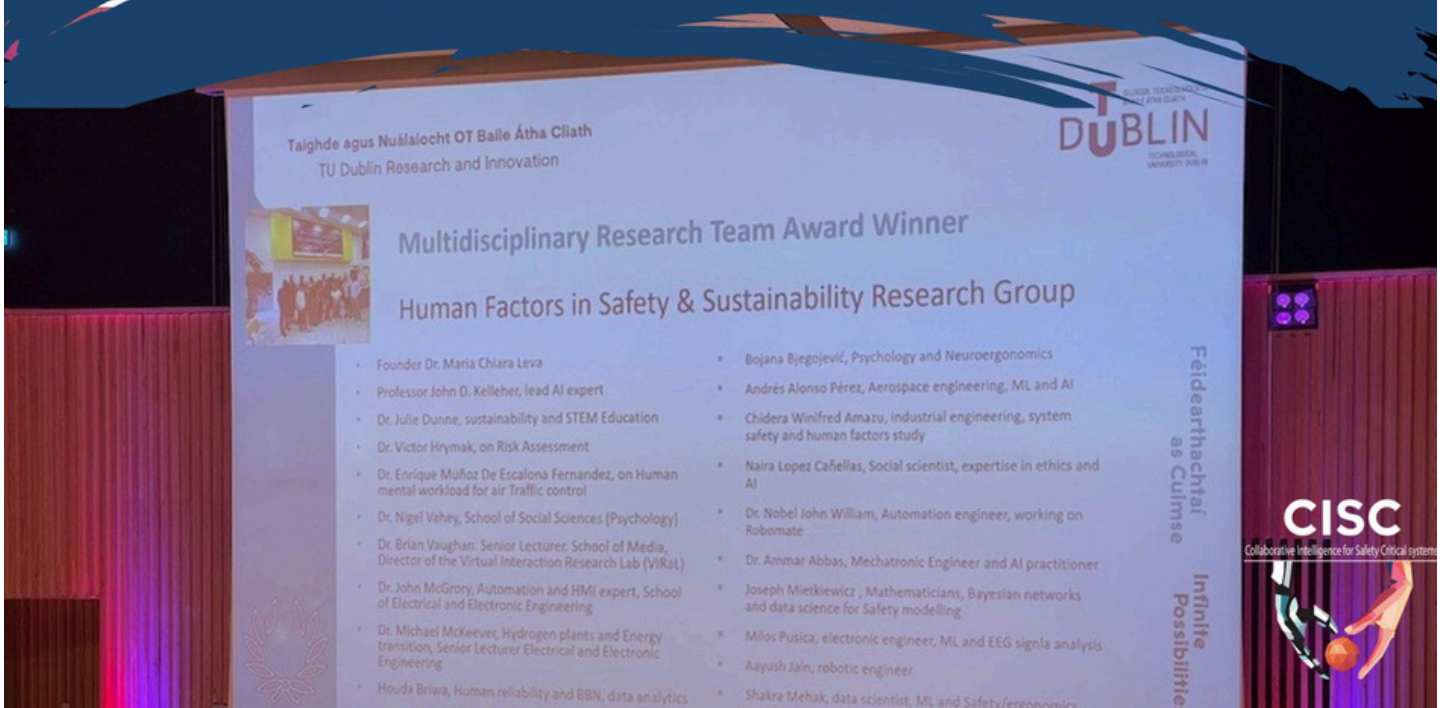




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TU Dublin Research and Innovation Awards 2024



CISC TEAM MEMBERS WIN MULTIDISCIPLINARY RESEARCH TEAM AWARD AT THE TU DUBLIN RESEARCH AND INNOVATION AWARDS 2024



On 4th November 2024, the Human Factors in Safety and Sustainability Research Group, led by Dr. Maria Chiara Leva, won the Multidisciplinary Research Team Award.

“This team led by Dr. Maria Chiara Leva has advanced the development of adaptive systems that predict and mitigate human errors and safety risks, for high-risk industries like aviation, healthcare, and nuclear energy, where both technical and human failures can lead to severe societal, economic, and environmental consequences. The team is large and truly interdisciplinary in nature with members based in Electrical and Electronic Engineering, Food Science, Media and Social Sciences and Computing (TU Dublin). External members come from hospitals, businesses, and academia from Denmark, Italy, Serbia and the UK.”

The TU Dublin Research and Innovation Awards recognises and rewards the positive contributions of the research & innovation community in the pursuit of their goals in pushing the boundaries of knowledge for the greater good of society. The awards supported by the Vice President for Research and Innovation, celebrate commitment and research and innovation excellence of staff from all disciplines across the university.

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Stavanger ESREL SRA-E 2025



COLLABORATIVE INTELLIGENCE AND SAFETY CRITICAL SYSTEMS APPLICATIONS AT THE 2025 EDITION OF THE THE EUROPEAN SAFETY AND RELIABILITY

in 2025, CISC project team will contribute with a special session to the European Safety and Reliability Conference, which will take place on 15-19 June 2025 in Stavanger, Norway.

The European Commission's guidelines on ethics in artificial intelligence (AI), published in April 2019, recognised the importance of a 'human-centric' approach to AI that is respectful of European values. Efforts to prepare for the integration of "humancentric" AI into European innovation and industry are now underway. AIs should be able to collaborate with (rather than replace) humans. Safety critical applications of AI technology are "human- in-the-loop" scenarios, where AI and humans work together, as manufacturing processes, IoT systems, and critical infrastructures.

The concept of Collaborative Intelligence is essential for safety critical situations, and it requires interdisciplinary approaches blending expertise across AI, Human Factors, Neuroergonomics and System Safety Engineering. The topics covered in this session should be at the intersections of the following:

1. Modelling the dynamics of system behaviours for the production processes, IoT systems, and critical infrastructures (System Safety Engineering);
2. Designing and implementing processes capable of monitoring interactions between automated systems and the humans destined to use them (Human Factors/ Neuroergonomics);
3. Using data analytics and AI to create novel human-in-the-loop automation paradigms to support decision making and/or anticipate critical scenarios;
4. Managing the Legal and Ethical implications in the use of physiology-recording wearable sensors and human performance data in AI algorithms.

Call for Contributions: Submissions are invited from researchers, industry experts, and policymakers on topics such as Human machine interface design, human reliability for human in the loop automation, Human Robotic interaction, and innovations in ergonomic design and safety of intelligent and autonomous systems.

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ACADEMIC ACHIEVEMENTS

Hierarchical framework for interpretable and specialized deep reinforcement learning-based predictive maintenance

In July 2024, Ammar Abbas successfully defended his thesis, "A Hierarchical Framework for Interpretable, Safe, and Specialised Deep Reinforcement Learning," introducing the Probabilistic Reinforcement Learning Activation Framework (PropFrame). PropFrame enhances the safety and transparency of deep reinforcement learning (DRL) in critical systems by autonomously identifying high-risk situations, reducing unsafe exploration, and integrating with conventional controls. Its effectiveness was demonstrated in applications such as predictive maintenance, process control, human decision support, and industrial robotics. This work paves the way for safer and more reliable AI in safety-critical industries.



Neuroergonomic Assessment of Mental Workload in Adaptive Industrial Human-Robot Collaboration

In November 2024, Carlo Caiazzo successfully defended his PhD thesis, "Neuroergonomic Assessment of Mental Workload in Adaptive Industrial Human-Robot Collaboration," at the University of Kragujevac, Serbia. Carlo's research offers a comparative neuroergonomic analysis of mental workload during human-robot collaboration in manufacturing assembly tasks. Using brainwave data, observational insights, and participant feedback, the study evaluated task effectiveness and the impact of collaborative robots (cobots) on the workforce across three scenarios. The findings provide valuable insights into optimizing human-robot collaboration to improve efficiency while minimizing cognitive strain on workers.





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EVENTS

Presentation of research paper by Carlo Caiazzo, Milos Pusica, and Carlos Albarrán Morillo "Development of a Neuroergonomic Assessment for the Evaluation of Mental Workload in an Industrial Human-Robot Interaction Assembly Task: A Comparative Case Study" at the 5th International Neuroergonomics Conference (8-12 July, Bordeaux, France).



On 27 September, CISC team members participated to the European Researchers' Night at Trinity College, in the heart of Dublin City Centre. Researchers contributed to a programme of AI-focused events – lively discussions, thought-provoking interactions and cutting edge AI research demos.

On October 2, 2024, the CISC Live Lab 3 presentation explored control room scenarios, highlighting how research findings could be applied to the design of control rooms for a new nuclear research facility. The session showcased innovative solutions aimed at enhancing decision-making and operational efficiency.



The webinar on "Optimizing Human-Machine Collaboration: Eye Tracking Insights in Safety-Critical Systems" organised in collaboration with Tobii (30 October 2024) explored how eye tracking technology is being used to enhance safety, decision-making, and user experience in high-stakes environments.

Presentation by Chiara Leva, "Lessons Learned from the CISC Project: Human Factors at the Core of Collaborative Intelligence in Safety-Critical Systems," at the Fattore H: The Research in Ergonomics International Seminar Series, organised by the Lombardy-Liguria section of the Italian Society of Ergonomics. (24 October, Online)

