

The State of CCI

Research, innovation, workforce
development in cybersecurity

Luiz DaSilva

Executive Director, CCI

Bradley Professor of Cybersecurity, Virginia Tech



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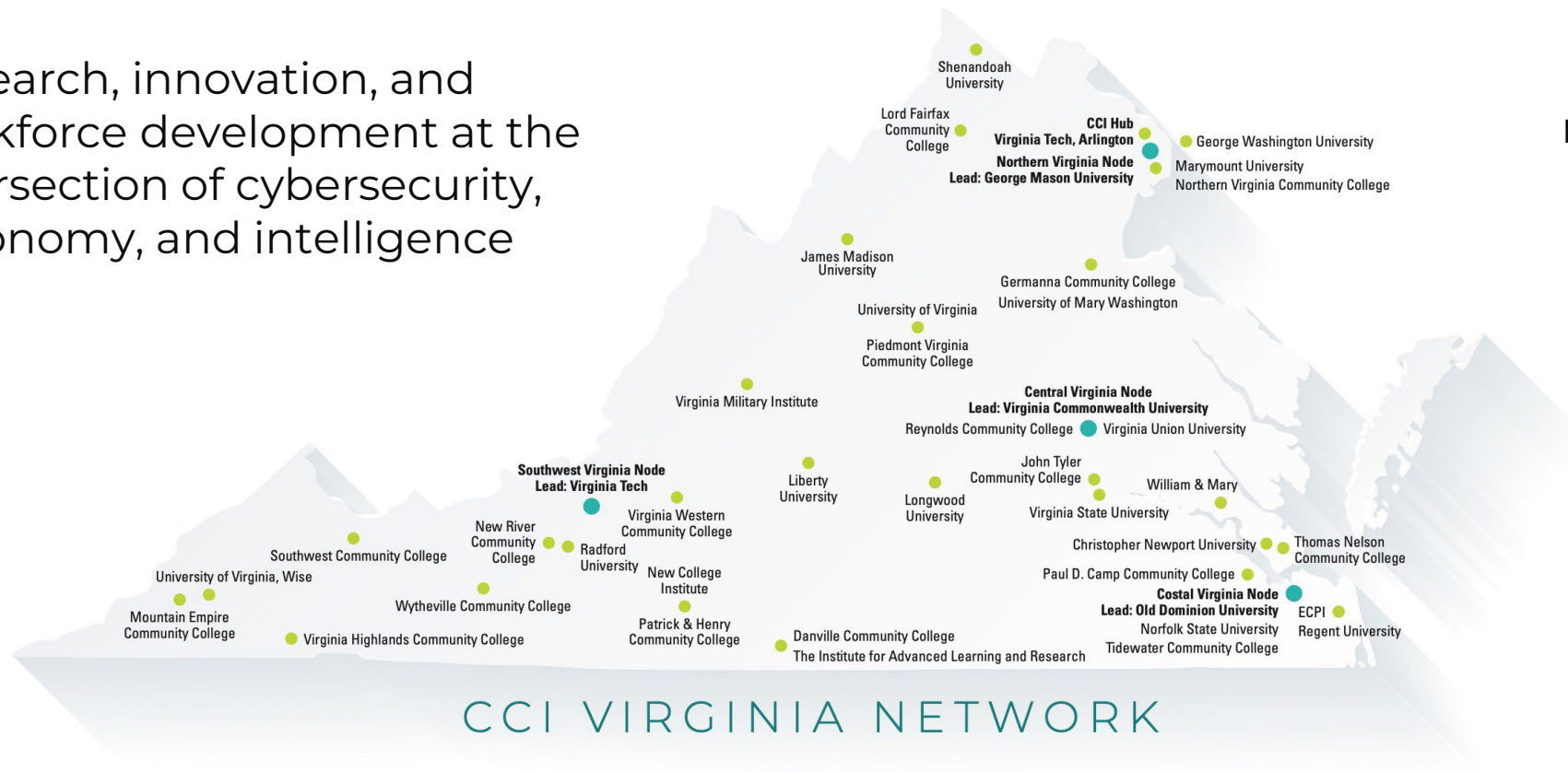
April 4, 2022

The Commonwealth Cyber Initiative

Our mission

Research, innovation, and workforce development at the intersection of cybersecurity, autonomy, and intelligence

300+
researchers



41 higher ed institutions



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CCI Node Directors



**Liza Wilson Durant,
George Mason University**



**Gretchen Matthews,
Virginia Tech**



**Brian Payne,
Old Dominion University**



**Erdem Topsakal,
Virginia Commonwealth
University**



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RESEARCH

Research

Our goal

To make Virginia a globally recognized center of excellence in cybersecurity, and by doing so contribute to Virginia's economic diversification and development



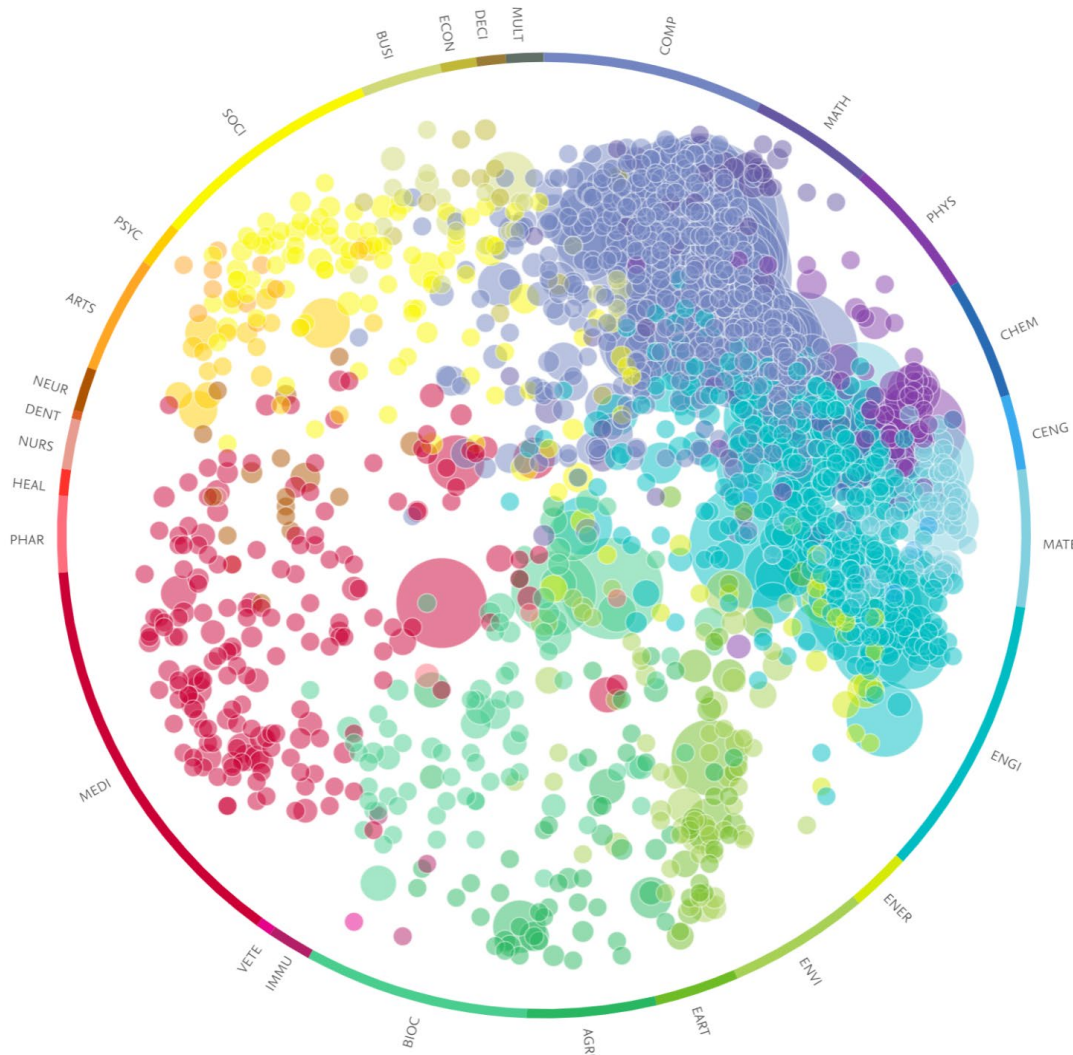
\$77M

research funding from
federal government and
industry in two years



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Transdisciplinary research and innovation



cybersecurity +
transportation
= autonomous
vehicle security



cybersecurity +
agriculture =
cyberbiosecurity



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CCI Research Theme: Secure NextG

Securing the Next Generation of Networks (Secure NextG)

Communication networks are part of the country's critical infrastructure, and in CCI we develop the technologies that make these networks secure. The US industry has made an investment of more than \$350 billion in the fifth generation of mobile networks, or 5G. Even larger investments have been made by industry and government in Europe and Asia. Cybersecurity is an area where the US has historically led, and CCI plays a leading role in securing the deployment of 5G and in the vision for the next generation of mobile networks (NextG). CCI is a member of the NextG Alliance, the major industry-led effort in mapping out a North American vision for NextG, providing us a unique opportunity to transition our research into the standardization process.

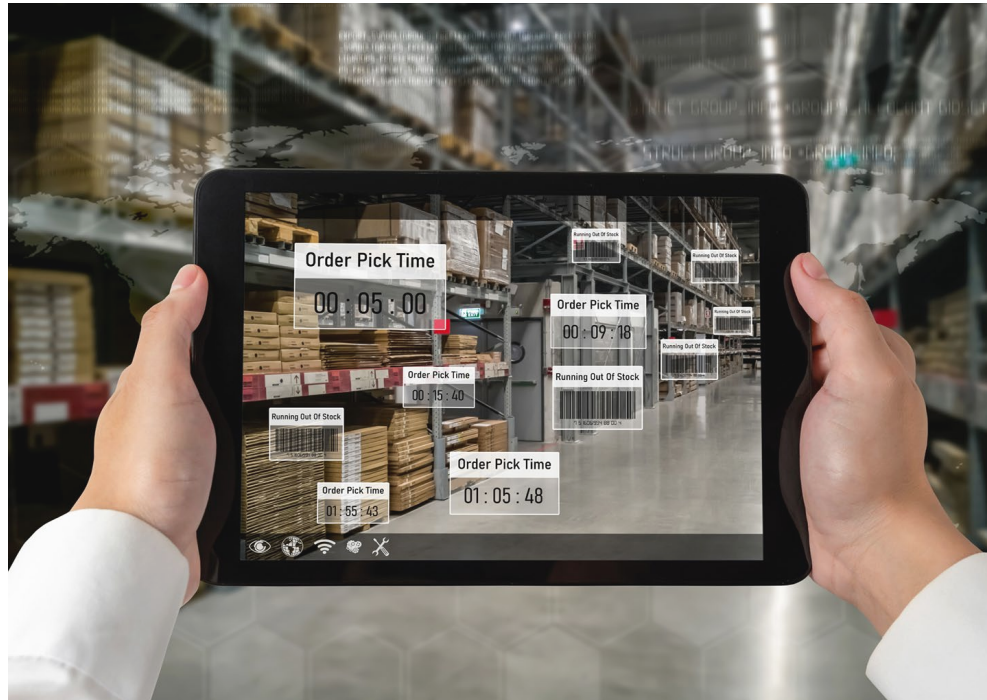
Key research areas:

- Open interfaces and standards
- Virtualization and network disaggregation
- Integration of cyber physical systems
- Quantum communications
- Secure and flexible spectrum



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DoD-funded 5G smart warehouse pilot



VT-ARC



\$13M

5G smart warehouse at the US Marine Corps logistics base in Albany, GA



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Shared research infrastructure



Unique, state-of-the art infrastructure

5G + 6G ; cybermanufacturing ; medical devices ; smart transportation ; artificial intelligence assurance



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CCI Research Theme

Securing Human-Machine Interactions (Social Cybersecurity)

Recent evolution in artificial intelligence, cyber physical systems, and communications are leading to a world where humans and autonomous machines increasingly interact. In CCI we view cybersecurity as intrinsically cross-disciplinary and devise solutions that lead to secure, resilient, and harmonious interactions between people and robots, drones, autonomous vehicles, and other cyber physical systems. Our research focuses on the technological challenges in securing this enhanced digital world experience, in close collaboration with experts from the social sciences, life sciences, health sciences, law and humanities.

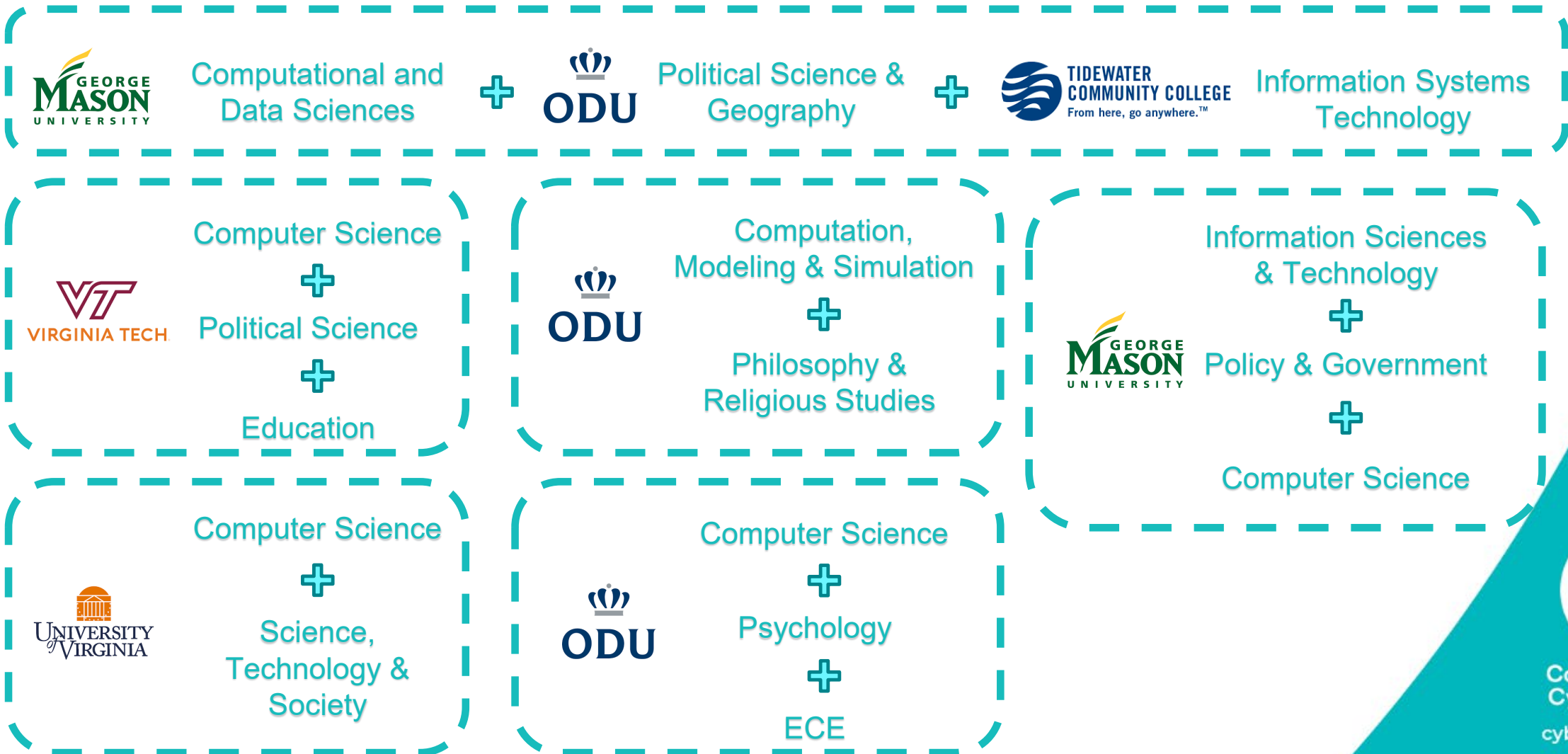
Key research areas:

- AI assurance
- Hacking humans
- The metaverse
- Security and privacy for embedded devices
- Ethical cybersecurity

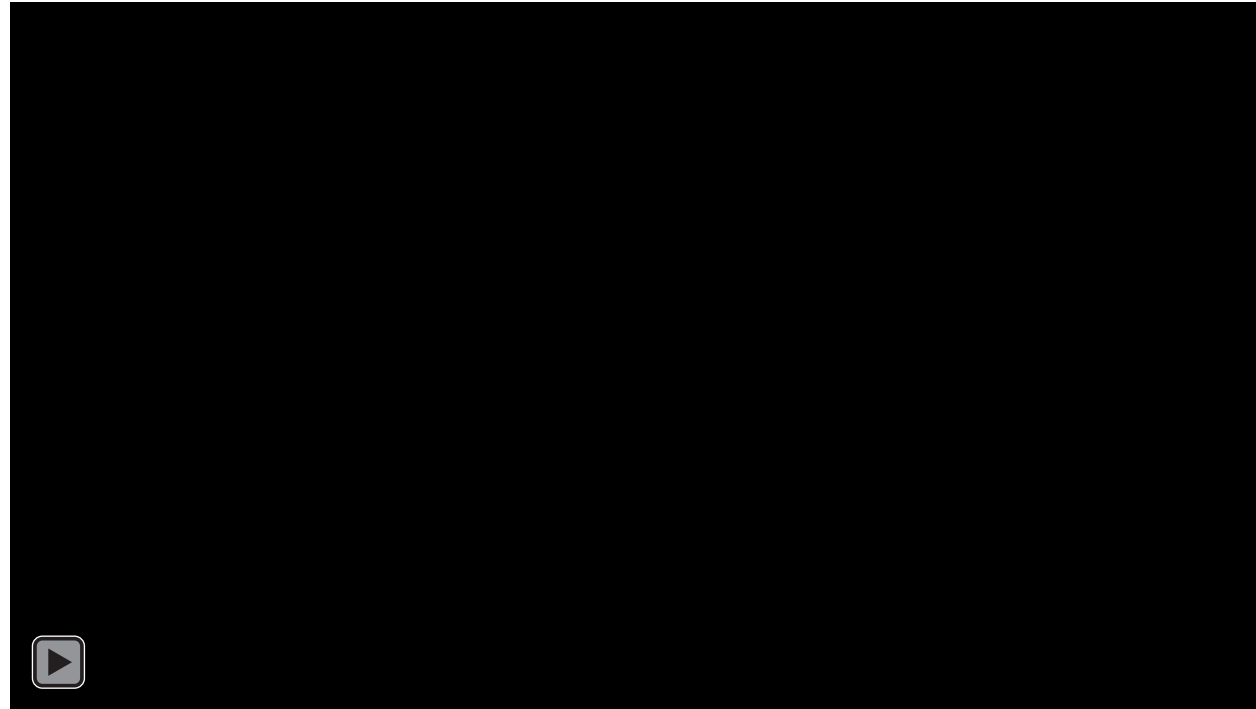


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Cybersecurity in Mis/Disinformation



Research



“Moving Choreography to a New
Universe: AI-Driven Privacy Automation”
Prof. Kate Sicchio
Dept. of Dance + Choreography
Virginia Commonwealth University



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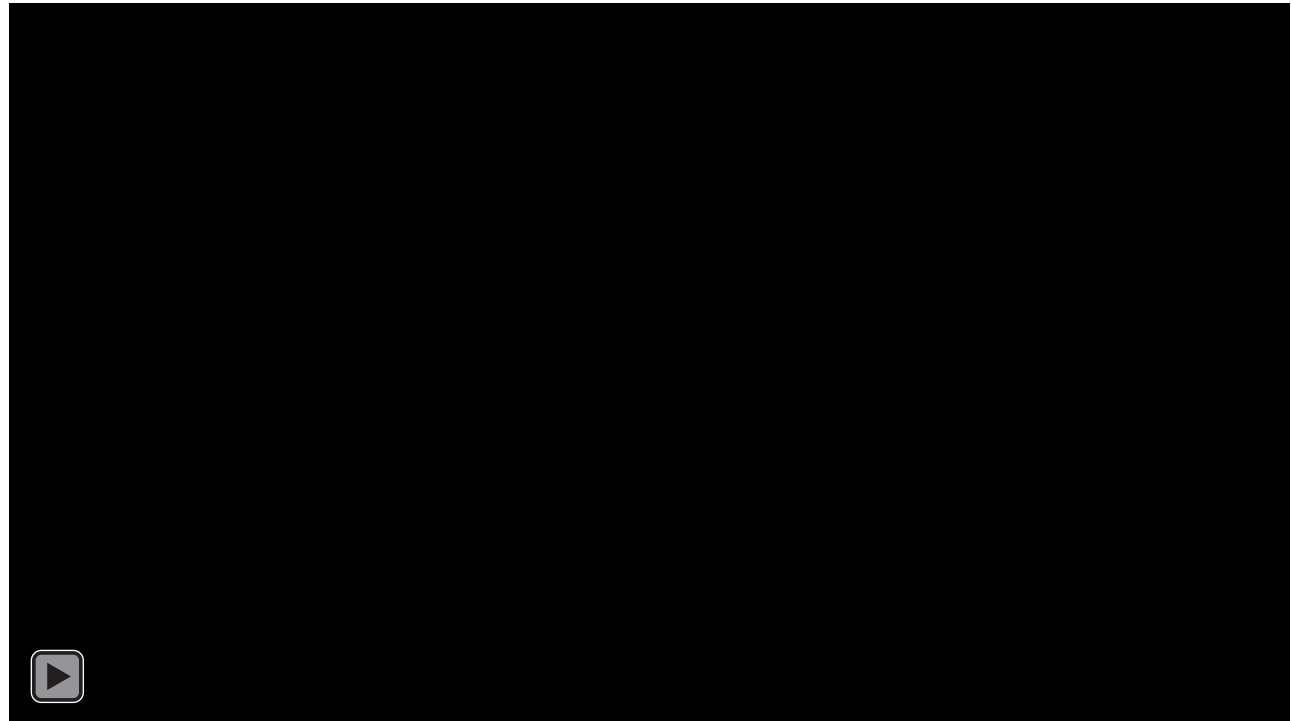
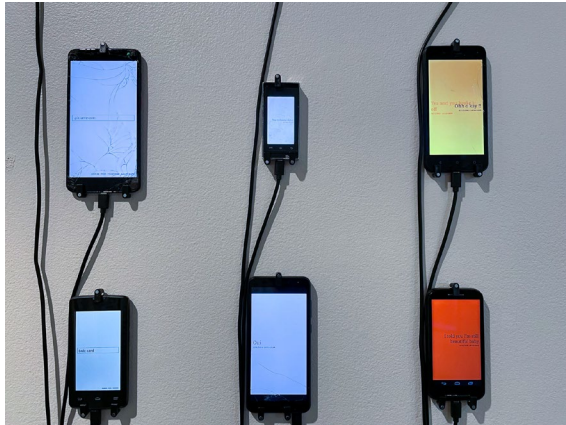
Innovation

“Loudspeaker Array for Evaluation
of Cybersecurity Data”
Dr. Tanner Upthegrove
Institute for Creative Arts and
Technology (ICAT)
Virginia Tech



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Awareness



“Undeleted”
Prof. Michael McDermott
School of Arts
George Mason University



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INNOVATION

Innovation Programs

Our goal

To facilitate translation of research into commercialization, protect intellectual property developed in CCI, and foster a robust ecosystem of startups



Dozens of VA startups engaged



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Innovation Bootcamp 2022



30

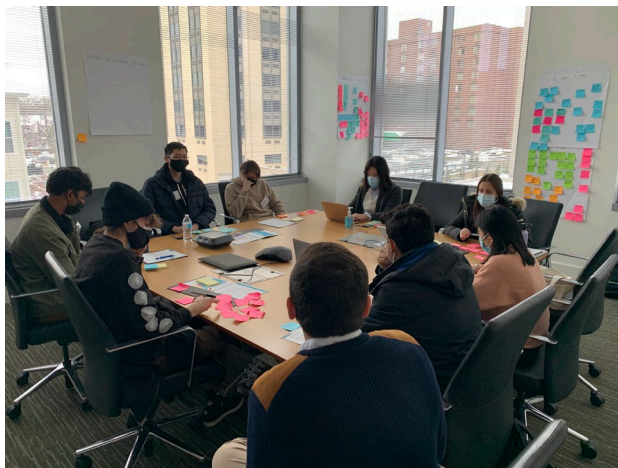
students

7

higher ed
institutions

1

week
immersion



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INNOVATE

≡ C Y B E R :

JOIN US

For a Virtual Student Showcase & Pitch Event

INNOVATE Cyber is a high-impact, experiential learning opportunity where students use a design thinking mindset to learn and resolve cybersecurity challenges through a human centered perspective.

Join the Pitch Event to hear from our INNOVATE Cyber teams about their innovative solutions to cybersecurity challenges facing our community.

April 19, 2022 7:00 pm
via Zoom

RSVP Today

**Come hear their
pitches, learn about
their experiences, ask
questions, and offer
feedback.**

For more information about Innovate Cyber, visit <https://odu.edu/asis/innovatecyber>.



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COASTAL VIRGINIA

Funding for Innovate Cyber was provided by Commonwealth Cyber Initiative Coastal Virginia, southeastern Virginia's node of the Commonwealth Cyber Initiative.

CCI+A

- ✓ Commonwealth Cyber Incubator and Accelerator
- ✓ Housed in Mason's facilities in Arlington, led by the CCI NOVA Node and co-funded by the CCI Hub
- ✓ Cyber Acceleration, Translation, and Advanced Prototyping for University-Linked Technology (CATAPULT) fund
- ✓ This year, 8 x \$50K grants for translational research projects
- ✓ Mentorship from volunteer industry experts, startup services (including free legal and business consulting), access to rent-free physical space in the Digital Innovation Pilot facility



Virginia Cybersecurity Challenge (Phase 3)



- ✓ Data-driven Cyber-Attack Control in Communication between Autonomous Vehicles and infrastructure for 5G-assisted Trajectory Optimization of Critical Systems (Haying Shen)



- ✓ Reducing the Impact of Electromagnetic Interference on Composite Structures



Electromagnetic Interference
Base Change



- ✓ NetSense: A Framework for Modeling and Analysis of Wireless 5G Networks as Complex Systems (Sherif Abdelhamid)

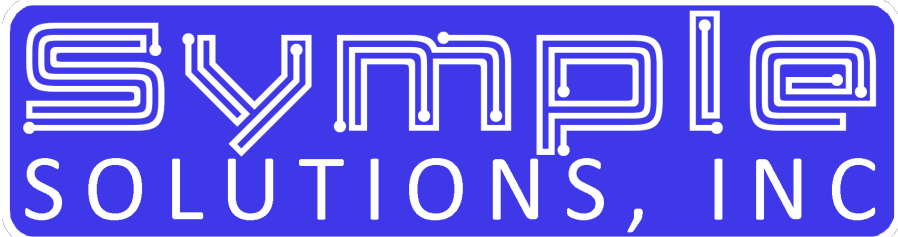


- ✓ Proactive Trustworthy - Self Sovereign Identity Management (PT-SSIM) solution for 5G IoT-based D2D authentication (Mohamed Azab)



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CCI Spinouts



(Founders: Carl Elks, Rick Hite,
Christopher Deloglos)

Leverages FPGA technology for
verifiability of critical
cyberphysical systems



VirtualPLC

(Founders: Syed Qasim, Irfan
Ahmed)

Automation of collection and
analysis of adversarial data for
critical infrastructure customers





WORKFORCE DEVELOPMENT

Workforce needs

Virginia

TOTAL CYBERSECURITY JOB OPENINGS ⓘ

53,767

TOTAL EMPLOYED CYBERSECURITY WORKFORCE ⓘ

93,225

SUPPLY/DEMAND RATIO ⓘ

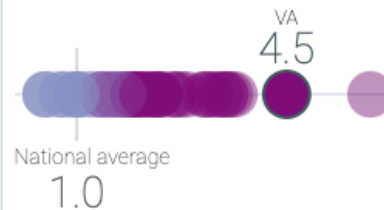


68% National average
67% Virginia

GEOGRAPHIC CONCENTRATION ⓘ

Very High

LOCATION QUOTIENT



TOP CYBERSECURITY JOB TITLES ⓘ

- Software Developer
- Systems Engineer
- Cybersecurity Analyst
- Network Engineer
- Cybersecurity Manager
- Systems Administrator
- Cybersecurity Consultant
- Cybersecurity Specialist
- Penetration & Vulnerability Tester

- 8% since Nov 2021

+ 10% since Nov 2021

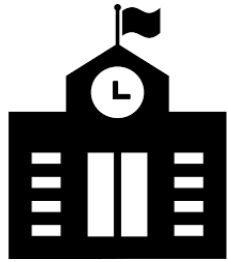
Total:
+ 2.6% since Nov 2021

Source: cyberseek.org
(03/30/22)



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Internships, from high school to grad school



NoVA Program (2021)

- ✓ 20 internships for HS juniors or seniors
- ✓ 110 applicants
- ✓ In 2022, 30 internships



- ✓ 54 placements
- ✓ 21 companies (13 new)
- ✓ 42% female, 50% POC
- ✓ 17% military veterans
- ✓ 91% remained in cyber

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**INTERNSHIP
FAIR**

**10/5
10/6**



Cyberstartups internship program (2021):

145 applicants, 15 positions (80% from underrepresented groups), 11 received post-internship job offers



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Student competitions



VMI and CCI co-hosted the
**Commonwealth
Cyber Fusion 2022**



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6 interns recruited
from Cyber Fusion



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CCI CYBER SHOWCASE

EXPLORING ACADEMIC AND CAREER PATHWAYS

MARCH 23RD
5:30-7:00 PM

JOIN US FOR A GENERAL INFORMATION SESSION COVERING CAREER AND EDUCATION RESOURCES FOR THOSE INTERESTED IN THE FIELD OF CYBERSECURITY. THE EVENT WILL FEATURE LOCAL INDUSTRY REPRESENTATIVES, EDUCATIONAL PARTNERS, AND CURRENT CYBERSECURITY STUDENTS.

SPONSORED BY COASTAL VIRGINIA CENTER FOR CYBER INNOVATION.
EVENT IS FREE AND OPEN TO THE PUBLIC, BUT REGISTRATION IS REQUIRED. PLEASE RSVP BY MARCH 20TH AT
[ODU.IMODULES.COM/CCS22](https://odu.imodules.com/ccs22)

THE EVENT LINK WILL BE SENT ONE DAY PRIOR TO THE EVENT.

FEATURED EDUCATIONAL PARTNERS:

CHRISTOPHER NEWPORT UNIVERSITY | EASTERN SHORE COMMUNITY COLLEGE
ECPI UNIVERSITY | NORFOLK STATE UNIVERSITY | OLD DOMINION UNIVERSITY
PAUL D. CAMP COMMUNITY COLLEGE | REGENT UNIVERSITY
THOMAS NELSON COMMUNITY COLLEGE | TIDEWATER COMMUNITY COLLEGE
WILLIAM AND MARY



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IMPACT

Impact relative to CCI Blueprint

CCI Implementation Targets	FY 2021 Goal	FY2021 Outcome
Faculty participating across network	Δ 25	321 (total)
Annual scholarly publications across network	Δ 100	111
Annual competitive research expenditures across network	\$ 10 M	\$ 37 M
Cumulative companies launched	3	4

Source: RTI International, August 31, 2021



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CCI Economic Impact Assessment FY 2020-21

“For every dollar spent by CCI, researchers leveraged an additional **\$2.32** in external funding over the first two years of the program”

“The research profile of VA universities has grown at a rate outpacing national averages, but they are still small as individual institutions. CCI can serve as a valuable convener to help universities collaborate to elevate their research profile.”

Source: RTI International, August 31, 2021



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Source: RTI International, August 31, 2021



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More to come in 2022...

- ✓ New CCI affiliates program focusing on workforce development
- ✓ Additional research and industry collaboration calls
- ✓ Hosting the annual VASEM summit
- ✓ Booth in the Mobile World Congress Americas
- ✓ Continued focus on large-scale proposals (2022 CCI Fellows program)



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