About the 20th International Conference on Cyber Warfare and Security, 2025

The International Conference on Cyber Warfare and Security (ICCWS) is a prominent academic conference that has been held annually for 20 years, bringing together researchers, practitioners, and scholars from around the globe to discuss and advance the field of cyber warfare and security. The conference proceedings are published each year, contributing to the body of knowledge in this rapidly evolving domain.

The Proceedings of the 20th International Conference on Cyber Warfare and Security, 2025 includes Academic research papers, PhD research papers, Master's Research papers and work-in-progress papers which have been presented and discussed at the conference. The proceedings are of an academic level appropriate to a professional research audience including graduates, post-graduates, doctoral and post-doctoral researchers. All papers have been double-blind peer reviewed by members of the Review Committee.

Aims and Scope

The ICCWS serves as a crucial platform for the exchange of ideas and the dissemination of cutting-edge research in cyber warfare and security. By having a broad scope and covering a wide range of topics, the conference aims to facilitate interdisciplinary dialogue and collaboration, driving forward innovations and improvements in how nations, organizations, and individuals address cyber threats. The conference proceedings provide valuable insights and are frequently cited by academics, policymakers, and industry professionals, underscoring the conference's role in shaping the future of cyber warfare and security.

Topics Covered

The call for papers for the ICCWS 2025 conference asked for contributions that considered the following topics. In addition to this the committee welcomed papers on a number of specialist mini-tracks which can be seen at the end of this list.

Cyber Warfare Strategies and Tactics

- Examination of state-sponsored cyber operations.
- Analysis of cyber deterrence and defence mechanisms.
- Offensive and defensive cyber strategies used in modern conflicts.
- Case studies of significant cyber-attacks and their geopolitical implications.

Cyber Security Technologies and Techniques

- Development and deployment of advanced cybersecurity tools and technologies.
- Network security protocols and architecture, including intrusion detection and prevention systems.
- Cryptographic methods and their application in securing communications.
- Penetration testing or pentesting techniques

Cyber Threat Intelligence

- Methods for gathering and analysing cyber threat intelligence.
- Role of artificial intelligence and machine learning in predicting cyber threats.
- Techniques for identifying and mitigating insider threats.
- Analysis of cyber threat actors, including nation-states, terrorist groups, and cybercriminal organizations.

Information Warfare and Psychological Operations

- Strategies for psychological operations in the cyber domain.
- Use of social media and other digital platforms for information warfare.
- Techniques for combating misinformation and disinformation.
- Impact of information warfare on public opinion and national security.

Legal and Ethical Issues in Cyber Warfare

- Legal frameworks governing cyber warfare and security.
- Ethical considerations in offensive and defensive cyber operations.
- Compliance with international laws and norms.
- Privacy issues and the balance between security and civil liberties.

Cyber Defence and Critical Infrastructure Protection

- Strategies for protecting critical infrastructure from cyber attacks.
- Resilience and recovery planning for cyber incidents.
- Sector-specific challenges in industries such as energy, finance, and healthcare.
- Collaboration between public and private sectors for enhanced cybersecurity.

Emerging Technologies and Future Trends

- Impact of emerging technologies like quantum computing on cybersecurity.
- Future trends in cyber warfare and security.
- Role of the Internet of Things (IoT) in expanding the cyber threat landscape.
- Predictions for the evolution of cyber conflict and defence mechanisms.

Human Factors in Cyber Security

- Role of human behaviour and psychology in cybersecurity.
- Training and awareness programs for improving cybersecurity culture including Cybersecurity Education in both formal and informal settings
- Strategies for mitigating human error and insider threats.
- Social engineering tactics and countermeasures.

The programme from the 2025 conference can be downloaded from here and full details about the conference can be seen from the conference website **https://www.academic-conferences.org/conferences/iccws/**

ICCWS 2025 Editorial

These proceedings represent the work of contributors to the 20th International Conference on Cyber Warfare and Security (ICCWS 2025), hosted by the William & Mary Law School, Williamsburg, Virginia, USA and sponsored by the William & Mary Center for Legal and Court Technology as well as Old Dominion University on 28-29 March 2025. The Conference Chair is Dr. Stephanie J. Blackmon, Williamsburg, Virginia, USA, and the Program Chair is Dr. Saltuk Karahan, from Old Dominion University, Norfolk, Virginia, USA.

ICCWS is a well-established event on the academic research calendar and now in its 20th year, the key aim remains the opportunity for participants to share ideas and meet the people who hold them. The scope of papers will ensure an interesting two days. The subjects covered illustrate the wide range of topics that fall into this important and ever-growing area of research.

The opening keynote presentation is given by Jeffrey Reynolds, Political-Military Advisor on the topic of *Enabling a Multi-Domain NATO Alliance through Cyber and Space.* The second day of the conference will open with an address by Francis A. “Skip” Hiser, III and his talk talk is titled: *Challenges Today and Tomorrow: The Conundrum of Rapidly Evolving Threats, and Speed to Deploy/Execute Evolving Solutions in Cyber Security and Cyber Warfare.*

With an initial submission of 168 abstracts, after the double blind, peer review process there are 61 Academic research papers, 13 PhD research papers, 4 Masters Research papers, 1 Non-Academic Paper and 3 work-in-progress papers published in these Conference Proceedings. These papers represent research from Australia, Austria, Czech Republic, Finland, Germany, India, Japan, Kazakhstan, Kingdom of Saudi Arabia, Latvia, Netherlands, Nigeria, Norway, Qatar, South Africa, UK, United Arab Emirates, and the USA.

We hope you enjoy the conference.

Dr. Stephanie J. Blackmon
Virginia, USA
March 2025

Biographies of Chairs and Keynote Speakers

Conference and Programme Chairs



Dr. Stephanie J. Blackmon is an associate professor, higher education leader, and technology researcher whose work focuses on privacy and technology integration; technology integration in college and university teaching and learning; technology integration in training; educational technology such as learning management systems (LMSs) and various course types such as massive open online courses (MOOCs); ethical integration of technology such as learning analytics and artificial intelligence; and leadership and experiential learning in technology and cybersecurity workforce development. Dr. Blackmon's research often involves working with interdisciplinary teams, and she has been a lead PI on several grants related to trust, privacy, and experiential learning in technology and co-PI on grants related to AI and workforce development, and cyber-clinic design and delivery. Dr. Blackmon's work also involves policy and framework development designed to support ethical technology integration, as well as ethical technological development.



Dr. Saltuk Karahan is the Undergraduate Program Director of the School of Cybersecurity at Old Dominion University (ODU). He is also the Cybersecurity Education Research Director for COVA CCI (Commonwealth Cyber Initiative). He has been teaching undergraduate and graduate level courses, including Cyber War, Leadership and Management in Cybersecurity, and Advanced Cyber Law and Policy at ODU. He is a Co-PI on the NSF-funded CyberCorps® Scholarship for Service Project that aims to increase the federal, state, local, and tribal workforce in cybersecurity. Before joining ODU, Dr. Karahan assumed leadership positions at NATO's Allied Command Transformation. Dr. Karahan's research interests and projects focus on the central themes of the interdisciplinary approach to cybersecurity education and how the developments in information security technology impact international security.

Keynote Speakers



Francis A. "Skip" Hiser, III, A Naval Flight Officer and Information Professional, Mr Hiser served in multiple Maritime Patrol Squadrons, Staffs, and two carriers as Tactical Action Officer and Combat Systems Officer. He commanded a Telecommunications Station, and was Deputy Director for Task Force Web. He was Executive Director for Requirements and Assessments at Naval Network Warfare Command, and Technical Director for Joint Innovation and Experimentation at Joint Forces Command to enhance information sharing between defense agencies and allies. At Fleet Forces Command he served as Deputy Director for Maritime Operations, and Executive Director for Communications, Information Systems, Nuclear Command and Control, Cybersecurity and CIO.



Jeffrey Reynolds has worked for two decades in the area of defence transformation to help NATO forces prepare for the inevitable crises of the future with the fewest regrets possible. He help security institutions see the macro perspective through political advice, strategy formulation, geopolitical analysis, and future forecasting. The scope of his work is broad covering engagement with senior civilian and military officials to development of NATO military policy and strategy. In 2017, Jeffrey received a Meritorious Service Commendation for his work with NATO's Partners. Currently, he serves as Political Military Advisor at NATO Allied Command Transformation in Norfolk Virginia. His current assignments include serving as the liaison officer to the Pentagon and multi-domain strategy development. Jeffrey is a non-resident senior fellow at the Atlantic Council and a Founding Fellow with the Policy Insights Forum in Ottawa, Canada. His interest areas include North American security and the implications of the emerging Eurasian Axis of China, Russia, Iran, and North Korea for NATO and Allies. He has degrees and certifications from the University of British Columbia, the Fletcher School at Tufts University,

Harvard Business School, and the NATO Executive Development Program (Ashridge Hult Business School). Prior to joining NATO, he served in the Royal Canadian Navy and was an assistant to the Premier of British Columbia.

Mini Track Chairs



Dr. Joe Adams is the Founder and President of Cyber By Design, LLC. Retiring as a Colonel in the US Army Signal Corps, his career included postings as an Associate Professor at the US Military Academy and as the Chief Information Officer of the National Defense University. He created the Michigan Cyber Range and, most recently, took a position as an Associate Professor at Virginia Tech. Joe earned a B.Sc. in Computer Engineering from Syracuse University and a M.Sc. in Computer Systems Engineering from the University of Arkansas. His Ph.D. is in Computer Engineering from Virginia Tech.



Dipl.-Phys. Jan Herbst graduated with the diploma of physics at the University of Kaiserslautern. There he worked in the fields of molecular beam epitaxy, quantum dot growth and control programming. As a Researcher and Ph.D. candidate he is working at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern. His fields of research are in Human-Physically Unclonable Functions (HPUFs), entity authentication, Artificial Intelligence, network and cyber security.



Christoph Lipps, graduated in Electrical and Computer Engineering at the University of Kaiserslautern, where he meanwhile lectures as well. He is a Senior Researcher and Ph.D. candidate at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern, Germany, heading the Cyber Resilience & Security Team of the Intelligent Networks Research Department. He is not only a member of the committee of the ICCWS and ECCWS, but also scientific committee member of various international conferences, and reviewer of several journals. His research focuses on Physical Layer Security (PhySec), Physically Unclonable Functions (PUFs), Artificial Intelligence (AI), Biometrics, Security for Medical applications, as well as entity authentication, Security in the Sixth Generation (6G) Wireless Systems and all aspects of network and cyber security.



Arun Mamgai has over 20 years of experience in cloud-native cybersecurity, application modernization, open-source secure supply chain, AI/machine learning, and digital transformation, including balanced scorecard, while working with Fortune 1000 customers across industries. He has published many articles highlighting the use of Generative AI for cybersecurity and developing secure cloud applications. He has also developed a Balanced Scorecard based framework for CISOs, and has been invited to speak at international conferences and universities on various topics like “digital transformation”, “Application-level attack in connected vehicle ”, "Generative AI and Cybersecurity", in addition to being a judge in industry-leading events. He mentors start-ups and actively engages with a nonprofit institution that enables middle school girls to become future technology leaders.



Prof Nolu Mpekoa is an Associate Professor at the Academy of Computer Science and Software Engineering, and also adjunct professor at the Department of Information Technology, Faculty of Informatics, at Cape Peninsula University of Technology, and an NRF Y-rated researcher. She has more than sixteen years of lecturing experience and has taught modules such as Computer Systems, Computer Security and Networking. She currently teaches Informatics and Information Security. Prof Mpekoa has a driven robust passion in the area of Mobile Technologies, M-Services (e-Government and M-Government), and mobile security.



Dr. Aunshul Rege is an Associate Professor and Director of the Cybersecurity in Application, Research, and Education (CARE) Lab at Temple university. Her research efforts focus on the human behavioral aspects of cyberattacks and cybersecurity, which has been funded by several National Science Foundation grants. She created the (inter)national Social Engineering (SE) Competition and she serves as the research lead for the SE Community at DefCon. Aunshul has a B.Sc. in Computer Science from the University of British Columbia, a B.A. (Hons) and M.A. in Criminology from Saint Mary's University, and a Ph.D. in Criminal Justice from Rutgers University.



Dr. Char Sample is an assistant professor of cybersecurity at Marshall University. Dr. Sample has 40 years of industry experience beginning in software development, through product test and integration, and finally as a researcher (both applied and academic). Dr. Sample's research areas are all cybersecurity related with an interest toward decision-making in cybersecurity.

ICCWS Reviewer Committee

ICCWS is fortunate to have a significant number of international experts in the field willing to review papers. Care is taken to ensure that a fully double-blind peer review process is followed and reviewers are not selected if they have any research or organisational connection to the author/s.

Dr Bulent Acma, Anadolu University, Eskisehir, Turkey; Dr William ("Joe") Adams, Univ of Michigan/Merit Network, USA; Dr Maamoun Ahmed, Military Technological College, Oman; Dr Elie Alhajjar, USMA, USA; Prof Todd Andel, University of South Alabama , USA; Prof Antonios Andreatos, Hellenic Air Force Academy, Greece; Leigh Armistead, Oak Ridge National Laboratory, USA; Prof Richard Baskerville, Georgia State University, USA; Dr Zakariya Belkhamza, Ahmed Bin Mohammed Military College, Qatar; Dr Mustafa Canan, Naval Postgraduate School, USA; Dr Jim Chen, U.S. National Defense University, USA; Dr Sabarathinam Chockalingam, Institute for Energy Technology, Norway; Dr Nathan Clarke, University of Plymouth, UK; Mr Edwin Covert, Bowhead Speciality Underwriters, USA; Dr Paul Crocker, University of Beira Interior, Portugal; Prof Rabelani Dagada, University of South Africa, South Africa; Prof Eric Filiol, ENSIBS, Vannes, France & CNAM, Paris, France; Dr Jonathan Fuller, United States Military Academy, USA; Dr Ahmad Ghafarian, University of North Georgia, USA; Prof Dr Tim Grant, Retired But Active Researcher, The Netherlands; Dr John Gray, Nova Southeastern University, USA; Virginia Greiman, Boston University, USA; Dr Michael Grimaila, Air Force Institute of Technology, USA; Dr George Grispos, University of Nebraska at Omaha, USA; Dr Tapiwa Gundu, Nelson Mandela University, South Africa; Vinay Gupta, Microsoft Corporation, USA; Prof Bill Hutchinson, Edith Cowan University, Australia; Ramkumar Jaganathan, VLB Janakiammal College of Arts and Science (affiliated to Bharathiar University), India; Dr Saltuk Karahan, Old Dominion University, USA; Prof Jesuk Ko, Universidad Mayor de San Andres, Bolivia; Dr Ahmet Koltuksuz, Yasar University, Turkey; Prof Thamizhmaran Krishnamoorthy, Government College of Engineering, Bodinayakkanur, Tamilnadu, India; Dr sanjeev kumar, Career Point University Hamirpur HP India , India; Mr Peter Kunz, Hexagon Geosystems, Germany; Dr Gregory Laidlaw, University of Detroit Mercy, USA; Dr Sylvain (Sly) Leblanc, Royal Military College of Canada, Canada; Louise Leenen, CSIR, Pretoria, South Africa; Prof Martti Lehto, University of Jyväskylä, Finland; Dr Antoine Lemay, CYDEF, Canada; Dr Andrew Liaropoulos, University of Piraeus, Greece; Christoph Lipps, German Research Center for Artificial Intelligence,Germany; Volodymyr Lysenko, University of Washington, USA; Dr Bill Mahoney, University of Nebraska, Omaha, USA; Dr Stephanos Mavromoustakos, Indiana Institute of Technology, USA; Dr Paul Maxwell, Army Cyber Institute, USA; Dr Terry Merz, Council for Scientific and Industrial Research, USA; Assc Noluntu Mpekoa, University of Johannesburg, South Africa; Prof Antonio Muñoz, University of Málaga, Spain; Dr Gilbert Peterson, Air Force Institute of Technology, Dayton, Ohio, USA; Andy Pettigrew, George Washington University, USA; Dr Jackie Phahlamohlaka, Council for Scientific and Industrial Research, Petoria, South Africa; Ms Heloise Pieterse, CSIR, South Africa; Dr Ajeet Singh Poonia, Bikaner Technical University, India; Dr Trishana Ramluckan, University of KwaZulu-Nata, South Africa; Dr Mark Reith, Air Force Institute of Technology, USA; Dr Neil Rowe, US Naval Postgraduate School, Monterey, USA; Prof Lili Saghafi, Canadian International College, Montreal, Canada; Dr Char Sample, US Army Research Laboratory, USA; Ramanamurthy Saripalli, Pragati Engineering College, India; Dr Yilun Shang, Singapore University of Technology and Design, Singapore; Dr Pankaj Kumar Sharma, Government Women Engineering college Ajmer , India; Dr Dan Shoemaker, Centre for Assurance Studies, USA; Mr Avinash Singh, University of Pretoria, South Africa; Prof Jill Slay, University of South Australia, Australia; Dr William Spring, University of Hertfordshire, UK; Baror Stacey, University of Pretoria, South Africa; Ms Sneha Sudhakaran, Louisiana State University, USA; Dr Sneha Sudhakaran , Florida Institute of Technology , USA; Mr Unal Tatar, University at Albany - SUNY, USA; Dr Manonmani Thayanithi, Mepco Schlenk Engineering College , India; Dr Le Thi-Thu-Huong, Pusan National University, Korea; Dr Antonio Jorge Tomeu-Hardasmal, University of Cadiz, Spain; Dr Eric

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