

About the 24th European Conference on Cyber Warfare and Security, 2025

The European Conference on Cyber Warfare and Security (ECCWS) is a distinguished academic conference that has been held annually for 24 years, attracting a global audience of scholars, researchers, military professionals, and industry experts. The conference is dedicated to advancing knowledge and understanding of cyber warfare and cybersecurity through the presentation and discussion of high-quality, peer-reviewed research.

The Proceedings of the 24th European 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 ECCWS 2025 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

ECCWS provides a comprehensive platform for the exploration and discussion of the complex and evolving challenges in the fields of cyber warfare and cybersecurity. It seeks to bridge the gap between academic research, practical applications, and policy-making, fostering interdisciplinary collaboration and the exchange of ideas. The conference focuses on both theoretical and applied aspects of cybersecurity and cyber defence, with an emphasis on the implications for national security, military strategy, and global stability.

Topics Covered

The call for papers for the ECCWS conference asked for contributions that considered the following topics. In addition, 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

- *Offensive Cyber Operations*
- *Defensive Cyber Operations*
- *Cyber Deterrence and Cyber Power.*

Cyber Defence and Security

- *Threat Detection and Incident Response*
- *Security Architectures*
- *Vulnerability Assessment and Management including pentesting*

Cyber Threat Intelligence

- *Adversary Tactics, Techniques, and Procedures (TTPs)*
- *Threat Intelligence Sharing*
- *Advanced Persistent Threats (APTs).*

Critical Infrastructure Protection

- *Protection of Energy, Water, and Transport Systems*
- *Financial Sector Security*
- *Telecommunications Security*

Military Applications of Cyber Technologies

- *Cyber Command and Control Systems*
- *Cyber-Physical Systems in Defence*
- *Information Warfare and Psychological Operations.*

Legal and Ethical Issues in Cyber Warfare

- *International Law and Cyber Conflict*

- *Ethical Dilemmas in Cyber Operations*
- *Cyber Espionage and Sovereignty.*

Emerging Technologies and Innovations

- *Artificial Intelligence in Cybersecurity*
- *Quantum Computing and Cybersecurity*
- *Blockchain for Cybersecurity*

Cybersecurity Education and Training

- *Military Cyber Training Programs*
- *Cybersecurity Curriculum Development*
- *Capacity Building in Cybersecurity*

Policy, Governance, and International Cooperation

- *National Cybersecurity Strategies*
- *International Cyber Norms and Agreements*
- *Public-Private Partnerships in Cybersecurity*

Cybercrime and Law Enforcement

- *Digital Forensics*
- *Countering Cybercrime*
- *Legal Frameworks for Cybercrime*

Experts in the field proposed mini tracks on the following topics. Papers accepted on these topics after the double-blind peer review process were presented as mini tracks at the conference and are also published in these proceedings.

- *Software Supply Chain Security Risks*
- *Smart Systems Under Siege: Analyzing Cybersecurity Risks and Real-World Incidents*

The programme from the 2025 conference can be downloaded from <https://papers.academic-conferences.org/index.php/eccws> and full details about the conference can be seen from the conference website: <https://www.academic-conferences.org/conferences/eccws/>

ECCWS Editorial

These proceedings represent the work of contributors to the 24th European Conference on Cyber Warfare and Security (ECCWS 2025), supported by The German Research Center for Artificial Intelligence - DFKI in Kaiserslautern, Germany on 26-27 June 2025. The Conference Co-Chairs are Christoph Lipps and Priv.-Doz. Dr.-Ing. habil. Bin Han, both from the DFKI, Kaiserslautern, Germany.

ECCWS is a well-established event on the academic research calendar and now in its 24th year conference remains the opportunity for participants to network and share ideas. The following conference proceedings contain a diverse range of papers and the conference continues to be a forum for technical, theoretical and practical exchange about the study, management, development and implementation of systems and concepts to improve cyber security and combat cyber warfare.

The opening keynote presentation is given by Dr. Jörn Hoffmann founder and CTO of bitaggregat GmbH on the topic of *From Silicon to Sovereignty: Resilient Computing for Tomorrow's Cyber Battles*. The second day of the conference will open with an address by Hekma Chaari from Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany speaking on the *German perspective on Trustworthiness in 6G*.

With an initial submission of 161 abstracts, after the double blind, peer review process there are 91 Academic research papers, 10 PhD research papers, 4 Masters Research papers and 2 work-in-progress papers published in these Conference Proceedings. These papers represent research from Australia, Canada, Country, Czech Republic, Deutschland, Estonia, Finland, France, Germany, Greece, India, Ireland, Italy, Netherlands, Nigeria, Norway, Poland, Portugal, Republic of Korea, Romania, Singapore, South Africa, Sweden, The Netherlands, UK and USA.

We hope you enjoy the conference.

Christoph Lipps and Priv.-Doz. Dr.-Ing. habil. Bin Han

The German Research Center for Artificial Intelligence - DFKI
Kaiserslautern, Germany
June 2025

Biographies of Chairs and Keynote Speakers

Conference and Programme Chairs



Christoph Lipps, M.Sc, graduated in Electrical and Computer Engineering at the University of Kaiserslautern (RPTU), Germany, where he meanwhile lectures as well. He is a Senior Researcher and head of the *Cyber Resilience & Security* Team of the Intelligent Networks Department at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern. His research focuses on Physical Layer Security (PhySec), Physically Unclonable Functions (PUFs), Artificial Intelligence (AI), Security in the Sixth Generation (6G) Wireless Systems and all aspects of network and cyber security. He is not only a member of the committee of the ICCWS and ECCWS, but the author of numerous scientific publications, member of the IEEE, ACM and VDE, as well as of the scientific advisory boards of several international conferences and journals.

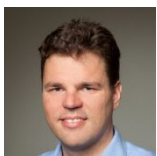


Priv.-Doz. Dr.-Ing. habil. Bin Han is Privatdozent (Senior Lecturer with Habilitation) at the [Division of Wireless Communications and Radio Positioning \(WICON\)](#), Department of Electrical and Computer Engineering, University of Kaiserslautern (RPTU), Germany. His research interests are in the broad area of wireless communications, networking, and signal processing, with a special current focus on the topics of B5G/6G, MEC, and physical layer security. He is the [author](#) of two books, six book chapters, and over 70 research papers. He has participated in multiple EU FP7, Horizon 2020, and Horizon Europe [research projects](#). He is Editorial Board Member for *Network* and Guest Editor for *Electronics*. He has served in organizing committee and/or TPC for *IEEE GLOBECOM*, *IEEE ICC*, *EuCNC*, *European Wireless*, and *ITC*. He is actively involved in the IEEE Standards Association Working Groups P2303, P3106, and P3454. He is a Senior Member of IEEE.

Keynote Speakers



Dr. Hekma Chaari graduated with a PhD degree in Telecommunications in April 2017. The topic of her research activities focused on the video quality transmission evaluation over radio communication networks. Before that, she obtained her master's degree in New Technologies for dedicated systems and her engineering's degree in Electronics in the National School of Engineers in Sfax – Tunisia. From 2010 to 2019, she worked as an academic assistant and the telecommunications department coordinator at the National School of Engineers in Telecommunications and Electronics Sfax – Tunisia and in the International Institute of Technologies also in Sfax. Since January 2024, she joined the Chair of Electrical Smart City Systems.



Dr. Jörn Hoffmann is a cybersecurity expert, founder and researcher. He holds a PhD in Computer Science and has developed secure hardware and network technologies for high-security environments. As founder and CTO of bitaggregat GmbH, he leads cutting-edge R&D in hardware-based trusted computing and machine-learning-driven intrusion detection. His achievements include developing the first European network card approved up to NATO SECRET. He teaches as a visiting professor at the University of Leipzig and HTWK Leipzig, and conducts research at the Institute for Applied Informatics (InfAI) in Leipzig. His work bridges academia, industry and defence, aiming to secure critical infrastructure and shape the future of sovereign cyber-defence technologies.

Mini Track Chairs



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.



Dr. Jawad Hussain Awan is a member of IFIP WG 9.10: ICT Uses in Peace and War, and an active researcher with the Global Foundation for Cyber Studies and Research Group. His research interests are ICT, Data Science, Cyber security, Security challenges in Smart and Physical Systems. He has published his research in several national and international research journals. He is the member of Editorial Review Board of a number of journals including of IEEE Access, Egyptian Journal of Informatics and the Journal of Information Warfare. He performed his duties as Committee member in ICCWS 2019, 2020, 2021, 2022 and 2023. He is also Microsoft Certified Professional in Web Programming, and has won research awards with the collaboration of HEC, Pakistan and the British Council. He also worked as Research Fellow, Lecturer, Assistant Professor and Professional expertise in federal departments, Government of Pakistan.

Workshop Facilitators



Dr. Henry Collier is the Assistant Dean for Online Learning at Marshall University. Dr. Collier is an internationally recognized expert in the human firewall, artificial intelligence, and networking, having published numerous peer-reviewed articles on these topics. In addition to his academic achievements, he has a distinguished background in industry and military service. He holds a Ph.D. in engineering with a concentration in security from the University of Colorado, Colorado Springs, along with degrees in managing innovations and information technology, information technology, and computer technology.



Dipl.-Phys. Jan Herbst graduated with the diploma of physics at the University of Kaiserslautern. As a Researcher he is working at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern. His fields of research are in entity authentication, Artificial Intelligence, small sensor networks and cyber security.



Matthias Rüb, M.Sc graduated in physics at the University of Kaiserslautern. He works as a Researcher at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern. His topics of interest include Synthetic data generation, biometrics, adversarial attacks, Artificial Intelligence and security applications.

ECCWS Review Committee

ECCWS 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 Mohd Faizal Abdollah, University Technical Malaysia Melaka, Malaysia; Dr Hossein Abroshan, Anglia Ruskin University, UK; Dr William Adams, University of Michigan/Merit Network, USA; Dr Ertuğrul Akbas, Istanbul Esenyurt University, Turkey; Dr Ertugrul Akbas, Esenyurt University, Turkey; Prof Hamid Alasadi, Basra University, Iraq; Dr Kari Alenius, University of Oulu, Finland; Prof Antonios Andreatos, Hellenic Air Force Academy, Greece; Dr Olga Angelopoulou, Royal Holloway, University of London, UK; John Anohar, Higher Education Dept, India; Dr Leigh Armistead, Edith Cowan University, Australia; Dr Sajad Bagheri Baba Ahmadi, Flinders University, Australia; Dr Hayretin Bahsi, Tallinn University of Technology, Estonia; Dr Dragos Barbieru, CAROL I National Defence University, Romania; Prof Jorge Barbosa, Coimbra Polytechnic, ISEC, Portugal; Stacey Baror, University of Pretoria, South Africa; Prof Matt Bishop, University of California at Davis, USA; Prof George Chiladze, The University of Georgia, Georgia; Dr Sabarathinam Chockalingam, Institute for Energy Technology, Norway; Dr Paul Crocker, Universidade de Beira Interior, Portugal; Prof Tiago Cruz, University of Coimbra, Portugal; Dr Christian Czosseck, CERT Bundeswehr (German Armed Forces CERT), Germany; Josef Demergis, Neapolis University, Paphos, Greece; Prof Patricio Domingues, Polytechnic Institute of Leiria, Portugal; Paul Dowland, Edith Cowan University, Australia; Marios Efthymiopoulos, Political Science Department University of Cyprus, Cyprus; Dr Colin Egan, University of Hertfordshire, Hatfield, UK; Dr Ruben Elamiryan, Public Administration Academy of the Republic of Armenia, Armenia; Dr Thaddeus Eze, University of Chester, UK; Dr Mohammad Faisal, University of Malakand, Pakistan; Prof Eric Filiol, ENSIBS, Vannes, France & CNAM, Paris, France; Prof Steve Furnell, University of Nottingham, UK; Dr Dimitra Georgiou, University of Piraeus, Greece; Dr Tapiwa Gundu, Nelson Mandela University, South Africa; Bill Hutchinson, Edith Cowan University, Australia; Hamid Jahankhani, University of East London, UK; Nor Badrul Anuar Jumaat, University of Malaya, Malaysia; Dr Connie Justice, Purdue School of Engineering and Technology, IUPUI, USA; Maria Karyda, University of the Aegean, Greece; Anthony Keane, Technological University Dublin, Ireland; Prof Mortaza Kokabi, Shaheed Chamran Univ., Iran; Prof Ahmet Koltuksuz, Yasar University, Dept. of Comp. Eng, Turkey; Prof Prof. Thamizhmaran Krishnamoorthy, Government College of Engineering, Bodinayakanur, Theni, Tamilnadu, India; Prof Shreyas Kumar, Texas A&M University, USA; Prof Shreyas Kumar, Texas A&M University, USA; Peter Kunz, Hexagon Geosystems, Germany; Martti Lehto, National Defence University, Finland; Christoph Lipps, German Research Center for Artificial Intelligence, Germany; Ascc Manmeet Mahinderjit Singh, University Sains Malaysia, Malaysia; James Malcolm, University of Hertfordshire, UK; Dr Silvestre Malta, Instituto Politécnico de Viana do Castelo Escola Superior de Tecnologia e Gestão, Portugal; Arun Mamgai, Red Hat Inc, USA; Dr Arianit Maraj, AAB College-Faculty of Computer Sciences, Kosovo; Ioannis Mavridis, University of Macedonia, Greece; Rob McCusker, Charles Sturt University, UK; Prof Marius-Iulian Mihailescu, SPIRU HARET University, Romania; Atefeh Mohseni Ejiyeh, University of California, Santa Barbara, USA; Antonio Muñoz, University of Málaga, Spain; Dr Stefania Loredana Nita, Military Technical Academy "Ferdinand I", Romania; Prof Abdelnaser Omran, Libyan Academy for Postgraduates Studies, Libya; Prof Teresa Pereira, Instituto Politécnico de Viana do Castelo, Portugal; Full-time Doctoral Students Wadduwage Shanika Perera, Sam Houston State University, Texas, United States; Michael Pilgermann, Technische Hochschule Brandenburg - University of Applied Sciences, Germany; Prof Pedro Pinto, Instituto Superior de Engenharia do Porto (ISEP), Portugal; Dr Ajeet Singh Poonia, Full time academic, Bikaner Technical University, Rajasthan; Prof Maria-Magdalena Popescu, Carol I National Defence University, Romania; Dr Trishana Ramluckan,

University of KwaZulu-Nata, South Africa; Dr Iain Reid, University of Portsmouth, UK; Dr Mark Reith, Full time academic, Air Force Institute of Technology; Dr Neil Rowe, US Naval Postgraduate School, Monterey, USA; Prof Vitor Sa, Catholic University of Portugal, Portugal; Dr Char Sample, Carnegie Mellon University/CERT, USA; Prof Henrique Santos, University of Minho, Portugal; Prof Leonel Santos, Polytechnic of Leiria, Portugal; Dr Keith Scott, De Montfort University, UK; Prof Dr Richard Sethmann, University of Applied Sciences Bremen, Germany; Dr Yilun Shang, Northumbria University, UK; Mr. Nakul Singh, Righ Inc. Palo Alto, CA, United States; Dr Siphesihle Sithungu, University of Johannesburg, South Africa; Prof Jill Slay, University of South Australia, Australia; Dr Lee Speakman, University of Chester, UK; Dr Joseph Spring, University of Hertfordshire, UK; Dr Sara Sutton, Grand Valley State University, USA; Prof Marco Valeri, Niccolò Cusano University, Italy; Dr Allison Wylde, GCU London, UK and Prof Omar Zakaria, National Defence University of Malaysia, Malaysia.