s discussion with Dr. Peter Campbell, a visiting Professor of Political Science from Baylor University.



Dr. Hamman asks Mr. Campbell about the political ramifications of cyber operations.

Cyber Movie Night – 2/2

The Cyber Center partnered with Cedarville Information Technology to host a movie night. This year’s showing was the cyber classic, *Wargames*. While an older film, its impact on society’s awareness and perception of cybersecurity shaped history. Prior to the movie, Dr. Hamman and Mr. Scott Hunnemeyer gave a short talk about the film’s relevance. As a Lieutenant Colonel in the U.S. Air Force, Mr. Hunnemeyer helped design Cheyenne Mountain Air Force Station, which the film refers to as “Crystal Palace.”



The Director provides some context before introducing Mr. Hunnemeyer.

Witnessing in the Workplace – 4/15

As students prepare to enter the workforce, it is crucial for them to begin thinking about how to be a light for Christ in their respective fields. To properly address this, a discussion panel was created to provide students and faculty the place to discuss how best to navigate working as a Christian in an unbelieving world.

Panelists this year included our own Professors Nick Parry and Eric Knoerr with Dr. Ward and Dr. Dittenber, mechanical and civil engineers respectively, sharing their experience of witnessing in the workplace.

Annual Cyber Debrief- 4/25

The Cyber Debrief featured our annual end of year ceremony with pizza provided and challenge coins awarded to recognize major accomplishments and exceptional service. This year's debrief also included a recap video found [here](#) or by scanning the below quick-response (QR) code.



WOMEN IN CYBERSECURITY CHAPTER



In 2021, female student leaders in our cyber program stood up Cedarville's chapter of Women in Cybersecurity (WiCyS). Our local chapter has flourished from the beginning, meeting a real need for creating connections and mentorship opportunities for the female students in our Computer Science and Cyber Operations majors. This school year the ladies organized several successful events.

8/25 - Involvement Fair Tabling: WiCyS ran a table at the Cedarville involvement fair to promote the organization and recruit new members.

8/28 - Kickoff Coffee Date: WiCyS organized an event with free coffee drinks as a meet and greet for the chapter's members.

10/10 - Career Talk: WiCyS hosted a "round table" with a Lockheed Martin employee who shared about her life and career.

11/10 - Cookie Night: Dr. Gallagher and Mrs. Gallagher hosted WiCyS for dinner and cookie decorating.

12/2 - Snack and Study: WiCyS members were invited to swing by our Computer Science laboratory for a snack and an opportunity to study with friends.



Left: Kickoff Coffee Date. Right: Cookie Night.

2/12 - *Galentines*: Held in the Cyber Lab, WiCyS provided snacks, drinks, crafts, and a photobooth for members to celebrate Valentine's Day while *The Princess Bride* played in the background.

4/21 - *Garden Tea Party*: Dr. Hamman and Mrs. Hamman hosted WiCyS members for lunch and painting. This was WiCyS's end of the year spring event to celebrate the end of the school year and to say goodbye.



Left: the Galentines party. Right: the Garden Tea Party.

CYBER SCHOLARSHIPS



Being designated as a Center of Academic Excellence (CAE) makes our cyber students eligible for the DoD Cyber Scholarship Program (CySP). CySP is a scholarship for service program that pays all education-related expenses and provides a \$27,000 living stipend. Since 2020, we have had 11 students selected for this elite scholarship, with CU's first 3 recipients finishing up their commitment to the DoD this summer. This school year we had 2 new students selected and 1 returning student for a total of 3.

CYBER COMPETITIONS

Known as capture-the-flags or CTFs, cyber competitions are a vital component of cybersecurity education. In these extracurricular competitions, students learn skills not taught in the classroom, build friendships, and have fun exploring cybersecurity. This year 72 Cedarville students competed in 11 different CTFs as part of the Cedarville Cyber Team. In the main national competition, the Collegiate Cyber Defense Competition, we were first overall in the Ohio, Iowa, Kentucky, and Michigan qualifier. Read below for more information about that competition and others.

Hack the Hospital – 9/17-23

Hack the Hospital is part of the larger Hack the Building series sponsored by the National Centers of Academic Excellence in Cybersecurity Program. It is a live fire exercise with both red and blue teams. Cedarville was asked to participate in the remote preliminary round in March of 2023, and the cyber team chose to compete as a red team. The target for that round was an entire miniature-sized city, against which the organizers wanted us to execute specific missions.



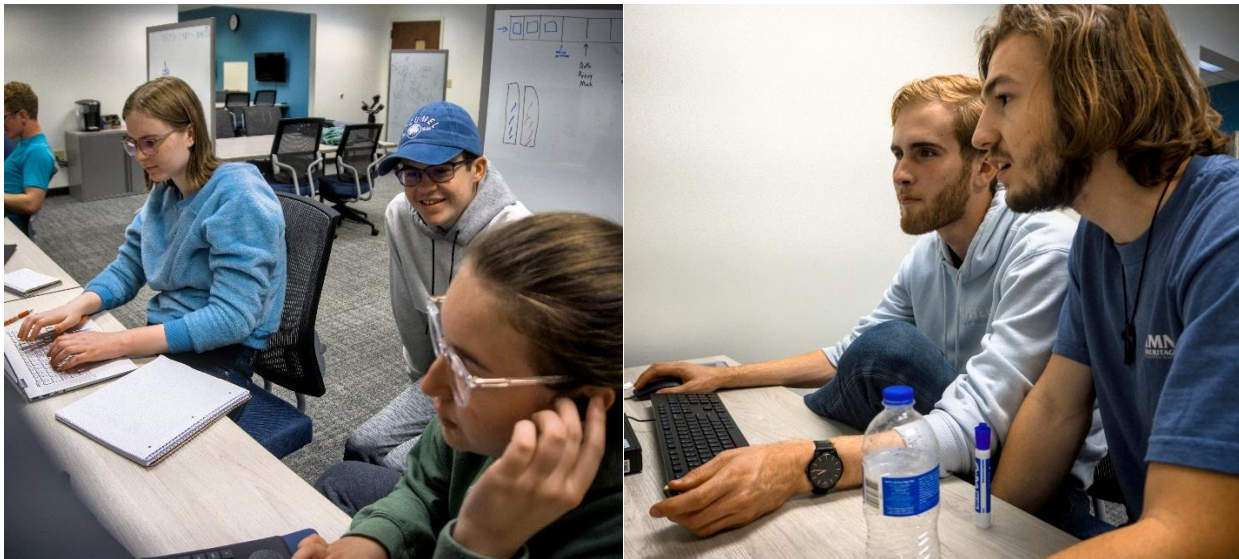
To advance to the finals, the team had to score in the top six of all red teams. We ended up placing second in our group to qualify. In September of 2023, the red team traveled to Columbia, Maryland where an entire hospital floor was recreated. For that week, red and blue teams battled it out, trying to infiltrate or defend medical systems. It was Cedarville's first time doing such a competition, and it turned out to be a great learning experience for all.



Cedarville's Red Team attempting to hack the hospital's HVAC system.

Hivestorm - 10/14

Hivestorm is a beginner friendly, defense competition where competitors are given Linux and Windows machines to secure. Participants need to patch vulnerabilities on the systems while solving forensics questions specific to each machine. Cedarville had 20 students compete virtually from within our own CS labs.



Students compete as a team on Hivestorm competition day.

VIVID - 3/11-14

The VIVID cyber competition is a unique mixture of various challenges, including a capture-the-flag (CTF) exercise with specific attack and defense objectives. The competition scenario involved a university developing a new artificial intelligence (AI)

research system. On the first day of the exercise, teams performed miscellaneous CTF activities to gain information about this AI, called Overlord. For day two, the teams performed red team activities, specifically trying to find a backdoor to take down Overlord. During the last day, teams performed defensive actions and incident response to secure the AI and prevent such actions from occurring again. Cedarville had three teams with a combined total of 14 students that competed. The highest scoring team ranked 1st in their section and 5th overall. They will go on to compete in the live competition on October 6–9th, 2024. This is the first time this competition has happened, and we look forward to competing at nationals next term.

Collegiate Penetration Testing Competition

This was Cedarville’s first year competing in the Collegiate Penetration Testing Competition (CPTC), specifically the Great Lakes Region hosted by Baldwin Wallace University. CPTC is a competition where mock penetration tests are performed on an enterprise environment, providing students with a glimpse of what it is like to work as a penetration tester. One unique aspect of the event is that all in-person interactions must be “in-character” meaning that the teams are supposed to act as if they are meeting with an actual client. This year’s theme was based on “People Moving (Air and Rail).” The network was patterned after an airport but also had a subway to move passengers around the port. We found some critical vulnerabilities that we documented and submitted in our final report. This was our first year in this new exercise, and we learned a lot and have laid the groundwork for future success.



The Cedarville CPTC team. Special thanks to Luke Giannoutsos ('21) for chaperoning the team.

Collegiate Cyber Defense Competition

The Collegiate Cyber Defense Competition is an elite blue team competition that simulates a real-world network. Competing in the Midwest region hosted by Moraine Valley Community College, our eight-man team was given three different categories of tasks: secure an environment sprawling with malware to keep critical services running, defend against industry professional attackers called the red team, and respond to business inquiries called injects that ask for things like network security policy and log extracts for court cases. It is an intense exercise.

The invitational occurred November 18th, 2023. Cedarville sent two different teams with a mix of skillsets that placed 2nd and 3rd at the event. Cedarville used the performance of members in the invitationals to select its core team for the actual competition in the Spring.

The Ohio State Qualifier was next on February 10th, 2024. Cedarville's team placed first in the state of Ohio for the second time in three years, moving on to the Regional Qualifier. On March 14th, 2024, the team traveled to Moraine Valley in Chicago for the two-day regional event. The team made one critical error which landed us 5th out of 11, with an inject ranking of 3rd, red team ranking of 2nd, and a service ranking of 7th. With victory within its grasp, the team hopes to score well next year, hopefully advancing to nationals.

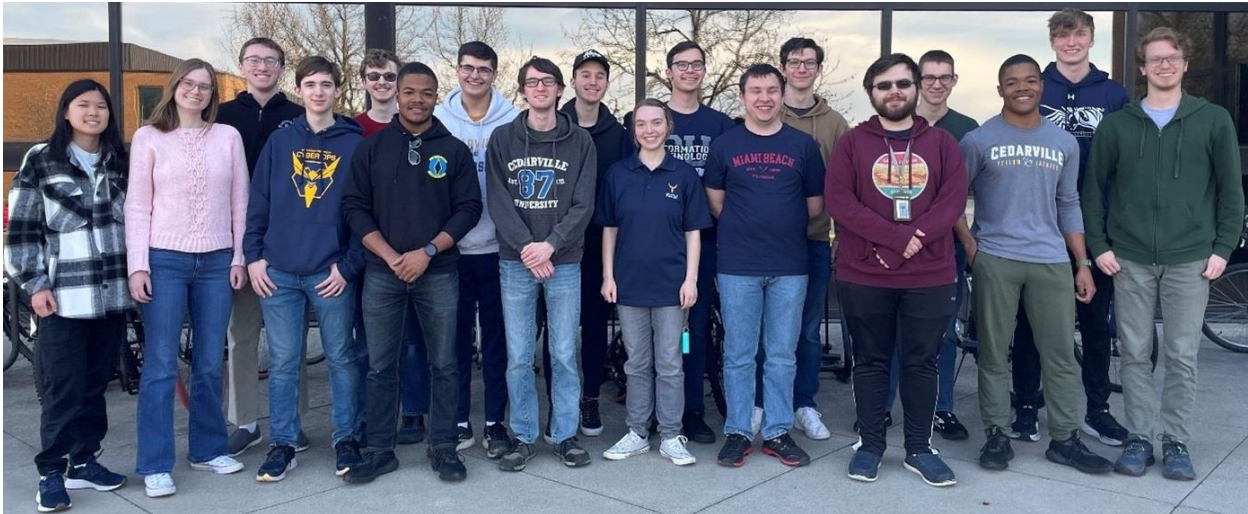


The Cedarville CCDC team.

Cyber Games – 3/23

Cyber Games is a blue team competition made for first time competitors. Teams are given various Linux machines to set up and secure. Participants learn valuable skills working with computer services, computer networks, and CTF challenges. The virtual competition saw eighteen Cedarville cyber operators participate, split into two teams. Each performed exceptionally well, placing second and fourth.

In preparation for the exercise, the teams met once a week to learn about the computer services they would be scored on and to understand how the computers networked together and the various skills needed to maintain them. Many of the participants were freshmen, giving them experience and new skills for their future classes and careers.



The Cedarville NCAE Cyber Games teams.

National Cyber League

The National Cyber League (NCL) is a virtual capture-the-flag competition held by Cyber Skyline. NCL has two seasons of competition: spring and fall. Each season features an individual game and a team game, that occur on different weekends. The individual portion took place October 20-22, 2023, and the team portion took place November 3-5, 2023. Cedarville had a total of 15 competitors. The highest scoring individual took 4th place nationally, and the highest scoring team placed 28th nationally. Overall, we placed 13th in the national Cyber Power Rankings during the Fall season.

STUDENT CYBER RESEARCH

Lockheed Martin Advanced Technologies Lab

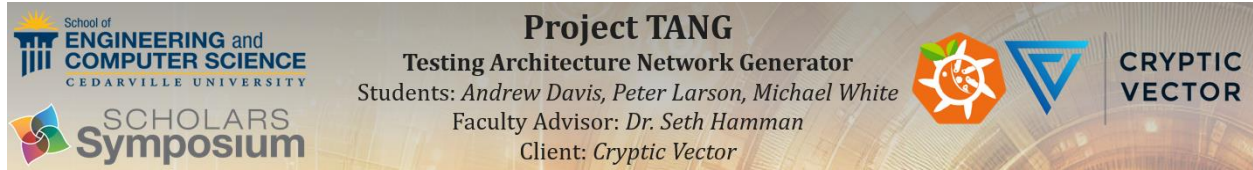
Through a grant from Lockheed Martin Advanced Technology Labs, Prof. Nick Parry led two teams of students in conducting proprietary cyber operations-related research this year. The research took place on Cedarville's campus, with most of the progress being made in Summer 2023 when the students worked full-time on the project. The teams traveled to Washington, D.C. at the end of the summer to present their results. Lockheed has partnered with the Cyber Center for cyber research since 2020, and this grant has provided an amazing opportunity for faculty mentorship of our students and a phenomenal hands-on learning experience for our cyber students. Many of the alumni from the program have been inspired to work in cyber operations after graduation.



Five undergraduate students worked on two different cyber research projects from January-December 2023. Both teams did an outstanding job and received high praise from Lockheed's leadership. Cedarville students began work on a new set of projects for Lockheed in January 2024.

Senior Design

Five senior design teams conducted cybersecurity-related research projects this year and presented their results at Cedarville University's 2024 Scholars Symposium.



Project TANG
Testing Architecture Network Generator
Students: Andrew Davis, Peter Larson, Michael White
Faculty Advisor: Dr. Seth Hamman
Client: Cryptic Vector

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SCHOLARS Symposium

CRYPTIC VECTOR

This project leveraged Kubernetes and GitLab's automated testing toolchain in support of cyber-tool related software development testing. ([link to short description video](#))



Speculo
Internet Resource Replicator
Faculty Advisor: Jordan Bellanti & Dr. Hamman
Students: Sam DeCook, Matthew Jacobs, Alvin Solomon

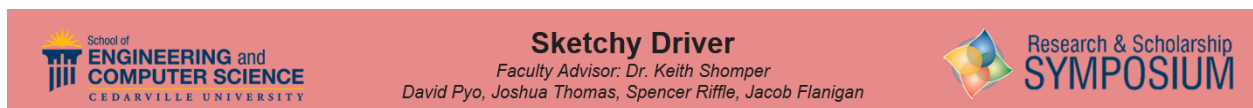
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CRYPTIC VECTOR

SPECULO

SCHOLARS Symposium

This project created a fully transparent mirror for serving content and software libraries in support of software development taking place in air-gapped networks. ([link to short description video](#))



Sketchy Driver
Faculty Advisor: Dr. Keith Shomper
David Pyo, Joshua Thomas, Spencer Riffle, Jacob Flanigan

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Research & Scholarship SYMPOSIUM

This project created an etch-a-sketch inspired hardware device in support of a device driver project in our CY3320 Linux Systems Programming class. ([link to short description video](#))

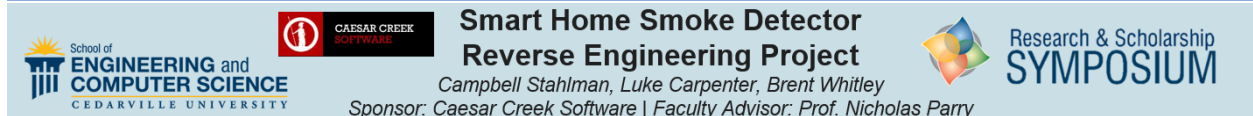


Reverse Engineering Smart/IOT Smoke Detector
Faculty Advisor: Professor N. Parry
Sponsor: Caesar Creek Software
Students: Brooke Ackley, Ben Lamoreaux, Jonathon Weinhold

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CAESAR CREEK SOFTWARE

Research & Scholarship SYMPOSIUM



Smart Home Smoke Detector Reverse Engineering Project
Campbell Stahlman, Luke Carpenter, Brent Whitley
Sponsor: Caesar Creek Software | Faculty Advisor: Prof. Nicholas Parry

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CAESAR CREEK SOFTWARE

Research & Scholarship SYMPOSIUM

These two projects performed software reverse engineering on an IOT smoke detector to probe for vulnerabilities and to develop an implant with an eavesdropping capability. ([link to short description video](#))

CYBER OPERATIONS GRADUATES

2024 marks the first graduating class of Cyber Operations majors at Cedarville and in the state of Ohio. We graduated 17 students in the new major and an additional 13 Computer Science students with a Specialization in Cyber Operations. This is a direct result of the incredible students the Lord brings us. The Cyber Center continues to seek ways to steward our responsibility for His glory and to advance His Kingdom. We are excited to see how the Lord will use these ambassadors in the strategic domain of cyber operations in the coming years and decades.



The Computer Science and Cyber Operations class of 2024!



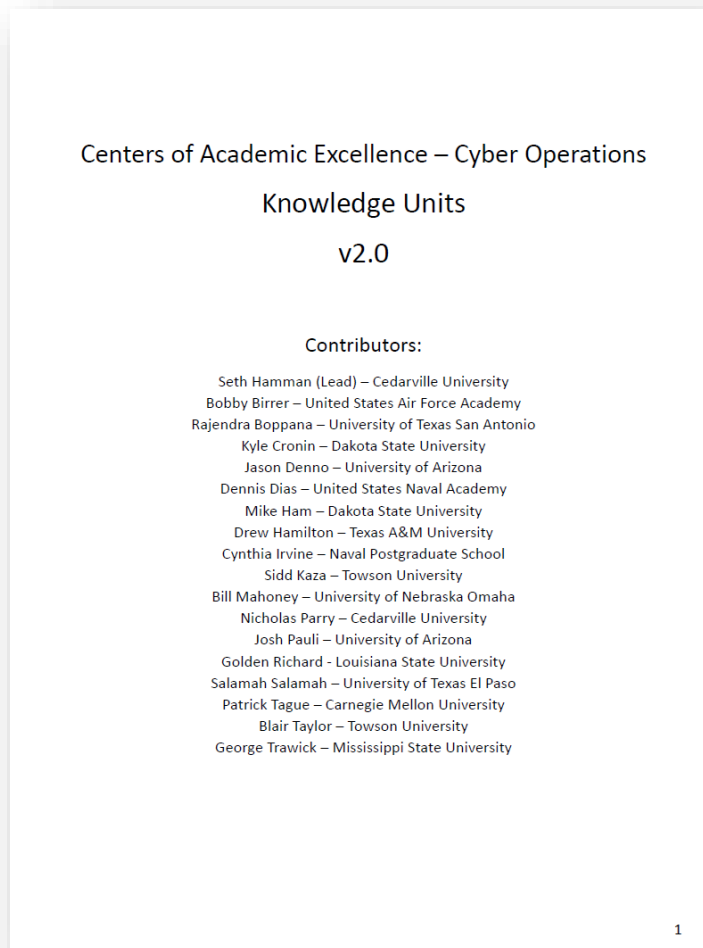
Cyber Operations seniors receiving awards at the 2024 Engineering and Computer Science commencement ceremony.

The first Cyber Graduation Coins were presented to our 17 Cyber Operations graduates in a special ceremony held in the Scharnberg Business & Communications Center. The coins are individually numbered and zero-indexed. They show the cyber stinger breaking out of the hive to symbolize our grads going forth from CU to advance God's kingdom.



CEDARVILLE'S CONTRIBUTIONS TO CYBER HIGHER-ED

Dr. Hamman was blessed with several opportunities for influence in the cybersecurity education community this school year. He managed multiple grants in support of several national initiatives. This included him leading a group of academics in updating the Knowledge Units (KUs) criterion for the NSA's CAE in Cyber Operations (CO) designation. The KUs are the core-criterion of the CAE-CO designation and are the de facto definition of the academic discipline of cyber operations. 25 different schools have been CO-designated since the NSA created the program in 2012, with Cedarville joining the ranks in 2018. 21 schools across the nation are currently designated. Updating the KUs has been a multi-year effort spearheaded by Dr. Hamman, involving several in-person workshops across the nation and walking through the approval process with the NSA program office.



Dr. Hamman authored the new version of the CAE-CO KUs. In that effort, he led a team of faculty from across the nation. The KUs were approved by the NSA and will be required starting Fall 2024.

As Co-Lead of the CAE-CO Community of Practice, Dr. Hamman communicates regularly with the CO schools and the NSA program office. He is a member of the CAE Symposium planning committee and heads the CO sub-committee. He is also the lead mentor for CO schools in the application process and advises aspiring CO schools. In May 2023, he led a mentor workshop in Ft. Lauderdale.



Dr. Hamman on the main stage at the 2024 CAE Symposium in Louisville in April 2024.

This past year, Dr. Hamman also served as Co-Chair of the Reconnaissance Subcommittee of the National Cybersecurity Education Curriculum Task Force. In that role he helped identify cybersecurity education curriculum materials and make them publicly available on CLARK, a curriculum repository for cybersecurity education.

In Spring 2024, Dr. Hamman was asked to serve on the Cybersecurity and AI Task Force, a joint program of the NSA and the National Science Foundation to create a program of study in cybersecurity and AI. He led brainstorming sessions at the initial workshop in Towson, MD, and then further sessions before the CAE Symposium in Louisville, KY. A third workshop is planned in Annapolis in July 2024.

For the second year in a row, Dr. Hamman was invited to speak to the 2023 CO Summer Program interns at the NSA. He taught game theory and adversarial thinking to approximately 20 students from several different colleges participating in the CO Summer Program, including three Cedarville students. Cedarville had an additional three students interning at other NSA summer programs in 2023.

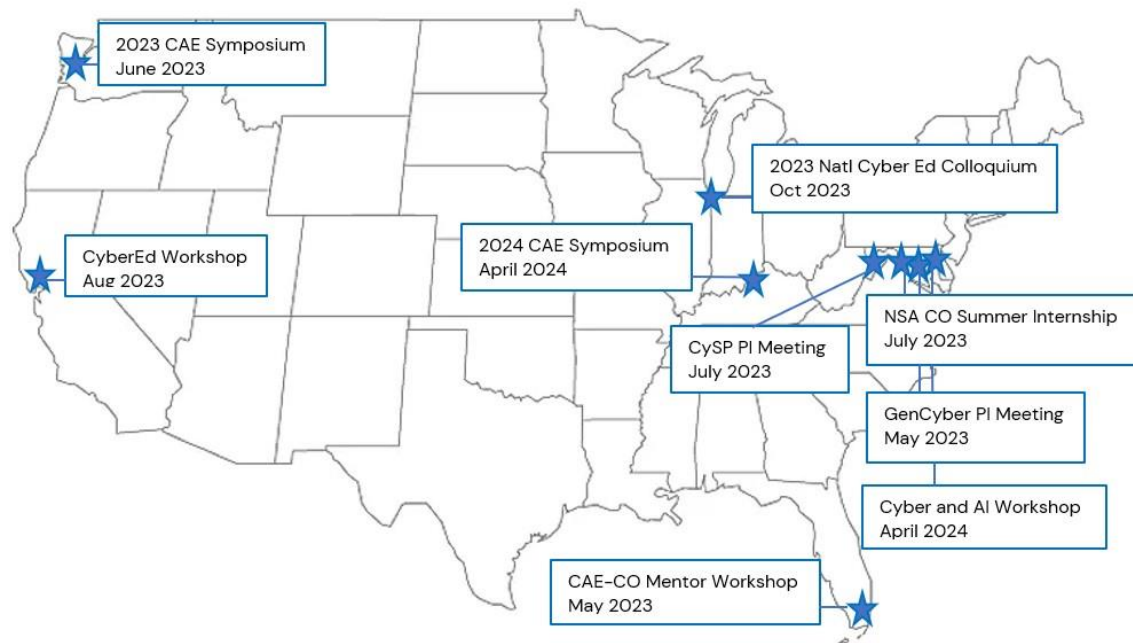
Dr. Hamman is also active as the head of Cedarville’s Regional Programming Center of the Ohio Cyber Range Institute (OCRI). In this role he has received funding to create cybersecurity education curriculum, and in 2022, to organize and host the Ohio CyberEd Workshop on Cedarville’s campus. In 2024, Cedarville was awarded an additional grant from the OCRI to develop an Intro to Cyber textbook and accompanying labs as well as low-level programming labs to be hosted on the Ohio Cyber Range. Cyber Faculty Fellow Dr. Shomper as well as a cyber student and Dr. Hamman will be working on these projects during the Summer of 2024.

Summary of Scholarly Activities Since 2023

6 Conference Presentations

2 Poster Presentations

\$909,162 in Grant Funds



This map shows where Dr. Hamman traveled in 2023-24 in the many opportunities he had for national influence in the academy.

CYBER MANEUVERS

Cybersecurity can be likened to an intellectual wrestling match in the fog for those not fluent in its languages. Some actions are obvious while others hide in the binary haze. For new students, this overwhelms and frustrates, not to mention tests their perseverance in the discipline. To expose the uninitiated to cyber operations earlier in the program, two new electives started this year dubbed Basic and Advanced Cyber Maneuvers or BCM and ACM for short. The one-hour Tuesday evening courses seek to shrink the skills gap between freshmen and their veteran counterparts.

Both are administered by a cyber student fellow and run under the registrar's engineering elective designators EGGN-1960 and EGGN-2960 respectively. BCM focuses on Linux, Windows, and networking fundamentals during the Fall, while in the Spring, ACM executes a mock cyber operation demonstrating the cyber kill chain and employing common tools used in capture-the-flag (CTF) exercises. BCM is defensive. ACM is offensive. Both teach maneuvers, the art of navigating the shadowy terrain of cyberspace. Together, the seminars significantly enhance underclassmen's hands-on skillsets, allowing them to compete on the cyber teams sooner and even earn better grades in the classroom. It is anticipated that BCM and ACM will create a larger and stronger talent pool for collegiate cyber capability that will result in Cedarville strengthening its place in the cyber competition rankings.



The Basic Cyber Maneuvers graduation key tag is colored blue to represent defensive cyber operations. The font is white to represent the white hat of hacking while the gold border and course initials symbolize Cedarville. The cyber stinger specifically represents our cyber operations teams. Jeremiah 46:3 inspires them to battle in defense of what we hold dear. The tag is complementary to its follow-on course.

The Advanced Cyber Maneuvers graduation key tag is colored red to represent offensive cyber operations. The font is white to represent the white hat of hacking while the gold border and course initials symbolize Cedarville. The cyber stinger specifically represents our cyber operations teams. Daniel 11:32 inspires them to do exploits in service to the Lord. The tag is complementary to its prerequisite.

CYBER OUTREACH

The Center strives to strengthen society's cybersecurity, often accomplishing this person by person. Throughout the year, we have engaged in numerous events to promote cybersecurity and spread awareness of the best cybersecurity practices.

National Cybersecurity Awareness Month (NCSAM)

In recognition of National Cybersecurity Awareness Month in October, we hosted several events and our students created cyber awareness slides that were shown on all of the advertising screens across campus. We also partnered with IT in hosting a cyber awareness table in the Stevens Student Center.



Anna Kauffmann, student fellow for public affairs, and Jacob Martin, a cyber student who works for campus IT, hosting a giveaway table for NCSAM.

As a more adventure-fueled way to reach students, the Cyber Center hosted a campus-wide scavenger hunt. Kaicheng Ye, the student fellow for cyber exercises, organized the hunt and built a website that distributed clues to students. These hints

led them around campus to find various pieces of information to help them complete the challenges. This scavenger hunt included puzzles such as basic cryptography and other cyber skills. At the end of the hunt, each participant received a prize.



The Cedarville rock painted with the first clue, a scannable quick-response (QR) code. You can scan the QR code using your phone right now, but the website won't work because the hunt is over!

GenCyber Summer Camp

In Summer 2023, Cedarville hosted an NSA-sponsored GenCyber residential summer camp. 38 rising high school seniors from 14 different states from Alaska to Connecticut attended our camp. The grant also included funding for the high schoolers to enroll in an exclusive online offering of Dr. Hamman's CY1000 Introduction to Cybersecurity course in the fall. 25 campers enrolled, earning 3 hours of college credit. Several of the campers will be matriculating at CU in Fall 2024.



Left: GenCyber campers learning how to use their Micro:bits. Right: GenCyber campers mixing with Cedarville cyber alumni at our Cyber Careers Mixer held at the NMUSAF.



Campers, counselors, and staff for our Summer 2023 GenCyber Summer Camp. The QR code was first deployed at camp to start the campers on our cyber scavenger hunt.

Community Outreach

Our Chief Cyber Student Fellow, David Reid, addressed airmen and auxiliary airmen of the Ohio Air National Guard and the Ohio Wing Civil Air Patrol (CAP) during a cyber exploration briefing hosted by the 179th Airlift Wing. We are proud of Cadet Major Reid, CAP for representing Yellow Jacket Cyber and his CAP contributions as part of the U.S. Air Force's Total Force.



Chief Student Fellow David Reid speaking on behalf of CAP at the 179th Airlift Wing in Mansfield, OH.

Sophomore student Annalina Lysne volunteered her time to mentor area high school students in partnership with a cybersecurity education program run by the National Museum of the United States Air Force (NMUSAF). A NMUSAF representative thanked Annalina with these words: *"You are doing an incredible job as a volunteer. Thank you for taking the time to assist!"*

Prof. Nick Parry, our Deputy Director, was invited to speak at a seminar organized by a local organization on how to stay safe online. He talked about identifying phishing emails, securing your online presence, protecting your digital assets, and more.



Deputy Director Professor Parry speaking at a seminar on how to stay safe online.

PUBLIC AFFAIRS

Cedarville Ranked Top Cyber Program

Cybersecurity Guide ranked Cedarville's Cyber Operations degree as the **#1 best overall program** and **#3 most affordable in the U.S.** A local news station covered the achievement, interviewing some of the Center's fellows. Read CU's [PR article](#) for info.



Dr. Hamman, David Reid, and Anna Kauffmann are interviewed for the news story.

Instagram @cucybercenter

We debuted on social media (but not TikTok!) this past academic year and maintained a vibrant Instagram account. [Follow us](#) to stay in the know!

A special thank you to Anna Kauffmann for standing up and managing our Instagram presence!



Podcasts

[Adversarial Thinking: An Integral Part of Cybersecurity Talent](#) on Cyberbit's Cyber Sensei Podcast, January 24, 2023.

[Playing to Win: Game Theory and Cybersecurity](#) on National Cryptologic Foundation's #CyberChats podcast, April 13, 2023.

[An Interview with Seth Hamman](#) on Cybersecurity Guide's Expert Interview Podcast, May 18, 2023.

Public Relations Stories Published by Cedarville

(Graphics link to stories on cedarville.edu)





EMPOWERING CYBERSECURITY WITH NEW CERTIFICATIONS



STUDENT DOMINATES NSA CODEBREAKER CHALLENGE



NATIONAL EXCELLENCE IN CYBERSECURITY



FROM CEDARVILLE TO TOP-TECH COMPANY: A COMPUTER SCIENCE MAJOR'S JOURNEY TO GOOGLE

(Graphics link to stories on cedarville.edu)

STUDENT TESTIMONIALS

The first part of the Cyber Center's mission is to develop tomorrow's cyber leaders in the classroom. The Center strives to bless its creative and diligent cyber students that attend Cedarville, molding them into seasoned cyber operators. Included here are testimonials from a few of the many students the Center has made an impact on.

Ben Lamoreaux



Cedarville's Cyber Program has not only met but exceeded my academic expectations, making my investment at Cedarville truly worthwhile. The faculty's dedication has been instrumental in pushing me to excel, and the program offers a well-rounded understanding of cybersecurity. Guest speakers frequently visit, where they cover topics from artificial intelligence to ransomware recovery, providing a comprehensive view of the cyber field. What sets the Cyber Program apart from other institutions is its unique blend of technical expertise and a commitment to putting Christ first, shaping a purpose-driven approach to cybersecurity. This program has transformed my educational journey into a valuable and enriching experience, and as I head into graduation, I feel very prepared to make a career out of cyber, and to bring glory to God while doing it.

Mr. Lamoreaux will defend the nation by serving in the Air National Guard's first ever cyberspace unit up at Mansfield Ohio's 179th Cyberspace Wing.

Hannah VanGeest



Going into my freshman year, I had chosen computer science with a cyber focus as my major partially on a whim. Unsure and unconfident in my ability to succeed in a discipline largely foreign to me, I found myself often debating whether studying in this field was the right choice. Now, as a current junior, I reflect on the past two years and clearly see God's grace in how He has surrounded with me with supportive, wonderful staff here at Cedarville as well as lifelong friends within this program. I am truly grateful for how I have been challenged by the computer science and cyber curriculum, whether in the classroom or cyber competitions. Furthermore, God has opened doors for me that I'd previously thought out of reach, such as incredible internships and already a

full-time job after graduation, which is greatly due to how well the professors here have equipped me to go out into the workforce. Sincerely, my time at Cedarville as a student has been transformational, and I look forward to how God uses Cedarville's computer science and cyber operations programs to impact the world for His glory.

Ms. VanGeest is a recipient of the U.S. Department of Defense's Cyber Scholarship Program, serving as a civil servant during her summers and after graduation.

Stephen Reid



As a freshman Computer Science and Cyber Operations major, I can emphatically attest to the impact that the Cyber Center has had on my academic and professional development. Perhaps the best aspect of the Cyber Center is the influence provided by the student leaders. I have participated in numerous cyber competitions this year, and my enjoyment of them and the wealth of knowledge I have gained are a direct reflection of the exceptional leadership and effort of the student leaders. The Cyber Center fosters an environment conducive to interactive skill development and bridges the gap between academic learning and practical application. The mentorship and guidance I have received through the program has been pivotal in shaping my professional trajectory, and I am thankful for what the Cyber Center has provided.

Mr. Reid is slotted to lead next year's fresh batch of cyber operators in Cyber Maneuvers at the new Scharnberg Business and Communication Center.

CONNECTION OPPORTUNITIES

Are you interested in partnering with us to develop tomorrow's cyber leaders in the classroom while advancing cybersecurity in our nation? If so, here's how:

- Support our Cyber Teams as they compete in cyber exercises around the U.S.
- Share your industry insights with our students via a speaking engagement.
- Sponsor an engineering senior design project.
- Receive a tour of Cedarville's cyber facilities.
- Invest financially to create enhanced learning opportunities for our students.

Contact us via email cybercenter@cedarville.edu or Instagram [@cybercenter](https://www.instagram.com/cybercenter).



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PARTNERS



