

Curriculum Vitae of Irfan Ahmed

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PERSONAL

I am a US Citizen.

RESEARCH INTERESTS

Digital Forensics
System Security
Malware Detection and Analysis
Cyber-Physical Systems (CPS)
Industrial Control System (ICS) Security
Additive Manufacturing/3D Printing Security
Cybersecurity Education

CURRENT PROFESSIONAL AFFILIATIONS

Associate Professor (tenured) July 2021 - To-date
Assistant Professor (tenure-track) August 2018 - June 2021
Department of Computer Science www.egr.vcu.edu/departments/computer/
College of Engineering <https://egr.vcu.edu>
Virginia Commonwealth University (VCU), Richmond, VA

Director, Security and Forensics Engineering (SAFE) Lab August 2018 - To-date
Department of Computer Science <https://safe.lab.vcu.edu>
Virginia Commonwealth University (VCU), Richmond, VA

Faculty Fellow August 2018 - To-date
VCU Cybersecurity Center, Richmond, VA <https://cybersecurity.vcu.edu>

DHS ICSJWG Steering Team (IST) Member Jan 2022 - To-date
Industrial Control Systems Joint Working Group (ICSJWG)
US Department of Homeland Security (DHS)'s Cybersecurity and Infrastructure Security Agency (CISA)
<https://www.cisa.gov/resources-tools/groups/industrial-control-systems-joint-working-group-icsjwg>

Memberships

Senior Member, IEEE (Institute of Electrical and Electronics Engineers)
Member, IEEE Computer Society Technical Committee on Security and Privacy
Member, IEEE Technical Committee on Cyber-Physical Systems
Member, American Academy of Forensic Sciences (AAFS) - www.aafs.org
Member, DHS Industrial Control Systems Joint Working Group (ICSJWG)
Member, ACM (Association for Computing Machinery)
Member, ACM Special Interest Group on Security, Audit and Control (SIGSAC)
Member, ACM Special Interest Group on Computer Science Education (SIGCSE) - sigcse.org/sigcse
Member, ACM Emerging Interest Group on Smart Cities and Communities
Member, Laboratories and Educators Alliance Program (LEAP), joint effort between the American Society of Crime Lab Directors (ASCLD) and the Council of Forensic Science Educators (COFSE)
Member, Council of Forensic Science Educators (COFSE). <https://www.cofse.org>

PREVIOUS PROFESSIONAL AFFILIATIONS

Canizaro-Livingston Endowed Assistant Professor in Cybersecurity Department of Computer Science University of New Orleans	August 2017 - July 2018 www.cs.uno.edu
Assistant Professor (tenure-track) Department of Computer Science University of New Orleans	August 2013 - July 2018 www.cs.uno.edu
Director, Cyber-Physical Systems (CyPhy) Lab Department of Computer Science University of New Orleans	August 2015 - July 2018 cyphy.cs.uno.edu
Associate Director Research Affiliation Greater New Orleans Center for Information Assurance (GNOCIA) University of New Orleans	January 2017 - July 2018 January 2012 - July 2018 gnocia.cs.uno.edu
Advisory Board Member of Cybersecurity Sacred Heart University, Fairfield, CT	June 2018 - May 2022 www.sacredheart.edu

PROFESSIONAL PREPARATION

<i>Postdoctoral Research Associate (Postdoc)</i> University of New Orleans, New Orleans, LA, United States http://www.uno.edu Project: Virtual Machine Introspection-based Live Forensics for Detection of Malicious Software Funded by: National Science Foundation (Award No.: 1016807)	Jan 2012-Aug 2013
<i>Postdoctoral Research Associate (Postdoc)</i> Queensland University of Technology, Brisbane, Australia http://www.qut.edu.au Project: Forensic Readiness in Control Systems: Tools and Methods Funded by: Department of Prime Minister and Cabinet's Research Support for National Security	Sept 2010-Sept 2011
<i>Doctor of Philosophy (PhD)</i> , Computer Science Ajou University, Suwon, South Korea http://www.ajou.ac.kr	June 2010
<i>Master of Science (M.S.)</i> , Computer Science SZABIST, Karachi, Pakistan http://szabist.edu.pk	April 2005
<i>Bachelor of Engineering (B.E.)</i> , Computer System NED University of Engineering and Technology, Karachi, Pakistan http://www.neduet.edu.pk	Feb 2003
<i>Oracle Certified Professional (OCP)</i> , Database Administration http://www.oracle.com/education/professional.html	May 2001

HONORS AND AWARDS

Best Student Paper Award

July 2023

23rd Annual Digital Forensics Research Conference (DFRWS US'23), hosted at Johns Hopkins University, Baltimore, MD

2022 Innovation Award

April 2023

Virginia Commonwealth Cyber Initiative (CCI)

<https://cyberinitiative.org>

For co-founding a company, VirtualPLC, to provide threat intelligence for industrial control systems.

(The CCI is a state-level initiative led by Virginia Tech and includes all state universities and colleges in Virginia, such as VCU, UVA, ODU, GMU, W&M, and VSU)

Best Paper Award

March 2022

9th Annual Digital Forensics Research Conference Europe (DFRWS EU'22), hosted at the University of Oxford, Oxford, United Kingdom

Best Student Paper Award

March 2022

9th Annual Digital Forensics Research Conference Europe (DFRWS EU'22), hosted at the University of Oxford, Oxford, United Kingdom

Best Poster Award

September 2021

8th Annual Women in Cybersecurity (WiCyS) Conference, Denver, CO

Best Student Paper Award

July 2020

20th Annual Digital Forensics Research Conference (DFRWS'20), USA

ORAU Ralph E. Powe Junior Faculty Enhancement Award

May 2019

Oak Ridge Associated Universities (ORAU)

<https://www.ornl.gov/news/releases/2019/2019-powe-winners.html>

Canizaro-Livingston Endowed Professorship in Cybersecurity

August 2017

University of New Orleans, New Orleans, LA

Early Career Research Prize

December 2016

University of New Orleans, New Orleans, LA

<http://new.uno.edu/research/research-council/awards>

(A university-level award given only to one junior faculty member each year based on the achievements in teaching, research, and service.)

Outstanding Poster Award

March 2016

6th ACM Conference on Data and Application Security and Privacy (CODASPY'16), New Orleans, LA

Outstanding Research Award

February 2014

66th Annual Meeting of the American Academy of Forensic Sciences, Washington, USA

Best Paper Award

November 2013

16th Information Security Conference (ISC'13), Dallas, Texas, USA

Best Paper Award

August 2011

International Cyber Resilience Conference, Perth, Australia

Korean Government Scholarship

Sept 2006 - Aug 2010

Institute of Information Technology Advancement (IITA), South Korea

Ajou University Full Tuition Scholarship
Ajou University, South Korea

Sept 2006 - Aug 2008

Silver Medalist

1993

23rd International Art Exhibition, Tokyo, Japan

INITIATIVES AND ACHIEVEMENTS

Created Cyber4n6, an industry-focused experiential learning program with Virginia State Police 2023
Funded by Virginia Commonwealth Cyber Initiative (CCI)

<https://www.people.vcu.edu/~iahmed3/cyber4n6.html>

Co-developed cybersecurity teaching lab at VCU Computer Science Department 2022-2023
Funded by VCU College of Engineering

Established an annual fully-funded GenCyber cybersecurity summer bootcamp at VCU 2022
Funded by NSA/NSF targeting JROTC middle and early high school students

<https://gencyber.vcu.edu/>

Led VCU to join the U.S. Cyber Command's Academic Engagement Network 2022
United States Cyber Command (USCYBERCOM)

<https://www.cybercom.mil/Partnerships-and-Outreach/Academic-Engagement/>

Led an Education Partnership Agreement (EPA) between the DoD DC3 and VCU 2021
The Department of Defense Cyber Crime Center (DC3) for excellence in digital forensics

<https://www.dc3.mil/>

Led the effort of achieving the DHS/NSA CAE-R designation at VCU 2020
DHS/NSA National Center for Academic Excellence in Research (CAE-R)

<https://www.caecommunity.org/cae-map>

One of the First Ten Contributors to the National Cybersecurity Curriculum Mar 2017- Dec 2018
National Security Agency (NSA)'s National Cybersecurity Curriculum Program (NCCP)
(Endorsed by the NSA program manager to the Dean of College of Engineering at VCU)

<https://clark.center/home>

Created a fully functional small-scale industrial control system (ICS) testbed at UNO 2016
Funded by the Army Research Office (ARO) to promote university research in ICS security

SOFTWARE/HARDWARE VULNERABILITY DISCLOSURE

- CVE-2023-2310, Schweitzer Engineering Laboratories (SEL) RTAC 3505,
<https://selinc.com/support/security-notifications/external-reports/>
- CVE-2021-32980, Automation Direct CLICK PLC,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-166-02>
- CVE-2021-32984, Automation Direct CLICK PLC,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-166-02>
- CVE-2021-32986, Automation Direct CLICK PLC,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-166-02>

- CVE-2021-32982, Automation Direct CLICK PLC,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-166-02>
- CVE-2021-32978, Automation Direct CLICK PLC,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-166-02>
- CVE-2021-32926, Rockwell Automation Micro800 and MicroLogix 1400 PLCs,
<https://us-cert.cisa.gov/ics/advisories/icsa-21-145-02>
- CVE-2020-15791, Siemens S7-300 and S7-400 PLCs,
<https://cert-portal.siemens.com/productcert/pdf/ssa-381684.pdf>
- CVE-2018-7790, Schneider Electric Modicon M221 PLC,
<https://ics-cert.us-cert.gov/advisories/ICSA-18-240-01>
- CVE-2018-7791, Schneider Electric Modicon M221 PLC,
<https://ics-cert.us-cert.gov/advisories/ICSA-18-240-01>
- CVE-2018-7792, Schneider Electric Modicon M221 PLC,
<https://ics-cert.us-cert.gov/advisories/ICSA-18-240-01>

TEACHING

Term	Level	Course No.	Course Name	Class Size	Evaluation
University of New Orleans					
Spring'13	U,G	CSCI 4621/5621	Introduction to Computer Security	21	4.64 / 5.00
Fall'13	U,G	CSCI 4311/5311	Computer Networks	26	4.13 / 5.00
Spring'14	U,G	CSCI 4311/5311	Computer Networks	23	N/A
Fall'14	U,G	CSCI 4401/5401	Operating System	37	4.71 / 5.00
Fall'14	U,G	CSCI 4621/5621	Introduction to Computer Security	33	4.88 / 5.00
Spring'15	U,G	CSCI 4311/5311	Computer Networks	45	N/A
Spring'15	U,G	CSCI 4621/5621	Introduction to Computer Security	34	N/A
Fall'15	G	CSCI 6627	Industrial Control System Security	38	4.91 / 5.00
Fall'15	U,G	CSCI 4621/5621	Introduction to Computer Security	26	4.95 / 5.00
Spring'16	G	CSCI 6627	Industrial Control System Security	19	4.45 / 5.00
Spring'16	G	CSCI 6621	Topics in Network Security and Forensics	20	4.56 / 5.00
Fall'16	U,G	CSCI 4623/5623	Introduction to Computer Forensics	15	4.89 / 5.00
Fall'16	U,G	CSCI 4621/5621	Introduction to Computer Security	25	4.42 / 5.00
Spring'17	G	CSCI 6627	Industrial Control System Security	14	4.72 / 5.00
Spring'17	G	CSCI 6621	Topics in Network Security and Forensics	10	4.71 / 5.00
Fall'17	U,G	CSCI 4621/5621	Introduction to Computer Security	35	4.78 / 5.00
Spring'18	U,G	CSCI 4621/5621	Introduction to Computer Security	48	4.56 / 5.00
Virginia Commonwealth University					
Fall'18	U	CMSC 414	Computer and Network Security	7	4.50 / 5.00
Spring'19	U	CMSC 414	Computer and Network Security	56	3.47 / 5.00
Fall'19	<i>No Teaching</i>			N/A	N/A
Spring'20	U	CMSC 414	Computer and Network Security	34	3.75 / 5.00
Fall'20	G	CMSC 654	Memory and Malware Forensics	8	4.57 / 5.00
Spring'21	U	CMSC 414	Computer and Network Security	41	4.08 / 5.00
Fall'21	G	CMSC 654	Memory and Malware Forensics	6	4.33 / 5.00
Spring'22	U	CMSC 414	Computer and Network Security	48	3.83 / 5.00
Fall'22	G	CMSC 654	Memory and Malware Forensics	15	4.11 / 5.00
Spring'23	U	CMSC 414	Computer and Network Security	41	3.61 / 5.00
Fall'23	G	CMSC 654	Memory and Malware Forensics		/ 5.00
U ← Undergraduate-level					
G ← Graduate-level					

EXPERIENTIAL AND OUTSIDE CLASS LEARNING

- *Faculty Advisor*, VCU Cybersecurity Club, 2022 - to-date
– Secured \$6200 in funding from VCU Student Government Association (SGA), July 2023
- *Program Director*, Cyber4n6 Program with Virginia State Police, 2023
Funded by Virginia Commonwealth Cyber Initiative (CCI)
<https://www.people.vcu.edu/~iahmed3/cyber4n6.html>
- *Program Director*, GenCyber Cybersecurity Summer Bootcamp at VCU, 2021-2023
Funded by the NSA/NSF, <https://gencyber.vcu.edu/>
- *Mentor*, CyberForce Competition (to defend/attack cyber-physical scenario), 2022
Organized by the Department of Energy (DOE), <https://cyberforce.energy.gov/>

FUNDED GRANTS/CONTRACTS

Total Funding: \$6,182,156 (Approx. \$6.20 Million)

My Share: \$3,712,218 (Approx. \$3.71 Million)

(Lead/Sole/Institute) PI: \$2,866,818 (Approx. \$2.87 Million)

Co-PI: \$845,400 (Approx. \$0.85 Million)

Funding Agency		Projects	Total Funds (\$)	My Share (\$)
US Department of Homeland Security	DHS	3	800,000	700,000
US National Science Foundation	NSF	6	2,222,366	1,050,000
National Security Agency	NSA	8	1,731,091	919,908
Department of Energy	DOE	1	50,000	50,000
Army Research Office	ARO	1	96,310	96,310
Office of Naval Research	ONR	1	80,000	24,000
Virginia Commonwealth Cyber Initiative	VA-CCI	6	*721,389	*391,000
Louisiana State Board of Regents	LA-BoR	4	344,500	344,500
University of New Orleans	UNO	7	126,500	126,500
Oak Ridge Associated Universities	ORAU	1	*10,000	*10,000

- Principal Investigator (PI)

*No Indirect Cost

- Co-Principal Investigator (Co-PI)

Pending Grants (not included in the summary table above)

- [NSF]. “Collaborative Research: DTI: Interactive Narrative Intelligence-based Cyber Range Exercises to Introduce Cybersecurity to Middle and High-school Students”, National Science Foundation (NSF) - Innovative Technology Experiences for Students and Teachers (ITEST), Role: Lead PI (with Stephen G. Ware and Lin Xiang from the University of Kentucky), Funding: \$1.3 million (My Share: \$450,000), Project Duration: 3 years (2023 - 2026)
- [NSA]. “Resilient Cyber Monitoring of Field Sites in Industrial Control Systems Using Lifelong Machine Learning”, National Security Agency (NSA), Role: Lead PI (with Latifur Khan from University of Texas Dallas), Total Funding: \$750,000, **My Share: \$390,000**, Project Duration: 3 years (2023-2026)
- [NSF]. “IMR: MT: PLCmap: An Attack Measurement Toolkit for Programmable Logic Controllers in Internet-Connected Industrial Control Systems”, National Science Foundation (NSF), Role: Lead PI (with Taqi Raza from University of Arizona, and Zubair Shafiq from University of California Davis), Total Funding: \$600,000, **My Share: \$200,000**, Project Duration: 2 years (2023-2025)

Research

- [DHS]. “PLC Forensic Toolset for Industrial Control Systems: Computing and Criminology Perspectives”, Department of Homeland Security (DHS), Role: Sole PI, Total Funding: \$450,000, **My Share: \$450,000**, Project Duration: 2 years (2023-2025)
- [DOE]. “CyManII Cyber Vulnerability Research”, Department of Energy (DOE) Cybersecurity Manufacturing Innovation Institute (CyManII), Role: Sole-PI, Total Funding: \$50,000, **My Share: \$50,000**, Project Duration: 1 year (2023 - 2024)
- [VA-CCI]. “Cybersecurity Initiative in Bioprinting”, Virginia Commonwealth Cyber Initiative (CCI), Role: Co-PI (with Nastassja Lewinski from VCU), Total Funding: \$100,000 (all direct cost), **My Share: \$50,000**, Project Duration: 1 year (Sept 2022 - Aug 2023)
- [NSF]. “OAC Core: Small: MedKnights - Towards Secure and Flexible Medical IoT (IoMT) Infrastructure using Generative Adversarial Networks”, National Science Foundation (NSF), Role: Co-PI (with Tamer Nadeem from VCU), Total Funding: \$599,924, **My Share: \$223,864**, Project Duration: 3 years (2022-2025), *Award No.: 2212424*
- [DHS]. “Digital Forensic Tools and Techniques for Investigating Control Logic Attacks in Industrial Control Systems”, Department of Homeland Security (DHS), Role: Sole PI, Total Funding: \$150,000, **My Share: \$150,000**, Project Duration: 1 year and 4 months (2022-2023)
- [NSA]. “Machine Learning-Based Entity Fingerprinting”, National Security Agency (NSA), Role: Institute PI (with Aisha Ali-Gombe from Towson University), Total Funding: \$483,226, **My Share: \$239,908**, Project Duration: 2 years (2021 - 2023)
- [VA-CCI]. “Spatiotemporal G-code Modeling for Additive Manufacturing Security”, Virginia Commonwealth Cyber Initiative (CCI), Role: Institute PI (with Robert J. Prins from James Madison University), Total Funding: \$176,389 (all direct cost), **My Share: \$121,000**, Project Duration: 1 year and 6 months (Jan 2021 - June 2022)
- [DHS]. “Data Science-integrated Experiential Digital Forensics Training based-on Real-world Case Studies of Cybercrime Artifacts”, Department of Homeland Security (DHS), Role: Lead PI (with Kostadin Damevski from VCU), Total Funding: \$200,000, **My Share: \$100,000**, Project Duration: 2 year (2022-2024)
- [VA-CCI]. “Digital Forensics Experiential Learning Program with Virginia State Police”, Virginia Commonwealth Cyber Initiative (CCI), Role: Sole PI, Total Funding: \$100,000 (all direct cost), **My Share: \$100,000**, Project Duration: 1 year and three months (2022 - 2023)
- [NSF]. “CyberTraining: Implementation: Small: Using Problem-Based Learning for Vocational Training in Cyberinfrastructure Security at Community Colleges”, National Science Foundation (NSF) CyberTraining, Role: Lead-PI (with Sajal Bhatia from Sacred Heart University), Total Funding: \$499,661, **My Share: \$250,000**, Project Duration: 3 years (2020 - 2023), *Award No.: 2017337*
- [VA-CCI]. “Control Logic Attacks and Defenses for Electric Vehicle Charging Stations”, Virginia Commonwealth Cyber Initiative (CCI), Role: Institute PI (with Joseph Shelton from Virginia State University and Kevin Heaslip from Virginia Tech), Total Funding: \$125,000 (all direct cost), **My Share: \$50,000**, Project Duration: 1 year (2021 - 2022)
- [NSF]. “EDU: Collaborative: Using Virtual Machine Introspection for Deep Cyber Security Education”, National Science Foundation (NSF) - Secure & Trustworthy Cyberspace (SaTC), Role: PI (with Zhiqiang Lin from The Ohio State University), Total Funding: \$299,913, **My Share: \$150,000**, Project Duration: 4 years (2016 - 2020), *Award No.: 1623276*
- [NSF]. “SaTC-EDU: EAGER: Peer Instruction for Cybersecurity Education”, National Science Foundation (NSF) - Secure & Trustworthy Cyberspace (SaTC), Role: PI (Co-PIs: Cynthia B. Lee from Stanford University and Golden G. Richard III and Vassil Roussev from UNO), Total Funding: \$300,000, **My Share: \$250,000**, Project Duration: 4 years (2015 - 2019), *Award No.: 1500101*

- [VA-CCI]. “Virtual PLC Platform for Threat Intelligence in Industrial Control Systems”, Virginia Commonwealth Cyber Initiative (CCI), Role: Sole PI, Total Funding: \$20,000 (all direct cost), **My Share: \$20,000**, Project Duration: 1 year (2021 - 2022)
- [VA-CCI]. “CCI Smart Cities: Cyber and Physically Secure Communities: Resilient, Sustainable, Energy Efficient”, Virginia Commonwealth Cyber Initiative (CCI), Role: Co-PI (with Milos Manic, Eyuphan Bulut, and Changqing Luo from VCU), Total Funding: \$200,000 (all direct cost), **My Share: \$50,000**, Project Duration: 1 year (2020 - 2021)
- [ORAU]. “A Virtual PLC Framework for Control Logic Forensics in Industrial Control System”, Oak Ridge Associated Universities (ORAU) Ralph E. Powe Junior Faculty Enhancement Award, Role: Sole-PI, Total Funding: \$10,000, **My Share: \$10,000**, Project Duration: 1 year (June 2019 - May 2020)
- [NSA]. “Automated Platform for Comprehensive Hands-on Cybersecurity Training”, National Security Agency, Role: Co-PI (with Vassil Roussev), Total Funding: \$274,370, **My Share: \$140,000**, Project Duration: 1 year (2017 - 2018)
- [NSA]. “Portable Hands-on Training Environment for SCADA Security”, National Security Agency, Role: PI (Co-PI: Vassil Roussev), Total Funding: \$280,310, **My Share: \$150,000**, Project Duration: 1 year (2017 - 2018)
- [NSA]. “Instructional Material for SCADA Security Course”, National Security Agency, Role: PI (Co-PI: Vassil Roussev from UNO and Sajal Bhatia from Fordham University), Total Funding: \$187,964, **My Share: \$100,000**, Project Duration: 1 year (2017 - 2018)
- [NSA]. “Concept Maps for Cybersecurity Education”, National Security Agency, Role: PI (Co-PI: Vassil Roussev), Total Funding: \$163,803, **My Share: \$100,000**, Project Duration: 1 year (2017 - 2018)
- [UNO]. “Towards Programmable Logic Controller Forensics”, UNO Office of Research and Sponsored Programs (ORSP) - SCoRe (Stimulating Competitive Research), University of New Orleans, Role: Sole PI, Total Funding: \$15,000, **My Share: \$15,000**, Project Duration: 1 year (January 2018 - February 2019)
- [UNO]. “Gap Analysis of Digital Forensics on SCADA Testbed”, UNO Office of Research and Sponsored Programs (ORSP) - SCoRe (Stimulating Competitive Research), University of New Orleans, Role: Sole PI, Total Funding: \$12,000, **My Share: \$12,000**, Project Duration: 1 year (July 2016 - June 2017)
- [ONR]. “Digital Forensic Toolkit for Machine Control Systems (TRACE)”, Office of Naval Research - STTR Phase 1, Role: PI (with Intelligent Automation Inc.), Total Funding: \$80,000, **My Share: \$24,000**, Project Duration: 7 Months (2016-2017)
- [UNO]. “UNO ORSP for Early Career Research Prize”, University of New Orleans, Role: Sole PI, Total Funding: \$7,500, **My Share: \$7,500**, Project Duration: 1 Year (2016-2017)
- [UNO]. “Fuzzing Infrastructure for the Cloud”, UNO ORSP Internal Grant Program funded by the Louisiana Working and Innovation for a Stronger Economy (WISE) initiative, Role: Sole PI, Total Funding: \$20,000, **My Share: \$20,000**, Project Duration: 8 Months (2015 - 2016)
- [NSA]. “Automatic Run-time Mitigation of Kernel Exploits in Cloud Environments”, National Security Agency, Role: PI (Co-PIs: Vassil Roussev and Golden G. Richard III), Total Funding: \$75,000, **My Share: \$50,000**, Project Duration: 1 year (2015 - 2016)
- [BoR RCS]. “Towards Effective Vulnerability Analysis of Application Code in a Cloud-computing Environment”, LA Board of Regents (BoR) - Research Competitiveness Subprogram (RCS), Role: Sole PI, Total Funding: \$146,700, **My Share: \$146,700**, Project Duration: 3 years (2015 - 2018)
Award No.: LEQSF(2015-18)-RD-A-34 (*awarded, but due to LA state budget cut, not funded*)
- [NSF]. “CNS-SaTC: EAGER: Integrating Cognitive and Computer Science to Improve Cyber Security: Selective Attention and Personality Traits for the Detection and Prevention of Risk”, National Science

Foundation (NSF) - Secure & Trustworthy Cyberspace (SaTC), Role: PI since January 2017 and Co-PI from 2014 to 2016 (with Carl Weems from Iowa State University and Golden G. Richard III from UNO), Total Funding: \$223,022, **My Share: \$100,000**, Project Duration: 4 years (2014 - 2018), *Award No.: 1358723*

- [UNO]. “Botnet Detection in Cloud-computing Environments”, UNO Office of Research and Sponsored Programs (ORSP) - SCoRe (Stimulating Competitive Research), University of New Orleans, Role: Sole PI, Total Funding: \$12,000, **My Share: \$12,000**, Project Duration: 3 months (May 2014 - Aug 2014)
- [NSF]. “EDU: Lightweight Environment for Network Security Education (LENSE)”, National Science Foundation (NSF) - Secure & Trustworthy Cyberspace (SaTC), Role: Co-PI (with Vassil Roussev and Golden G. Richard III), Total Funding: \$299,846, **My Share: \$50,000**, Project Duration: 3 years (2014 - 2017), *Award No.: 1419358*

Planning

- [NSF]. “IUCRC Planning Grant VCU: Center for Wireless Innovation towards Secure, Pervasive, Efficient and Resilient Next G Networks (WISPER)”, National Science Foundation (NSF), Role: Co-PI (with Erdem Topsakal, Eyuphan Bulut, and Tamer Nadeem), Total Funding: \$20,000, Project Duration: 1 year (2022 - 2023), *Award No.: 2209902*

Equipment

- [BoR]. “UNO CyberRange: An Advanced Platform for Cybersecurity Workforce Training”, LA Board of Regents (BoR) Departmental Enhancement, Role: Co-PI (with Vassil Roussev and Minhaz Zibran), Total Funding: \$195,400, Project Duration: 1 year (2018 - 2019)
- [ARO]. “SCADA Testbed for Security and Forensics Research”, Army Research Office (ARO) - Defense University Research Instrumentation Program (DURIP), Role: PI (Co-PIs: Golden G. Richard III and Vassil Roussev), Total Funding: \$96,310, Project Duration: 1 year (2015 - 2016)

Outreach

- [NSA]. “GenCyber Bootcamp for JROTC Middle and Early High-school Students”, National Security Agency, Role: PI (Co-PI: Ahmet Sonmez), Total Funding: \$150,000, **My Share: \$130,000**, Project Duration: 2 year (2021 - 2023)
- [NSA]. “GenCyber@UNO: An Intensive Cybersecurity Bootcamp for Secondary School Teachers”, Joint funding of National Security Agency & National Science Foundation, Role: Co-PI (with Vassil Roussev), Total Funding: \$116,418, **My Share: \$10,000**, Project Duration: 1 year (2017 - 2018)

Others

- [UNO]. Total Funding:\$50,000, **My Share: \$50,000** from UNO Foundation for ICS Equipment in 2016
- [BoR]. “Travel Grants for Emerging Faculty (TGEF)”, Board of Regents - Louisiana, Total Funding: \$1200, **My Share: \$1200**, 2016
- [UNO]. Total Funding:\$10,000, **My Share: \$10,000** from UNO CS Department for Equipment (PLC Trainers) in 2015
- [BoR]. “Travel Grants for Emerging Faculty (TGEF)”, Board of Regents - Louisiana, Total Funding: \$1200, **My Share: \$1200**, 2014

COMMERCIALIZATION AND PATENTS

- **Company Name:** VirtualPLC LLC
Co-Founders: Irfan Ahmed, and Syed Ali Qasim
Product: Virtual programmable logic controllers (PLCs) for threat intelligence
Seed Funding: Virginia Commonwealth Cyber Initiative (CCI), <https://cyberinitiative.org>

The CCI is a state-level initiative led by Virginia Tech and includes all state universities and colleges in Virginia, such as VCU, UVA, ODU, GMU, W&M, and VSU.

Awards: CCI Innovation Award, April 2023

PEER-REVIEWED PUBLICATIONS

- **[SecDev]**. Ramyapandian Vijayakanthan, Karley Waguespack, **Irfan Ahmed**, Aisha Ali-Gombe, “Fortifying IoT Devices: AI-Driven Intrusion Detection via Memory-Encoded Audio Signals”, In IEEE Secure Development Conference (SecDev), October 2023, Atlanta, GA
(Acceptance rate (44%): 23 out of 53 submissions)
- **[DFRWS US]**. Syed Ali Qasim, Wooyeon Jo, **Irfan Ahmed**, “PREE: Heuristic Builder for Reverse Engineering of Network Protocols in Industrial Control Systems”, In 23rd Annual Digital Forensics Research Conference (DFRWS US’23), July 2023, Baltimore, MD
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(Acceptance rate (28%): 16 out of 56 submissions)
(*Best Student Paper Award*)
- **[Computers & Security Journal]**. Ramyapandian Vijayakanthan, **Irfan Ahmed**, Aisha Ali-Gombe, “SWMAT: Mel-frequency Cepstral Coefficients-based Memory Fingerprinting for IoT Devices”, In Computers & Security Journal, Elsevier, 2023.
(Impact Factor: 5.11 in 2021)
(JIF Quartile: Q2 in 2021)
- **[IEEE S&P Journal]**. Adeen Ayub, Wooyeon Jo, Syed Ali Qasim, **Irfan Ahmed**, “How are industrial control systems insecure by design? A deeper insight into real-world PLCs”, In IEEE Security & Privacy, 2023
(Impact Factor: 3.105 in 2021)
(JIF Quartile: Q2 in 2021)
- **[IEEE EuroS&P]**. Muhammad Ahsan, Muhammad Haris Rais, **Irfan Ahmed**, “SOK: Side Channel Monitoring for Additive Manufacturing - Bridging Cybersecurity and Quality Assurance Communities”, In 8th IEEE European Symposium on Security and Privacy (EuroS&P’23), July 2023, Delft, Netherlands.
(Acceptance rate (35%): 63 out of 180 submissions)
- **[IEEE HOST]**. Adeen Ayub, Nauman Zubair, Hyunguk Yoo, Wooyeon Jo, **Irfan Ahmed**, “Gadgets of Gadgets in Industrial Control Systems: Return Oriented Programming Attacks on PLCs”, In 16th IEEE International Symposium on Hardware Oriented Security and Trust (HOST), May 2023, San Jose, CA
(Acceptance rate (26%): 29 out of 110 submissions)
- **[DFRWS EU]**. Rima Asmar Awad, Muhammad Haris Rais, Michael Rogers, **Irfan Ahmed**, Vincent Paquit, “Towards Generic Memory Forensic Framework for Programmable Logic Controllers”, In 10th Annual Digital Forensics Research Conference Europe (DFRWS EU’23), March 2023, Bonn, Germany
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(Acceptance rate (23%): 16 out of 70 submissions)
- **[DFRWS EU]**. Muhammad Haris Rais, Muhammad Ahsan, **Irfan Ahmed**, “FRoMEPP: Digital Forensic Readiness Framework for Material Extrusion based 3D Printing Process”, In 10th Annual Digital Forensics Research Conference Europe (DFRWS EU’23), March 2023, Bonn, Germany
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(Acceptance rate (23%): 16 out of 70 submissions)
- **[IEEE CSR]**. Nauman Zubair, Adeen Ayub, Hyunguk Yoo, **Irfan Ahmed**, “Control Logic Obfuscation Attack in Industrial Control Systems”, In IEEE International Conference on Cyber Security and Resilience (IEEE CSR’22), July 2022. (*held virtually*)
(Acceptance rate (48.8%): 61 out of 125 submissions)

- [DFRWS US]. Megan Davis, Bridget McInnes, **Irfan Ahmed**, “Forensic Investigation of Instant Messaging Services on Linux OS: Discord and Slack as Case Studies”, In 22nd Annual Digital Forensics Research Conference (DFRWS US’22), July 2022. (*held virtually*)
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(Acceptance rate (30%): 13 out of 43 submissions)
- [ICCIP]. Muhammad Haris Rais, Muhammad Ahsan, Vaibhav Sharma, Radhika Barua, Rob Prins, **Irfan Ahmed**, “Low-magnitude Infill Structure Manipulation Attacks on FFF-based 3D Printers”, In 16th IFIP International Conference on Critical Infrastructure Protection (ICCIP), March 2022, Arlington, Virginia. (*held virtually*)
- [DFRWS EU]. Nauman Zubair, Adeen Ayub, Hyunguk Yoo, **Irfan Ahmed**, “PEM: Remote Forensic Acquisition of PLC Memory in Industrial Control Systems”, In 9th Annual Digital Forensics Research Conference Europe (DFRWS EU’22), March 2022, Oxford, United Kingdom
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(*Best Paper Award*)
(Acceptance rate (32.5%): 13 out of 40 submissions)
- [DFRWS EU]. Muhammad Haris Rais, Rima Asmar Awad, Juan Lopez Jr., **Irfan Ahmed**, “Memory Forensic Analysis of a Programmable Logic Controller in Industrial Control Systems”, In 9th Annual Digital Forensics Research Conference Europe (DFRWS EU’22), March 2022, Oxford, United Kingdom
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(*Best Student Paper Award*)
(Acceptance rate (32.5%): 13 out of 40 submissions)
- [IEEE Access]. Shresht Bhatia, Sajal Bhatia, **Irfan Ahmed**, “Automated Waterloo Rubric for Concept Map Grading”, In IEEE Access Journal, 2021
(Impact Factor: 3.48 in 2021)
(JIF Quartile: Q2 in 2021)
- [IEEE Access]. Masrik Dahir, Syed Ali Qasim, **Irfan Ahmed**, “Cronus: An Automated Feedback Tool for Concept Maps”, In IEEE Access Journal, August 2021
(Impact Factor: 3.48 in 2021)
(JIF Quartile: Q2 in 2021)
- [Additive Manufacturing Journal]. Muhammad Haris Rais, Ye Li, **Irfan Ahmed**, “Dynamic-thermal and Localized Filament-kinetic Attacks on Fused Filament Fabrication based 3D Printing Process”, In Additive Manufacturing Journal, Elsevier, July 2021
(Impact Factor: 11.00 in 2021)
(JIF Quartile: Q1 in 2021)
- [DFRWS]. Muhammad Haris Rais, Rima Asmar Awad, Juan Lopez Jr., **Irfan Ahmed**, “JTAG-based PLC Memory Acquisition Framework for Industrial Control Systems”, In 21st Annual Digital Forensics Research Conference (DFRWS’21), July 2021. (*held virtually*)
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(Acceptance rate (36%): 16 out of 44 submissions)
- [WOOT]. Adeen Ayub, Hyunguk Yoo, **Irfan Ahmed**, “Empirical Study of PLC Authentication Protocols in Industrial Control Systems”, In 15th IEEE Workshop on Offensive Technologies (WOOT’21), co-located with the 42nd IEEE Symposium on Security and Privacy and in cooperation with Usenix, May 2021, San Francisco, CA (*held virtually*)
(*Resulted in seven CVEs: CVE-2021-32980, CVE-2021-32984, CVE-2021-32986, CVE-2021-32982, CVE-2021-32978, CVE-2021-32926, and CVE-2020-15791*)
(Acceptance rate (35%): 12 out of 34 submissions)
- [ICCPs]. Muhammad Haris Rais, Ye Li, **Irfan Ahmed**, “Spatiotemporal G-code Modeling for Secure FDM-based 3D Printing”, In 12th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPs), May 2021, Nashville, TN. (*held virtually*)
(*Included in the VA Commonwealth Cyber Initiative’s CCI Research Showcase, a curated collection*)

of significant, influential peer-reviewed research papers published in the last two years.

(Acceptance rate (26%): 20 out of 77 submissions)

- [ICCIP]. Syed Ali Qasim, Adeen Ayub, Jordan Johnson, **Irfan Ahmed**, “Attacking IEC-61131 Logic Engine in Programmable Logic Controllers in Industrial Control Systems”, In 15th IFIP International Conference on Critical Infrastructure Protection (ICCIP), March 2021, Arlington, Virginia. (*held virtually*)
(*Resulted in a CVE: CVE-2023-2310*)
- [MAKE]. Manish Bhatt, Avdesh Mishra, Sharon Gatto, Rishav Rajendra, Md Tamjidul Hoque, **Irfan Ahmed**, “Hierarchical based File Fragment Classification”, Journal of Machine Learning and Knowledge Extraction (MAKE), MDPI, August 2020
- [DFRWS]. Syed Ali Qasim, Jared Smith, **Irfan Ahmed**, “Control Logic Forensics Framework using Built-in Decompiler of Engineering Software in Industrial Control Systems”, In 20th Annual Digital Forensics Research Conference (DFRWS’20), July 2020, Memphis, TN. (*held virtually*)
- Published by Forensic Science International (FSI): Digital Investigation Journal, Elsevier.
(*Best Student Paper Award*)
- [ISC]. Syed Ali Qasim, Juan Lopez Jr., **Irfan Ahmed**, “Automated Reconstruction of Control Logic for Programmable Logic Controller Forensics”, In 22nd Information Security Conference (ISC’19), September 2019, New York.
(Acceptance rate (26.7%): 23 out of 86 submissions)
- [INTERPOL]. Vassil Roussev, **Irfan Ahmed**, “Cloud Forensics - A True Game Changer”, INTERPOL Digital 4N6 Pulse, Volume: V, June 2019
- [CISSE]. Mandar Shivapurkar, Sajal Bhatia, **Irfan Ahmed**, “Problem-based Learning for Cybersecurity Education”, In 23rd Colloquium for Information Systems Security Education (CISSE’19), June 2019, Las Vegas, NV.
- [IFIP SEC]. Hyunguk Yoo, **Irfan Ahmed**, “Control Logic Injection Attacks on Industrial Control Systems”, In 34th IFIP International Conference on Information Security and Privacy Protection (IFIP SEC’19), June 2019, Lisbon, Portugal.
(*Resulted in three CVEs: CVE-2018-7790, CVE-2018-7791, and CVE-2018-7792*)
(Acceptance rate (18%): 26 out of 142 submissions)
- [DIMVA]. Hyunguk Yoo, Sushma Kalle, Jared Smith, **Irfan Ahmed**, “Overshadow PLC to Detect Remote Control-Logic Injection Attacks”, In 16th SIG SIDAR Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA’19), June 2019, Gothenburg, Sweden.
(Acceptance rate (28%): 23 out of 80 submissions)
- [NDSS BAR]. Sushma Kalle, Nehal Ameen, Hyunguk Yoo, **Irfan Ahmed**, “CLIK on PLCs! Attacking Control Logic with Decompilation and Virtual PLC”, In Binary Analysis Research (BAR) Workshop in Conjunction with Network and Distributed System Security Symposium (NDSS), Feb 2019, San Diego, CA.
- [SIGCSE]. Pranita Deshpande, **Irfan Ahmed**, “Topological Scoring of Concept Maps for Cybersecurity Education”, In 50th ACM Technical Symposium on Computer Science Education (SIGCSE), February 2019, Minneapolis, Minnesota, USA.
(Acceptance rate (32%): 169 out of 526 submissions)
- [SIGCSE]. Pranita Deshpande, Cynthia Lee, **Irfan Ahmed**, “Evaluation of Peer Instruction for Cybersecurity Education”, In 50th ACM Technical Symposium on Computer Science Education (SIGCSE), February 2019, Minneapolis, Minnesota, USA.
(Acceptance rate (32%): 169 out of 526 submissions)
- [PLOS One Journal]. Carl Weems, **Irfan Ahmed**, Golden G. Richard III, Justin Russell, Erin Neill, “Susceptibility and Resilience to Cyber Threat: Findings from a Scenario Decision Program to Measure Secure and Insecure Computing Behavior”, PLoS One, Dec 2018
(Impact Factor: 2.76 in 2018)
(JIF Quartile: Q1 in 2018)

- **[Book Chapter]**. Sajal Bhatia, Sunny Behal, **Irfan Ahmed**, “Distributed Denial of Service Attacks and Defense Mechanism: Current Landscape and Future Directions”, In Advances in Information Security Series, Conti, Somani, and Poovendran (Eds.), Springer, 2018.
- **[Book Chapter]**. **Irfan Ahmed**, Vassil Roussev, “Analysis of Cloud Digital Evidence”, In Security, Privacy, and Digital Forensics in the Cloud, L. Chen, and H. Takabi (Eds.), IGI Global, 2018.
- **[IEEE S&P Journal]**. **Irfan Ahmed**, Vassil Roussev, “Peer Instruction Teaching Methodology for Cybersecurity Education”, IEEE Security & Privacy, Vol. 16, No. 4, July 2018.
(Impact Factor: 1.382 in 2018)
- **[DFRWS]**. Manish Bhatt, **Irfan Ahmed**, “Leveraging Relocations in Kernel ELF-binaries for Linux Kernel Version Identification”, In 18th Annual Digital Forensics Research Conference (DFRWS’18), July 2018, Providence, RI, USA.
- Published by Digital Investigation Journal, Elsevier.
(Acceptance rate (31%): 14 out of 44 submissions)
- **[CODASPY]**. Saranyan Senthivel, Shrey Dhungana, Hyunguk Yoo, **Irfan Ahmed**, Vassil Roussev, “Denial of Engineering Operations Attacks in Industrial Control Systems”, In 8th ACM Conference on Data and Application Security and Privacy (CODASPY’18), March 2018, Tempe, AZ.
(Acceptance rate (21%): 23 out of 110 submissions)
- **[SIGCSE]**. Manish Bhatt, **Irfan Ahmed**, Zhiqiang Lin, “Using Virtual Machine Introspection for OS Kernel Security Education”, In 49th ACM Technical Symposium on Computer Science Education (SIGCSE), February 2018, Baltimore, Maryland, USA.
(Acceptance rate (35%): 161 out of 459 submissions)
- **[IEEE S&P Journal]**. **Irfan Ahmed**, Sebastian Obermeier, Sneha Sudhakaran, Vassil Roussev, “Programmable Logic Controller Forensics”, IEEE Security & Privacy, Vol. 15, No. 6, Nov 2017.
(Impact Factor: 1.38 in 2017)
- **[WISA]**. Jonathan Grimm, **Irfan Ahmed**, Vassil Roussev, Manish Bhatt, ManPyo Hong, “Automatic Mitigation of Kernel Rootkits in Cloud Environments”, In 18th World Conference on Information Security Applications (WISA’17), Lecture Notes in Computer Science (LNCS) Springer, August 2017, Jeju Island, South Korea
(Acceptance rate (47.1%): 25 out of 53 submissions)
- **[USENIX ASE]**. William Johnson, **Irfan Ahmed**, Vassil Roussev, Cynthia B. Lee, “Peer Instruction for Digital Forensics”, USENIX Advances in Security Education Workshop (ASE’17), co-located with 26th USENIX Security Symposium, August 2017, Vancouver, BC, Canada
(Acceptance rate (46.1%): 12 out of 26 submissions)
- **[DFRWS]**. Saranyan Senthivel, **Irfan Ahmed**, Vassil Roussev, “SCADA Network Forensics of the PCCC Protocol”, In 17th Annual Digital Forensics Research Conference (DFRWS’17), August 2017, Austin, USA.
- Published by Digital Investigation Journal, Elsevier.
(Acceptance rate (32%): 13 out of 41 submissions)
- **[Taylor & Francis JCST]**. Justin Russell, Carl Weems, **Irfan Ahmed**, Golden G. Richard III, “Self-reported secure and insecure cyber behaviour: factor structure and associations with personality factors”, Journal of Cyber Security Technology, Taylor & Francis, July 2017.
- **[ACSAC ICSS]**. **Irfan Ahmed**, Vassil Roussev, William Johnson, Saranyan Senthivel, Sneha Sudhakaran, “A SCADA System Testbed for Cybersecurity and Forensic Research and Pedagogy”, In 2nd Annual Industrial Control System Security Workshop (ICSS’16), In conjunction with 32nd Annual Computer Security Applications Conference (ACSAC’16), December 2016, Los Angeles, CA.
- **[Elsevier DI]**. Vassil Roussev, **Irfan Ahmed**, Andres Barreto, Shane McCulley, Vivek Shanmughan, “Cloud Forensics-Tool Development Studies & Future Outlook”, Digital Investigation, Elsevier, Vol. 18, No. 3, September 2016.
(Impact Factor: 1.77 in 2017)

- [USENIX ASE]. William Johnson, Allison Luzader, **Irfan Ahmed**, Vassil Roussev, Golden G. Richard III, Cynthia B. Lee, “Development of Peer Instruction Questions for Cybersecurity Education”, USENIX Advances in Security Education Workshop (ASE’16), co-located with 25th USENIX Security Symposium, August 2016, Austin, TX
(Acceptance rate (57.1%): 12 out of 21 submissions)
- [WiSec]. Aisha Ali-Gombe, Golden G. Richard III, **Irfan Ahmed**, Vassil Roussev, “Don’t Touch that Column: Portable, Fine-Grained Access Control for Android’s Native Content Providers”, In 9th ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec’16), July 2016, Darmstadt, Germany.
(Acceptance rate (26%): 13 out of 51 submissions)
- [IFIP DF]. Vassil Roussev, Andres Barreto, **Irfan Ahmed**, “API-based Forensic Acquisition of Cloud Drives”, In 12th IFIP WG 11.9 International Conference on Digital Forensics, Jan 2016, New Delhi, India
- [ACSAC PPREW]. Aisha Ali-Gombe, **Irfan Ahmed**, Golden G. Richard III, Vassil Roussev, “OpSeq: Android Malware Fingerprinting”, In 5th Program Protection and Reverse Engineering Workshop (PPREW’15), In conjunction with 31st Annual Computer Security Applications Conference (ACSAC’15), December 2015, Los Angeles, CA, USA.
- [CODASPY]. **Irfan Ahmed**, Vassil Roussev, Aisha Ali Gombe, ”Robust Fingerprinting for Relocatable Code”, In 5th ACM Conference on Data and Application Security and Privacy (CODASPY’15), March 2015, San Antonio, TX, USA.
(Acceptance rate (21%): 19 out of 91 submissions)
- [DFRWS]. Vassil Roussev, **Irfan Ahmed**, Thomas Sires, “Image-Based Kernel Fingerprinting”, In 14th Annual Digital Forensics Research Conference (DFRWS’14), August 2014, Denver CO, USA.
- Published by Digital Investigation Journal, Elsevier.
(Acceptance rate (29%): 15 out of 52 submissions)
- [ISC]. **Irfan Ahmed**, Golden G. Richard III, Aleksandar Zoranic, Vassil Roussev, “Integrity Checking of Function Pointers in Kernel Pools via Virtual Machine Introspection”, In 16th Information Security Conference (ISC’13), November 2013, Dallas, Texas, USA.
(Acceptance rate (23%): 16 out of 70 submissions)
(*Best Paper Award*)
- [IFIP DF]. **Irfan Ahmed**, Aleksandar Zoranic, Salman Javaid, Golden G. Richard III, Vassil Roussev “Rule-based Integrity Checking of Interrupt Descriptor Table in Cloud Environments”, In 9th IFIP WG 11.9 International Conference on Digital Forensics, January 2013, Orlando, Florida.
- [ACSAC LAW]. Salman Javaid, Aleksandar Zoranic, **Irfan Ahmed**, Golden G. Richard III, “Atomizer: Fast, Scalable and Lightweight Heap Analyzer for Virtual Machines in a Cloud Environment”, In 6th Layered Assurance Workshop (LAW’12), In conjunction with 28th Annual Computer Security Applications Conference (ACSAC’12), December 2012, Orlando, Florida, USA.
- [IEEE Computer]. **Irfan Ahmed**, Sebastian Obermeier, Martin Naedele, Golden G. Richard III, “SCADA Systems: Challenges for Forensic Investigators”, In IEEE Computer, Vol. 45, No. 12, December 2012.
(Impact Factor: 1.75 in 2017)
- [ICPP CloudSec]. **Irfan Ahmed**, Aleksandar Zoranic, Salman Javaid, Golden G. Richard III, “ModChecker: Kernel Module Integrity Checking in the Cloud Environment”, In 4th International Workshop on Security in Cloud Computing (CloudSec’12), In conjunction with 41st International Conference on Parallel Processing (ICPP’12), Sept 2012, Pittsburgh, Pennsylvania.
- [Springer IJIS]. **Irfan Ahmed**, Martin Naedele, Bradley Schatz, Ryoichi Sasaki, Andrew West, “SCADA System Security”, In International Journal of Information Security, Springer, Vol. 11, No. 4, August 2012. (*Editorial*)
(Impact Factor: 1.91 in 2016)

- **[Springer JCV]. Irfan Ahmed**, Kyung-suk Lhee, “Classification of Packet Contents for Malware Detection”, In Journal of Computer Virology and Hacking Techniques, Springer, Vol. 7, No. 4, pp. 279-295, October 2011.
- **[NSS]. Eesa Al Soalmi, Colin Boyd, Andrew Clark and Irfan Ahmed**, “User-Representative Feature Selection for Keystroke Dynamics” In the 5th IEEE International Conference on Network and System Security (NSS’ 11), pp. 229-233, September 2011, Milan, Italy.
(Acceptance rate (44%): 56 out of 127 submissions)
- **[ICRC]. Nishchal Kush, Ernest Foo, Ejaz Ahmed, Irfan Ahmed, Andrew Clark**, “Gap Analysis of Intrusion Detection in Smart Grids”, In International Cyber Resilience Conference, pp. 38-46, August 2011, Perth, Australia.
(*Best Paper Award*)
- **[IFIP DF]. Irfan Ahmed**, Kyung-suk Lhee, Hyunjung Shin, and ManPyo Hong, “Fast Content-based File-type Identification”, In 7th IFIP WG 11.9 International Conference on Digital Forensics, pp. 65-75, February 2011, Orlando, Florida, USA.
- **[IETE TR]. Irfan Ahmed**, Kyung-suk Lhee, Hyunjung Shin, and ManPyo Hong, “Content-based File-type Identification using Cosine Similarity and a Divide-and-Conquer approach”, In IETE Technical Review, Vol. 27, No. 6, pp. 465-477, Nov 2010.
(Impact Factor: 1.33 in 2017)
- **[SAC]. Irfan Ahmed**, Kyung-suk Lhee, Hyunjung Shin, and ManPyo Hong, “Fast File-type Identification”, In 25th Annual ACM Symposium on Applied Computing, (SAC’10), ACM Special Interest Group on Applied Computing (SIGAPP), March 2010, Sierre, Switzerland.
- **[ACISP]. Irfan Ahmed**, Kyung-suk Lhee, Hyunjung Shin, and ManPyo Hong, “On Improving the Accuracy and Performance of Content-based File-type Identification”, In 14th Australasian conference on information security and privacy (ACISP’09), Lecture notes in computer science (LNCS), pp. 44-59, July 2009, Brisbane, Australia.
(Acceptance rate (28%): 30 out of 106 submissions)
- **[ARES]. Irfan Ahmed**, Kyung-suk Lhee, “Detection of Malcodes by Packet Classification”, In International Workshop on Privacy and Security by means of Artificial Intelligence (PSAI’08), In conjunction with 3rd IEEE International Conference on Availability Reliability and Security (ARES’08), March 2008, Barcelona, Spain.
- **[IAS]. Irfan Ahmed**, Usman Tariq, Shoaib Mukhtar, Kyung-suk Lhee, Seung-Wha Yoo, Piao Yanji and Manpyo Hong, “Binding Update Authentication Scheme for Mobile IPv6”, In 3rd IEEE International Symposium on Information Assurance and Security (IAS’07), pp. 109-114, August 2007, Manchester, United Kingdom.
(Acceptance rate (42.5%): 60 out of 141 submissions)

KEYNOTE SPEAKER, PANEL MODERATOR AND PANELIST

- **Keynote Speaker**, “Digital Forensic Investigations of Field Devices in Industrial Control Systems”, In 19th Annual IFIP WG 11.9 International Conference on Digital Forensics, Jan 2023, Arlington VA.
- **Keynote Speaker**, “Searching for digital evidence in SCADA systems”, In 18th Annual IFIP WG 11.9 International Conference on Digital Forensics, January 2022 (*virtual*)
- **Moderator**, a panel on “Industrial Cybersecurity Education”, In the 7th Industrial Control System Security (ICSS) Workshop, In conjunction with Annual Computer Security Applications Conference (ACSAC), Dec 2021
- **Panelist**, “Infrastructure Cybersecurity: Industry, Government, and Academia Viewpoints”, University of New Orleans Engineering Forum, and Southeast Symposium on Contemporary Engineering Topics (SSCET), New Orleans LA, Sept 2017.
- **Moderator**, a panel on “SCADA System Security: Challenges and Future Directions”, Annual Computer Security Applications Conference (ACSAC), New Orleans LA, Dec 2014

TECHNICAL WORKSHOPS

- [DFRWS US]. Mia Mohammad Imran, Hala Ali, Kostadin Damevski, **Irfan Ahmed**, “Natural Language Processing (NLP) for Digital Forensics”, In 23rd Annual Digital Forensics Research Conference (DFRWS US’23), July 2023, Baltimore, MD. (*Duration: 4 hours*)
- [DFRWS EU]. Adeen Ayub, **Irfan Ahmed**, “Network Forensics of Industrial Control Systems”, In the 9th Annual Digital Forensics Research Conference Europe (DFRWS EU’22) at the University of Oxford, March 2022, Oxford, United Kingdom. (*Duration: 2 hours*)
- [Fordham University] **Irfan Ahmed**, “Supervisory Control and Data Acquisition (SCADA) System Security”, Fordham University, New York, USA, Jun 2016. (*Duration: 4 hours*)
- [QUT] **Irfan Ahmed**, “Network Forensics”, Queensland University of Technology (QUT), Brisbane, Australia, Jun 2011. (*Duration: 1 hours*)

INVITED TALKS, PRESENTATIONS, DEMOS, AND POSTERS

- [CyAD]. (*Presentation*) - **Irfan Ahmed**, “Cybersecurity of Additive Manufacturing”, In CyAD Conference: Cybersecurity Across Disciplines, August 2023, Chicago, IL
- [CyAD]. (*Presentation*) - **Irfan Ahmed**, “How Are Industrial Control Systems Insecure by Design? A Deeper Insight Into Real-World PLCs”, In CyAD Conference: Cybersecurity Across Disciplines, August 2023, Chicago, IL
- [DFRWS US]. (*Poster*) - Adeen Ayub, Nauman Zubair, Wooyeon Jo, Hyunguk Yoo, **Irfan Ahmed**, “Manipulating the Code Maze- Exploring Return Oriented Programming Attacks on PLCs”, In 23rd Annual Digital Forensics Research Conference (DFRWS US’23), July 2023, Baltimore, MD
- [DFRWS US]. (*Poster*) - Hala Ali, **Irfan Ahmed**, “G-Code Forensics: Uncovering Footprints of Manipulation Attacks in FFF-Based 3D Printing Processes”, In 23rd Annual Digital Forensics Research Conference (DFRWS US’23), July 2023, Baltimore, MD
- [DFRWS US]. (*Poster*) - Nehal Ameen, Ramyapandian Vijayakanthan, Aisha Ali-Gombe, **Irfan Ahmed**, “MemSig: ICS Triage and Incident Response using Memory-Signal Fingerprint”, In 23rd Annual Digital Forensics Research Conference (DFRWS US’23), July 2023, Baltimore, MD
- [IEEE HOST].(*Demo*) - Adeen Ayub, Nauman Zubair, Hyunguk Yoo, **Irfan Ahmed**, “Memory Forensics of Firmware Level Attacks in Programmable Logic Controllers in Industrial Control Systems”, In 16th IEEE International Symposium on Hardware Oriented Security and Trust (HOST), May 2023, San Jose, CA
- [HoTSoS]. (*Peer-reviewed Presentation*) - Syed Ali Qasim, Jared Smith, **Irfan Ahmed**, “Control Logic Forensics Framework using Built-in Decompiler of Engineering Software in Industrial Control Systems”, In the 10th Annual Hot Topics in the Science of Security (HoTSoS) Symposium, April 2023. (*Held Virtually*)
- [HoTSoS]. (*Peer-reviewed Presentation*) - Muhammad Haris Rais, Ye Li, **Irfan Ahmed**, “Spatiotemporal G-code Modeling for Secure FDM-based 3D Printing”, In the 10th Annual Hot Topics in the Science of Security (HoTSoS) Symposium, April 2023. (*Held Virtually*)
- [WiCyS]. (*Poster*) -Ramyapandian Vijayakanthan, **Irfan Ahmed**, Aisha Ali-Gombe, “CNN model for classifying audio signals of IoT App Memory”, In the 10th Annual Women in Cybersecurity (WiCyS) Conference, Denver, CO, March 2023.
- [ACSAC ICSS]. (*Invited Talk*) - **Irfan Ahmed**, “How are PLCs Insecure by Design? A Story of Experiments and Experiences on Real-world PLCs”, In the 8th Industrial Control System Security (ICSS) Workshop, with Annual Computer Security Applications Conference (ACSAC), Austin TX, December 2022.

- [HoTSoS]. (*Peer-reviewed Presentation*) - Adeen Ayub, Hyunguk Yoo, **Irfan Ahmed**, “Empirical Study of PLC Authentication Protocols in Industrial Control Systems”, In the 9th Annual Hot Topics in the Science of Security (HoTSoS) Symposium, April 2022. (*Held Virtually*)
- [CODASPY]. (*Poster*) - Ramyapandian Vijayakanthan, **Irfan Ahmed**, Aisha Ali-Gombe, “Transforming Memory Image to Sound Wave Signals for an Effective IoT Fingerprinting”, In 12th ACM Conference on Data and Application Security and Privacy (CODASPY’22), Baltimore-Washington DC Area, April 2022.
- [WiCyS]. (*Poster*) - Adeen Ayub, Hyunguk Yoo, **Irfan Ahmed**, “ROP on PLCs”, In the 9th Annual Women in Cybersecurity (WiCyS) Conference, Cleveland, OH, March 2022.
- [WiCyS]. (*Poster*) - Ramyapandian Vijayakanthan, **Irfan Ahmed**, Aisha Ali-Gombe, “Comparative Analysis on IoT Memory Images Generated using Hardware and Software Acquisition”, In the 9th Annual Women in Cybersecurity (WiCyS) Conference, Cleveland, OH, March 2022.
- [AAFS]. (*Peer-reviewed Presentation*) - Syed Ali Qasim, **Irfan Ahmed**, “A Case Study of Virtual Programmable Logic Controllers (PLC) Forensic Framework on Investigating Control Logic Attacks in a Belt Conveyor System”, In the 74th Annual Meeting of the American Academy of Forensic Sciences, February 2022, Seattle, Washington. (*Extended Abstract*)
- [AAFS]. (*Peer-reviewed Presentation*) - Muhammad Haris Rais, **Irfan Ahmed**, “A Forensic Readiness Model for the Fused Filament Fabrication (FFF)-Based Additive Manufacturing (AM) Process”, In the 74th Annual Meeting of the American Academy of Forensic Sciences, February 2022, Seattle, Washington. (*Extended Abstract*)
- [AAFS]. (*Poster*) - Muhammad Haris Rais, **Irfan Ahmed**, “Memory Forensic Analysis for Programmable Logic Controllers (PLCs)”, In the 74th Annual Meeting of the American Academy of Forensic Sciences, Seattle, Washington, February 2022. (*Extended Abstract*)
- [ICOSST]. (*Invited Talk*) - “Digital Forensics of Industrial Control Systems”, In 15th IEEE International Conference on Open Source Systems And Technologies (ICOSST 2021), December 2021
- [WiCyS]. (*Poster*) - Adeen Ayub, **Irfan Ahmed**, Hyunguk Yoo, “Empirical Analysis of PLC Authentication Protocols in Industrial Control Systems”, In the 8th Annual Women in Cybersecurity (WiCyS) Conference, Denver, CO, September 2021.
(*Best Poster Award*)
- [WiCyS]. (*Poster*) - Nixy Camacho, Adeen Ayub, **Irfan Ahmed**, Hyunguk Yoo, “Automating Binary Analysis of PLCs”, In the 8th Annual Women in Cybersecurity (WiCyS) Conference, Denver, CO, September 2021.
- [ACNS CIMSS]. (*Demo*) - Syed Ali Qasim, **Irfan Ahmed**, “Virtual PLC-assisted Forensic Analysis of Control Logic Injection Attacks”, In the 1st International Workshop on Critical Infrastructure and Manufacturing System Security (CIMSS) in conjunction with the 19th International Conference on Applied Cryptography and Network Security, Kamakura, Japan, June 2021.
- [ACNS CIMSS]. (*Demo*) - Muhammad Haris Rais, Ye Li, **Irfan Ahmed**, “On Detecting Sabotage Attacks on 3D Printing Process”, In the 1st International Workshop on Critical Infrastructure and Manufacturing System Security (CIMSS) in conjunction with the 19th International Conference on Applied Cryptography and Network Security, Kamakura, Japan, June 2021.
- [DHS ICSJWG]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, “Control-logic Forensics of Denial of Engineering Operations (DEO) Attacks”, In Industrial Control Systems Joint Working Group (ICSJWG) meeting organized by DHS Cybersecurity and Infrastructure Security Agency (CISA), April 2021. (*Presentation*)
- [ARPCON]. (*Invited Talk*) - “Using RAM as a Playground to Explore OS Kernel-level Attacks”, In ARPCON, October 2020
- [RAEE & CS]. (*Invited Talk*) - “A Tale of a New PLC in Town: Exploitation and Mitigation of Modicon M221 Programmable Logic Controller, In International Symposium on Recent Advances in Electrical Engineering and Computer Sciences, Islamabad, Pakistan October 2020

- [DHS ICSJWG]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, “Control Logic Attacks and Mitigation: A Case Study of Modicon M221 Programmable Logic Controller”, In Industrial Control Systems Joint Working Group (ICSJWG) meeting organized by DHS Cybersecurity and Infrastructure Security Agency (CISA), Sept 2020. (*Presentation*)
- [UET Lahore]. (*Invited Talk*) - “Research Topics in Cybersecurity”, University of Engineering and Technology, Lahore, <https://uet.edu.pk/>, Jan 2020, Lahore, Pakistan. (*Duration: 90 minutes*)
- [PIEAS]. (*Invited Talk*) - “Research Topics in Cybersecurity”, Pakistan Institute of Engineering and Applied Sciences (PIEAS), <http://www.pieas.edu.pk/>, Jan 2020, Islamabad, Pakistan. (*Duration: 90 minutes*)
- [ACSAC ICSS]. (*Invited Talk*) - “Control Logic Injection Attacks and Defenses”, In 5th Annual Industrial Control System Security Workshop (ICSS’19), In conjunction with 35th Annual Computer Security Applications Conference (ACSAC’19), December 2019, San Juan, Puerto Rico.
- [NEDUET]. (*Invited Talk*) - “Research Topics in Cybersecurity”, NED University of Engineering and Technology, <https://www.neduet.edu.pk/>, Dec 2019, Karachi, Pakistan. (*Duration: 90 minutes*)
- [DFRWS]. (*Peer-reviewed Presentation*) - Muhammad Haris Rais, Ye Li, **Irfan Ahmed**, “Forensic Readiness Framework for 3D printing process: A case study of Ultimaker 3”, In the 20th Annual Digital Forensics Research Conference (DFRWS’20), July 2020, Memphis, TN.
- [ICPS]. (*Poster*) - Carl Weems, Golden Richard III, **Irfan Ahmed**, Justin Russell, Erin Neill, Marsee Monica, “Susceptibility and Resilience to Cyber Threat: Findings from a Scenario Decision Program to Measure Secure and Insecure Computing Behavior”, In International Convention of Psychological Science (ICPS), March 2019, Paris, France.
- [AAFS]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, “A Ladder Logic Decompiler for Supervisory Control and Data Acquisition (SCADA) Network Forensics”, In the 71st Annual Meeting of the American Academy of Forensic Sciences, February 2019, Baltimore, MD, USA. (*Extended Abstract*)
- [ACSAC ICSS]. (*Invited Talk*) - “Programmable Logic Controller Forensics”, In 3rd Annual Industrial Control System Security Workshop (ICSS’17), In conjunction with 33rd Annual Computer Security Applications Conference (ACSAC’17), December 2017, Orlando, FL USA.
- [Sacred Heart University]. (*Invited Talk*) - “Modern Critical Infrastructure at the Risk of Cyberattacks”, Sacred Heart University, <http://www.sacredheart.edu>, Oct 2017, Fairfield, CT, USA. (*Duration: 90 minutes*)
- [NOLASec]. (*Invited Talk*) - “An Industrial Control System Testbed for Cybersecurity and Forensic Research and Pedagogy”, NOLASec computer security group, <https://sites.google.com/site/nolasecurity>, Aug 2017, New Orleans, LA, USA. (*Duration: 60 minutes*)
- [NSRI]. (*Invited Talk*) - “Digital Forensics of Industrial Control System: An Academia Viewpoint”, National Security Research Institute (NSRI), http://www.nst.re.kr/nst_en/member/03_12.jsp, August 2017, Yuseong-gu, Daejeon, South Korea. (*Duration: 2 hours*)
- [Soonchunhyang University]. (*Invited Talk*) - “Digital Forensics of Industrial Control System: An Academia Viewpoint”, Soonchunhyang University, <http://sgee.sch.ac.kr/>, August 2017, Chungcheongnam-do, South Korea. (*Duration: 60 minutes*)
- [Ajou University]. (*Invited Talk*) - “Digital Forensics of Industrial Control System: An Academia Viewpoint”, Ajou University, <https://www.ajou.ac.kr/en/>, August 2017, Suwon, Gyeonggi-do, South Korea. (*Duration: 60 minutes*)
- [AAFS]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, “Supervisory Control and Data Acquisition (SCADA) Forensics: Network Traffic Analysis for Extracting a Programmable Logic Controller (PLC) System and Programming Logic Files”, In the 69th Annual Meeting of the American Academy of Forensic Sciences, February 2017, New Orleans, USA. (*Extended Abstract*)

- [CODASPY]. (*Poster*) - Aisha Ibrahim Ali-Gombe, **Irfan Ahmed**, Golden G. Richard III, Vassil Roussev, “AspectDroid: Android App Analysis System”, In 6th ACM Conference on Data and Application Security and Privacy (CODASPY’16), March 2016, New Orleans, LA, USA. (*Outstanding Poster Award*)
- [CODASPY]. (*Poster*) - Anjila Tamrakar, Justin D. Russell, **Irfan Ahmed**, Golden G. Richard III, Carl F. Weems, “SPICE: A Software Tool for Bridging the Gap Between End-user’s Insecure Cyber Behavior and Personality Traits”, In 6th ACM Conference on Data and Application Security and Privacy (CODASPY’16), March 2016, New Orleans, LA, USA.
- [AAFS]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, Vassil Roussev, Aisha Ali Gombe, “Memory Forensics: Reliable In-Memory Code Identification Using Relocatable Pointers”, In the 67th Annual Meeting of the American Academy of Forensic Sciences, February 2015, Orlando, FL, USA. (*Extended Abstract*)
- [ACSAC MMF]. (*Invited Talk*) - “Reliable In-Memory Code Identification Using Relocatable Pointers”, In Malware Memory Forensics Workshop (MMF), In conjunction with 30th Annual Computer Security Applications Conference (ACSAC’14), December 2014, New Orleans, LA, USA.
- [AAFS]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, Golden G. Richard III, “Kernel Pool Monitoring to Support Malware Forensics in a Cloud Computing Environment”, In the 66th Annual Meeting of the American Academy of Forensic Sciences, February 2014, Washington, USA. (*Extended Abstract*)
- [AAFS]. (*Peer-reviewed Presentation*) - Golden G. Richard III, **Irfan Ahmed**, “Compressed RAM and Live Forensics”, In the 66th Annual Meeting of the American Academy of Forensic Sciences, February 2014, Washington, USA. (*Extended Abstract*)
- [ACSAC]. (*Poster*) - **Irfan Ahmed**, Aleksandar Zoranic, “HookLocator: Function Pointer Integrity Checking in Kernel Pools via Virtual Machine Introspection”, In 29th Annual Computer Security Applications Conference (ACSAC’13), December 2013, New Orleans, LA, USA.
- [ACSAC]. (*Peer-reviewed Presentation*) - Aisha Ali-Gombe, **Irfan Ahmed**, Golden G. Richard III, “DROIDHOOK: Android MalApp Detection Through Context”, In 29th Annual Computer Security Applications Conference (ACSAC’13), December 2013, New Orleans, LA, USA.
- [AAFS]. (*Peer-reviewed Presentation*) - **Irfan Ahmed**, Golden G. Richard III, “Live Forensic Analysis of Kernel Code for Malware Detection in Cloud Computing Environments”, In the 65th Annual Meeting of the American Academy of Forensic Sciences, February 2013, Washington, USA. (*Extended Abstract*) (*Outstanding Research Award*)
- [ACSAC NGMAD]. (*Invited Talk*) - “Integrity Checking of Function Pointers in Kernel Pools – A Virtual Machine Introspection based Approach”, In the Next Generation Malware Attacks and Defense Workshop (NGMAD), In conjunction with 29th Annual Computer Security Applications Conference (ACSAC’13), December 2013, New Orleans, LA, USA.
- [BIDM]. (*Invited Talk*) - “Computer Forensics with Data Mining: File-Type Identification”, In the Business Intelligence and Data Mining Conference (BIDM 2010), pp. 110-123, April 2010, Seoul, South Korea.

THESIS/RESEARCH ADVISOR

Academic Lineage (of Ph.D. Mentors):

... → Eugene H. Spafford → Steve J. Chapin → Kyung-suk Lhee → **Irfan Ahmed**

Eugene Spafford’s academic lineage: <https://spaf.cerias.purdue.edu/Students/ped.pdf>

Postdocs:

- Wooyeon Jo
PhD from Ajou University, South Korea

Aug 2022 - Present

- Hyungkuk Yoo Aug 2017 - July 2018
PhD from Ajou University, South Korea
First employment: Assistant Professor at University of New Orleans

PhD Students:

- Muhammad Shaharyar Yaqub Aug 2023 - to-date
- Yahya Forihat Jan 2023 - to-date
- Allison Sands Jan 2023 - to-date
- Hala Ali Jan 2023 - to-date
- Ashwini Vasudev Aug 2022 - to-date
- Nehal Ameen Aug 2022 - to-date
- Muhammad Ahsan Aug 2021 - to-date
- Adeen Ayub Jan 2020 - May 2024 (expected)
Awards: 1) Best Paper Award at DFRWS'22,
2) Best Poster Award at WiCyS'21, and
3) Outstanding Early Career Student Researcher Award from VCU Computer Science
- Muhammad Haris Rais Jan 2019 - May 2023
Thesis Title: Material Extrusion-based Additive Manufacturing: G-Code and Firmware Attacks and Defense Frameworks
Awards: 1) Best Student Paper Award at DFRWS EU'22, and
2) Winner of 3MT Competition at VCU College of Engineering
Employment: Assistant Professor at Virginia State University, VA
- Syed Ali Qasim Aug 2017 - July 2023
Thesis Title: Virtual PLC Platform for Security and Forensics of Industrial Control Systems
Awards: 1) Best Student Paper Award at DFRWS US'20
2) Best Student Paper Award at DFRWS US'23
3) 2022 Innovation Award from Virginia Commonwealth Cyber Initiative (CCI), April 2023
Employment: Assistant Professor at Grand Valley State University, MI
- Aisha Ibrahim Ali-Gombe August 2013 - May 2017
Thesis Title: Malware Analysis and Privacy Policy Enforcement Techniques for Android Applications
Co-supervised by: Dr. Golden G. Richard III
Awards: 1) Outstanding Poster Award at CODASPY'16
Employment: Associate Professor at Louisiana State University, LA

Master Students:

- Masrik Dahir June 2023 - to-date
- Justin Hoyle June 2023 - to-date
- Pranita Deshpande May 2017 - Aug 2018
Thesis Title: Assessment of Two Pedagogical Tools for Cybersecurity Education
Publications: ACM SIGCSE'19 (a), and ACM SIGCSE'19 (b)
- Sharon Elizabeth Blake Aug 2016 - July 2018
Thesis Title: MAnanA: A Heuristic Scoring Framework for Concept Map Analysis in Cybersecurity Education
- Sushma Kalle Aug 2017 - July 2018
Thesis Title: Semantic-aware Stealthy Control Logic Infection Attack
Publications: NDSS BAR'19, and DIMVA'19

- Jonathan Grimm Sept 2015 - Aug 2017
Thesis Title: Automatic Mitigation of Kernel Rootkits in Cloud Environments
Publications: WISA'18
- Saranyan Senthivel June 2016 - July 2017
Thesis Title: Automatic Forensic Analysis of PCCC Network Traffic Log
Publications: ACSAC ICSS'16, DFRWS'17, and CODASPY'18
- William Eldon Johnson July 2015 - May 2017
Thesis Title: Development of Peer Instruction Material for a Cybersecurity Curriculum
Publications: ACSAC ICSS'16, USENIX ASE'16, and USENIX ASE'17
- Anjila Tamrakar June 2014 - April 2016
Thesis Title: SPICE: A Software Tool for Studying End-user's Insecure Cyber Behavior and Personality-traits
Publications: CODASPY'18
- Dalbir Kaur Chhabra Jan 2014 - Aug 2014
Thesis Title: Feature Selection and Clustering for Malicious and Benign Software Characterization

Undergraduate Students:

- Sam Castle June 2023 - To-Date
- Vishaal Mehta March 2022 - To-Date
- Joseph Dinsmoor June 2021 - To-Date
- Nixy Camacho Oct 2020 - Aug 2021
- Max Safo Feb 2021 - Aug 2021
- Masrik Dahir June 2020 - May 2021
Publications: IEEE Access Journal 2021
- Francisco Perez Feb 2021 - May 2021
- Amrita Harshini Kondeti June 2020 - Aug 2020
- Byron Stearns Feb 2020 - Aug 2020
- Jose Rene Berlioz Rivera Aug 2017 - May 2018
- Shrey Dhungana May 2017 - May 2018
Publications: ACM CODASPY'18
- Nabeel Gulzar Rana Aug 2017 - July 2018
- Manish Bhatt Dec 2016 - May 2017
Publications: WISA'17
- Banan Ibrahim Oct 2016 - Jun 2017
- Phillip Bradley Reason Feb 2016 - Jul 2016
- Philip Schwartz May 2014 - Aug 2014

High School Students:

- Bradley King July 2020 - June 2021

Other Graduate Research Assistants:

- Manish Bhatt May 2017 - Jul 2018
The University of New Orleans, New Orleans LA
Publications: SIGCSE'18, and DFRWS'18
- Nehal Ameen January 2018 - Aug 2018
The University of New Orleans, New Orleans LA
Publications: NDSS BAR'19

- Sneha Sudhakaran June 2016 - Aug 2017
The University of New Orleans, New Orleans LA
Publications: ACSAC ICSS'16, and IEEE S&P'17
- Allison Luzader June 2015 - Dec 2015
The University of New Orleans, New Orleans LA
Publications: USENIX ASE'16
- Eesa Alsolami Mar 2011-Aug 2012
Queensland University of Technology, Brisbane QLD
Publications: NSS'11
- Nishchal Kush Mar 2011-Sept 2011
Queensland University of Technology, Brisbane QLD
Publications: ICRC'11

THESIS COMMITTEE MEMBER

PhD Students:

- Erwin Karincic Current
Department of Electrical & Computer Engineering
Virginia Commonwealth University, VA
- Norah Alobaidan Current
Department of Computer Science
Virginia Commonwealth University, VA
- Peter Vaughan Truslow Current
Department of Electrical & Computer Engineering
Virginia Commonwealth University, VA
- Matthew Gelber Current
Department of Electrical & Computer Engineering
Virginia Commonwealth University, VA
- Ramyapandian Vijayakanthan Current
Towson University, MD
- Richard Hite Current
Department of Electrical & Computer Engineering
Virginia Commonwealth University, VA
- Douglas Krug May 2023
Code Beats - Teaching Computer Programming Coding via Hip Hop Beats
Department of Computer Science
Virginia Commonwealth University, VA
- Santosh Kumar Nukavarapu May 2022
AI-assisted Tools for the Security and Privacy of Edge Devices
Department of Computer Science
Virginia Commonwealth University, VA
- Joseph T. Sylve May 2017
Towards Real-Time Volatile Memory Forensics: Frameworks, Methods, and Analysis
Department of Computer Science
University of New Orleans, LA

Master Students:

- Shane McCulley May 2017
Forensic Analysis of G-Suite Collaborative Services
University of New Orleans, LA

- Vivek Oliparambil Shanmughan May 2017
Lightweight Environment for Cyber Security Education
University of New Orleans, LA
- Andrew Case June 2016
Detecting Objective-C Malware through Memory Forensics
University of New Orleans, LA
- Elyse Bond June 2015
Creating Volatility Support for FreeBSD
University of New Orleans, LA
- Andres E. Barreto June 2015
API-Based Acquisition of Evidence from Cloud Storage Providers
University of New Orleans, LA
- Robert Strickland June 2015
GPU Keystroke Logging and Detection on Microsoft Windows with Kernel Mode Drivers
University of New Orleans, LA
- Salman Javaid Aug 2014
Analysis and Detection of Heap-base Malware Using Introspection in a Virtualized Environment
University of New Orleans, LA
- Christopher Stelly Nov 2013
Dynamic User Defined Permissions for Android Devices
University of New Orleans, LA
- Deekshit Kura Nov 2013
Categorization of Large Corpora of Malicious Software
University of New Orleans, LA

ACADEMIC SERVICES

Funding Proposal Peer-reviewer

- The US Department of Defense (DoD) SMART (Science, Mathematics, and Research for Transformation) Scholarship for Service Program - 2022
- UTSA Limited Submission for NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) - 2021
- National Science Foundation (NSF) CyberTraining – 2021 (small), 2022 (medium)
- National Science Foundation (NSF) SaTC – 2023
- National Nuclear Security Administration (NNSA) - Minority Serving Institution Partnership Program (MSIPP), 2020, 2021, 2022
- ORAU Ralph E. Powe Junior Faculty Award, 2020, 2023
- Department of Homeland Security (DHS) - Office of University Programs for Criminal Investigations and Network Analysis (CINA) - Biennial Review, 2019
- DHS Office of University Programs for Terrorism Prevention and Counterterrorism Research (TPCR) Center of Excellence (COE), 2019
- University of Texas at San Antonio (UTSA) Limited Submission for Department of Defense's Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) Science Program for basic research, 2019
- Florida Center for Cybersecurity - Collaborative Seed Awards and Capacity Building Awards, 2018, 2019, 2020
- UTSA Limited Submission for the NSF Major Research Instrumentation (MRI), 2018
- UTSA Limited Submission for Johnson & Johnson Scholars Program, 2018
- DHS Scientific Leadership Awards at Minority Serving Institutions, 2016
- VCU Breakthroughs Funding Program, 2022, 2023

General Chair/Program Chair/Track Chair of Conference/Workshop

- **Program Co-Chair**, *Digital Forensics Research Conference USA (DFRWS USA)*
 - 24th annual DFRWS conference in July 2024 at Baton Rouge, LA
<https://dfrws.org/conferences/dfrws-usa-2024>
 - 23rd annual DFRWS conference in July 2023 at Baltimore, MD
<https://dfrws.org/conferences/dfrws-usa-2023>
- **Program Chair**, *Industrial Control System Security (ICSS) Workshop*, In conjunction with Annual Computer Security Applications Conference (ACSAC)
 - 9th workshop in December, 2023 at Austin, TX
<https://www.acsac.org/2023/workshops/icss/>
 - 8th workshop in December, 2022 at Austin, TX
<https://www.acsac.org/2022/workshops/icss/>
 - 7th workshop in December, 2021 (virtual)
<https://www.acsac.org/2021/workshops/icss/>
 - 6th workshop in December, 2020 at Austin, TX
<https://www.acsac.org/2020/workshops/icss/>
 - 5th workshop in December, 2019 at San Juan, Puerto Rico, USA
<https://www.acsac.org/2019/workshops/icss/>
 - 4st workshop in December, 2018 at San Juan, Puerto Rico, USA
<https://www.acsac.org/2018/workshops/icss/>
 - 3rd workshop in December, 2017 at Orlando, FL
<https://www.acsac.org/2017/workshops/icss/>
 - 2nd workshop in December, 2016 at Los Angeles, California
<http://acsac.org/2016/workshops/icss/>
 - 1st workshop in December, 2015 at Los Angeles, California
<http://acsac.org/2015/workshops/icss/>
- **General Co-chair**, 10th *EAI International Conference on Digital Forensics & Cyber Crime (ICDF2C)*, September 2018, New Orleans, USA
<http://d-forensics.org/>
- **Program Chair**, *Malware Memory Forensics Workshop (MMF)*, In conjunction with 30th Annual Computer Security Applications Conference (ACSAC'14), December 2014, New Orleans, LA, USA.
<https://www.acsac.org/2014/workshops/mmf/>
- **Track Chair**, *Intrusion Detection and Forensics Track*
IEEE World Congress on Information and Communication Technologies (WICT 2011), 11-14 December 2011, Mumbai, India
<http://www.mirlabs.net/wict11/>

Technical Program Committee Member

- American Academy of Forensic Sciences (AAFS) - 2023, 2024
- International Workshop on Additive Manufacturing Security (AMSec), in conjunction with ACM CCS - 2022
- IEEE International Conference on Machine Learning and Applications (ICMLA), 2021, 2022
- ACM Conference on Data and Application Security and Privacy (CODASPY) – 2019, 2020, 2021, 2022
- IFIP Working Group 11.10 International Conference on Critical Infrastructure Protection (ICCIP) - 2021, 2022
- Digital Forensics Research Conference US (DFRWS USA) – 2015, 2016, 2020, 2021, 2022, 2023
- Digital Forensics Research Conference Europe (DFRWS Europe) – 2021, 2022, 2023
- Digital Forensics Research Conference APAC (DFRWS APAC) – 2023

- International Workshop on Critical Infrastructure and Manufacturing System Security (CIMSS), in conjunction with ACNS – 2021, 2022
- IEEE International Conference on Big Data (IEEE BigData) – 2019, 2020, 2021, 2022
- ACM Technical Symposium on Computer Science Education (SIGCSE) – 2017, 2018, 2019, 2020, 2021, 2022
- Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE) – 2020, 2021, 2022, 2023
- International Conference on Smart City and Informatization (iSCI) – 2019, 2020
- International Conference on Internet Monitoring and Protection (ICIMP) – 2018, 2019
- International Conference on Digital Forensics & Cyber Crime (ICDF2C) – 2013, 2014, 2015, 2016, 2017, 2018
- International Conference on High Performance Computing and Communications (HPCC) – 2014
- International Conference on Emerging Technologies (ICET) – 2012, 2013, 2017
- Annual Cyber and Information Security Research Conference (CISRC), held at Oak Ridge National Laboratory – 2018
- International Workshop on Cyber-Physical Systems (IWCPs), held with IEEE TrustCom – 2018
- International Conference on Cyber-Technologies and Cyber-Systems (CYBER) – 2018
- The Northwest Cybersecurity Symposium at Pacific Northwest National Laboratory (Cybersec) – 2020
- IEEE Top Picks Workshop in Hardware and Embedded Security, Co-located with the International Conference On Computer Aided Design (ICCAD) – 2021
- Cloud S&P in conjunction with ACNS – 2022, 2023
- IARIA International Conference on Data Analytics – 2022

External Cybersecurity Curriculum Reviewer

- Consultant on developing a process for reviewing the relevancy of the curriculum materials in the CLARK library, <https://clark.center>, 2021
- Chair, External Curriculum Reviewer Team, Master of Science (MS) in Cybersecurity Engineering, University of New Hampshire, 2019
- External Reviewer, NSA National Cybersecurity Curriculum (NCCP) Program - Two courses on the Cybersecurity of Industrial Control Systems, 2018

Tenure and Promotion (T&P) Case Evaluator

- Dr. Alexander Rasin, DePaul University's School of Computing, Chicago, IL, 2023
- Dr. Sajal Bhatia, School of Computer Science & Engineering at Sacred Heart University, Fairfield, CT, 2022
- Dr. Vahid Heydari, Computer Science Department at Rowan University, Glassboro, NJ, 2022
- Dr. Yufei Tang, Department of Computer & Electrical Engineering and Computer Science at the Florida Atlantic University, Boca Raton, FL, 2021

PhD/Master Thesis - External Examiner/Reviewer

- [PhD Thesis] *Shahab Tahzeeb*, "Machine Learning Techniques for Analysis of Protein Sequences", NED University of Engineering & Technology, Pakistan, 2022
- [PhD Thesis] *Sana Shokat*, "An Analysis Of Braille On Accessible Touch Screen Using Deep Learning Methods", Department of CS & IT, University of Azad Jammu and Kashmir, Pakistan, 2021
- [PhD Thesis] *Zareen Abbas*, "Incorporating Memristors for Efficient Processor Design", NED University of Engineering & Technology, Pakistan, 2021
- [PhD Thesis] *Nazim Uddin Sheikh*, "Quantifying Privacy Threats in Aggregated Energy Data Analytics", Macquarie University, Australia, 2021
- [PhD Thesis] *Beenish Ayesha Akram*, "Context Aware Services Portal for the Global Access of Sensing-Based Applications in Cellular Networks and Internet", Department of Computer Science and Engineering, University of Engineering and Technology, Lahore Pakistan, 2019
- [PhD Thesis] *Nicholas R. Rodofile*, "Generating Attacks and Labelling Attack Datasets for Industrial Control Intrusion Detection Systems", Queensland University of Technology, Brisbane, Australia, 2018

- [PhD Thesis] *Abdur Rehman*, “Development of Feature Extraction Algorithms for Classification of Text Documents”, Department of Computer Science and Engineering, University of Engineering and Technology, Lahore Pakistan, 2016

Editorial Work

- **Distinguished Editorial Board Member**, In International Journal of Cyber Forensics and Advanced Threat Investigations (CFATI) (2021 - To-date)
<https://conceptechint.net/index.php/CFATI/index>
- **Review Editor**, *Cybersecurity and Privacy Section*, In Frontiers in Big Data (2018 - To-date)
<https://www.frontiersin.org/journals/big-data#>
- **Guest Editor**, *Special Issue on Advances in Pervasive Computing and Communication Technologies*, In Computers, Materials & Continua (CMC), Tech Science Press, 2022
- **Guest Editor**, *Special Issue on Pervasive Computing and Communication: Challenges, Technologies & Opportunities*, In Computers, Materials & Continua (CMC), Tech Science Press, 2021
- **Guest Editor**, *Special Issue on SCADA and Control System Security*, In International Journal of Information Security (IJIS), Springer, Vol. 11, No. 4, August 2012
- **Guest Editor**, *Special Issue on Applications of Machine Learning Techniques on Intrusion Detection and Digital Forensics*, In Security and Communication Networks Journal, Wiley, May 2011
<http://onlinelibrary.wiley.com/doi/10.1002/sec.344/full>

Journal Reviewer

- IEEE Transactions on Dependable and Secure Computing <https://www.computer.org/csdl/journal/tq>
- IEEE Security & Privacy www.computer.org/security-and-privacy
- IEEE Computer www.computer.org/computer
- IEEE Transactions on Computers <http://www.computer.org/web/tc>
- IEEE Transactions on Education <https://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=13>
- IEEE Transactions on Cloud Computing <https://www.computer.org/web/tcc>
- IEEE Transactions on Engineering Management <https://www.ieee-tems.org/ieee-transactions-on-engineering-management/>
- IEEE Embedded Systems Letters, <https://ieeecedas.org/publication/ieee-embedded-systems-letters-esl>
- ACM Transactions on Cyber-Physical Systems <http://tcps.acm.org>
- ACM Transactions on Privacy and Security <https://tops.acm.org/>
- Computers & Security, Elsevier www.journals.elsevier.com/computers-and-security
- IEEE Access <http://ieeeaccess.ieee.org>
- Future Internet, MDPI <https://www.mdpi.com/journal/futureinternet>
- Journal of Forensic and Legal Medicine, Elsevier <https://www.journals.elsevier.com/journal-of-forensic-and-legal-medicine>
- Journal of Network and Computer Application, Elsevier <http://www.journals.elsevier.com/journal-of-network-and-computer-applications/>
- Frontiers of Information Technology & Electronic Engineering, Springer <https://www.springer.com/journal/11714/>
- Crime Science, Springer <https://crimesciencejournal.springeropen.com>
- The Journal of Supercomputing, Springer <https://link.springer.com/journal/11227>
- IETE Technical Review Journal <http://tr.ietejournals.org>
- International Journal of Network Security <http://ijns.femto.com.tw>
- Journal of Applied Mathematics, Hindawi <http://www.hindawi.com/journals/jam/>
- MDPI Future Internet <http://www.mdpi.com/journal/futureinternet>
- Journal of Defense Modeling and Simulation, SAGE Publications, <https://journals.sagepub.com/home/dms>

- Security and Communication Networks, Wiley [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1939-0122](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1939-0122)
- Engineering Reports, Wiley <https://onlinelibrary.wiley.com/journal/25778196>
- Computer Communications, Elsevier <https://www.journals.elsevier.com/computer-communications>

Book Proposal Reviewer

- Cybersecurity and Digital Forensics for the (Criminal Justice and other) Nontechnical Major(s), Jones & Bartlett Learning, 2019.
- Cyber Security And Applications, CRC Press, 2020

Other Committees

- Awards Committee Member, American Academy of Forensic Sciences (AAFS) - 2023
- Sponsorship Committee co-chair, American Academy of Forensic Sciences (AAFS) - 2022

University/College/Department Service

Virginia Commonwealth University:

- *Search Committee Member for the Department Chair of Computer Science*, 2021-2022
- *Team Lead* to apply for the DHS/NSA National Center for Academic Excellence in Research (CAE-R), 2020
- *Team Member* to apply for the DHS/NSA National Center for Academic Excellence in Cyber Defense (CAE-CD), 2019
- *Graduate Committee Member* to oversee master and PhD programs, 2018-to-date
- *Team Member of High School Programming Contest* to organize the VCU annual programming contest, 2018-to-date
- *Search Committee Chair for Adjunct Faculty* to find a suitable adjunct faculty candidate for the CS department, 2021
- *Search Committee Member for Tenure-track Faculty* to find a suitable tenure-track faculty candidate for the CS department, 2019-2021
- Midterm Tenure Review Committee Member, 2022

University of New Orleans:

- *Faculty Search Committee Member* to find a suitable faculty candidate for the CS department, 1 year (2017 - 2018)
- *Departmental Seminar Coordinator* to organize departmental seminars regularly, 3 years (2014-2017)
- *Graduate Grade Appeal Committee* to resolve grading issues raised by a student, 4 years (2014-2018)
- *Undergraduate Grade Appeal Committee* to resolve grading issues raised by a student, 4 years (2014-2018)
- *Team Member* to apply for the DHS/NSA National Center for Academic Excellence in Research (CAE-R), 2013
- *Team Member* to apply for the DHS/NSA National Center for Academic Excellence in Cyber Operations (CAE-CO), 2014