The 35th Irish Signals and Systems Conference
(ISSC 2024)

The conference schedule is based on UK Time
June 13-14, 2024
Ulster University, Belfast

Registration Desk Location & Hours: Outside LT1 starting at 8:30am, 13th June 2024

June 13 Day1

9:00-9:10	Welcome and Opening Ceremony
Keynote 1 (9:10-9:50) Location: LT1	**Keynote Talk:** Prof. Qiang Shen **Title:** *Supporting Data and Systems Analysis with Approximate Feature Selection* **Chair:** Prof. Jane Zheng
Keynote 2 (9:50-10:30) Location: LT1	**Keynote Talk:** Prof. Seán McLoone **Title: From MLP to LLMs - The Road to Industry 5.0** **Chair:** Prof. Chris Nugent
Coffee Break (10:30-10:50)	Coffee and poster setup/display Location: LT1 Foyer
Morning Sessions (10:50-12:30)	**Session 1:** Machine Learning and AI (1) (LT1) **Session 2:** Signal Processing (1) (LT3)
Lunch Break (12:30-13:30)	Lunch provided by Conference Location: Outside LT1
Afternoon Sessions I (13:30-15:10)	**Session 3:** Communications and Future Networking (LT1) **Session 4:** Control Systems (LT3)
Coffee Break (15:10-15:30)	Coffee and poster display
Afternoon Sessions II (15:30-17:30)	**Session 5:** Machine Learning and AI (2) (LT1) **Session 6:** Signal Processing (2) (LT3)
18:30 - 20:30	Conference dinner (Ramada Hotel)

June 14 Day2

AICC Presentation (9:00 - 9:10) Location: LT1	**AICC Presentation:** Prof. Johnny Wallace
Keynote 3 (9:10-9:50) Location: LT1	**Keynote Talk:** Prof. Mathini Sellathurai **Title:** *Hearing Aids as Reduced Capability Ultra-Reliable Low-Latency IoT Devices* **Chair:** Prof. James McLaughlin
Keynote 4 (9:50-10:30) Location: LT1	**Keynote Talk:** Prof. Mark Flanagan **Title:** *The Certainty Principle: Correcting Errors in Quantum Computers* **Chair:** Dr Nikolaos Athanasopoulos
Coffee Break (10:30-10:50)	Coffee and Poster display Location: LT1 Foyer
Morning Sessions (10:50-12:30)	**Session 7:** Cybersecurity and Cyberphysical Systems (LT1) **Session 8:** Signal Processing (3) (LT3)
Lunch Break (12:30-13:30)	Lunch provided by Conference Location: Outside LT1
Afternoon Sessions (13:30-15:10)	**Session 9:** Machine learning and AI (3) (LT1) **Session 10:** Control Systems and Signal Processing (LT3)
Coffee Break (15:10-15:40)	Coffee Location: LT1 Foyer
15:40 – 16:00	Prize presentation and closing remarks (LT1)

June 13 and 14: Poster Sessions

Room: LT1 Foyer

Chair: Dr Aftab Ali

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(#17) *Uncertainty Calibrated Deep Regression for QT Interval Measurement in Reduced Lead Set ECGs* **Peter Doggart (PulseAI Ltd)**, Alan Kennedy (PulseAI Ltd), Raymond Bond (Ulster University), Dewar Finlay (Ulster University)
(#26) *A Comprehensive Data Collection System for Agricultural Machinery* **Krishna Panduru (Munster Technological University**), De Jong Yeong (Munster Technological University), Joseph Walsh (Munster Technological University)
(#45) *Investigation and Implementation of AI-HDLCoder for Automated VHDL Code Synthesis and Code Generation for Hardware SoC Development* **Vladyslav Romashchenko (Anhalt University of Applied Sciences, Germany)**, Michael Brutscheck (Anhalt University of Applied Sciences, Germany), Ingo Chmielewski (Anhalt University of Applied Sciences, Germany)
(#30) *Digital Twin Bridging: Enabling Virtual Worlds to Manifest in the Physical* **Adam Dooley (University of Limerick)**, Mihai Penica (University of Limerick), Sean McGrath (University of Limerick), William O'Brien (University of Limerick), Eoin O'Connell (University of Limerick)
(#66) *Combining Topological Signature with Text Embeddings: Multi-Modal approach to Fake News Detection* Rachel Lavery (Queen's University Belfast), **Anna Jurek-Loughrey (Queen's University Belfast)**, Lu Bai (Queen's University Belfast)
(#76) *An Investigation on Classical Methods and Unsupervised Deep Learning Algorithms for Image Segmentation in High Variance Images for Industrial Application* **Nathan Henry (Queen's University Belfast)**, Tamás Reiter (Department of Computing, Atlantic Technical University, Donegal)
(#27) *Smart Agriculture: Software Platform for Telematics Monitoring in Farm Machinery* **De Jong Yeong (Munster Technological University)**, Krishna Panduru (Munster Technological University), Joseph Walsh (Munster Technological University)
(#41) *An extended design framework of antithetic integral feedback controller for restoring disrupted circadian gene profiles* J**oelle Tan (University of Warwick), Mathias Foo (University of Warwick)**

(#50) *IoT-based liquefied gas tank level monitoring system for industrial welding process* **Akseer Ali Mirani (Munster Technological University)**, Anshul Awasthi (Munster Technological University), Niall O'Mahony (Munster Technological University), Joseph Walsh (Munster Technological University)
(#103) *An Optimized Constant-time Implementation of KASUMI FI Function* **Emma Urquhart (University of Galway)**, Desmond Chambers (University of Galway)
(#39) *Unsharp Mask Sharpening Detection via Global Analysis* Rong-Hui Lu (Information Technology and Laboratory Management Center, Wuyi University,), **Tzong-Jer Chen (School of Mathematics & Computer Science, Wuyi University, Taiwan)**, Junhong Pan (School of Mathematics & Computer Science, Wuyi University, China)
(#116) *A Novel Random Effect based Simulation System for the Replication of Dairy Cattle Methane Emission Experiments* **Stephen Ross (Ulster University)**, Haiying Wang (Ulster University), Jane Zheng (School of Computing, Ulster University), Tianhai Yan (Agri Food and Biosciences Institute)
(#78) *Management of Deep Learning Models for Oil Infrastructure Extraction from Remote Sensing Imagery* Yuan Luo (Northeast Petroleum University, China), **Lu Bai (Queen's University Belfast)**, Zhibao Wang (Northeast Petroleum University, China), Jinhua Tao (Aerospace Information Research Institute of Chinese Academy of Sciences), Anna Jurek-Loughrey (Queen's University Belfast)
(#121) *OS Compatible Orthogonally Controllable TOQSO* **Shafali Jagga (Jaypee Institute of Information Technology, India)**
(#106) *An Entropy-Based Feature Selection for Curve Parameter Estimations in Grayscale Images* **Tamas Reiter (Atlantic Technological University)**, Michael McCann (Atlantic Technological University)

June 13: Morning Sessions (10:50 – 12:30)

Session 1: Machine Learning and AI (1)

Room: LT1

Chair: Dr Ian Cleland

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10:50 – 11:10	(#62) *Modelling, Data Mapping, and Evaluation of Analog Multiply-And-Accumulate Components in Quantized CNNs* **Fergal Kilgannon (University College Dublin, Ireland)**, Sayan Kumar (University College Dublin, Ireland), Viet Nguyen (University College Dublin, Ireland), Teerachot Siriburanon (University College Dublin, Ireland)
11:10 – 11:30	(#84) *Molecular Adversarial Generative Graph Network Model for Large-scale Molecular Networks* **Mallikharjuna Sakhamuri (Department of Computing, Atlantic Technical University, Donegal)**, Shagufta Henna (Department of Computing, Atlantic Technical University, Donegal), Leo Creedon (Centre for Mathematical Modelling and Intelligent Systems for Health and Environment, Ireland), Kevin Meehan (Centre for Mathematical Modelling and Intelligent Systems for Health and Environment, Ireland)
11:30 – 11:50	(#81) *Algorithm selection to identify brain dominance through game-based learning. An ethical perspective* **Garry Gorman (Atlantic Technological University Donegal)**, Nigel McKelvey (Department of Computing, Atlantic Technical University, Donegal), James Connolly (Department of Computing, Atlantic Technical University, Donegal)
11:50 – 12:10	(#85) *Investigating Loss Dynamics and Early Stopping Criteria in Training Generative Adversarial Networks for Biomedical Image Synthesis* Muhammad Muneeb Saad (Munster Technological University), Mubashir Rehmani (Munster Technological University), **Ruairí O'Reilly (Munster Technological University)**
12:10 – 12:30	(#61) *In-Vehicle Networks Security using Transfer Learning Approach Against AI-Generated Cyberattacks* **Rahman Shafique (Yeungnam University, Korea)**, Furqan Rustam (University College Dublin, Ireland), Gyu Sang Cho (Yeungnam University, Korea), Sarath Kumar Posa (University of Arkansas, USA) **VIRTUAL PRESENTATION**

Session 2: Signal Processing (1)

Room: LT3

Chair: Dr Joseph Rafferty

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10:50 – 11:10	(#91) *Anechoic Demixing under Phase Wraparound Conditions in Assisted Living Environments* Swarnadeep Bagchi **(Technological University Dublin)**, Ruairí de Fréin (Technological University Dublin)
11:10 – 11:30	(#115) *Speech Feature Fidelity from a Generative Wavenet Auditory Transduction Model* **Cathal Ó Faoláin (University College Dublin, Ireland)**, Andrew Hines (University College Dublin, Ireland)
11:30 – 11:50	(#44) *Advancing Sleep Studies: An Exploration of Phase-Based Approaches for Sleep Staging* **Christopher McCausland (Ulster University)**, Parid Biglarbeigi (University of Dundee), Raymond Bond (Ulster University), Dewar Finlay (Ulster University)
11:50 – 12:10	(#43) *Efficient Approximate Checkerboard K-SVD for Resource Constrained Embedded Systems* **Yun Wu (Queen's University Belfast)**, John McAllister (Queen's University Belfast)
12:10 – 12:30	(#67) *A simplified Volterra approach to non-linear ADC post correction* David O'Leary (University College Dublin, Ireland), Barry Cardiff (University College Dublin, Ireland), **Haoyang Shen (University College Dublin, Ireland)**

Session 3: Communications and Future Networking

Room: LT1

Chair: Dr Mark Ng

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13:30 – 13:50	(#22) *Resource allocation for the IEEE 802.11ax OFDMA mechanism based on Dynamic Programming combined with Timsort* **Yang Yu (Technological University Dublin)**, Mark Davis (Technological University Dublin)
13:50 – 14:10	(#64) *Experimental Analysis of A-RoF based Optical Communication System for 6G O-RAN Downlink* **Muhammad Usman Hadi (School of Engineering, Ulster University, Belfast)**, Muhammad Yunis Daha (Ulster University), Sunish Kumar Orappanpara Soman (School of Engineering, Ulster University, Belfast), Muhammad Ijaz (School of Engineering, Manchester Metropolitan University)
14:10 – 14:30	(#31) *Optimizing MIMO Detection with DM-Detnet in 6G Networks* **Muhammad Yunis Daha (School of Engineering Ulster University, Belfast),** Joseph Rafferty (School of Computing, Ulster University, Belfast), Muhammad Ikram Ashraf (Nokia Espoo, Finland), Muhammad Usman Hadi (School of Engineering, Ulster University, Belfast)
14:30 – 14:50	(#95) *Traffic-Specific Packet-Level Monitoring in SDN* **Fatemeh Amou Aghaei (Technological University Dublin)**, Ruairí de Fréin (Technological University Dublin)
14:50 – 15:10	(#80) *Relative Implementation Costs of ENOP Digital Δ-Σ Modulators* **Sanil Goyal (University College Dublin, Ireland)**

Session 4: Control Systems

Room: LT3

Chair: Dr Diarmuid O'Briain

Email: Diarmuid.OBriain@tus.ie

13:30 – 13:50	(#12) *A reinforcement learning control and fault detection method for the MADNI drone* **Cara Rose (Ulster University)**, Robert McMurray (Ulster University), Muhammad Usman Hadi (Ulster University)
13:50 – 14:10	(#108) *An Open-Source Quadcopter for Wind Field Surveying* James Rainey (Queen's University Belfast), Naga Venkata Sai Chandra Mouli Gunturi (Queen's University Belfast), **Nikolaos Athanasopoulos (Queen's University Belfast)**, Pantelis Sopasakis (Queen's University Belfast)
14:10 – 14:30	(#28) *Mathematical Modelling of Froude-Krylov Forces and Moments Using Dynamic Parameterised Surfaces* Jander Santos (Universidade Federal de Sao Joao del-Rei), Josefredo Silva (Maynooth University), **Matheus Costa (Maynooth University)**, Ariadne Bertolin (Maynooth University)
14:30 – 14:50	(#14) *Leveraging the MITRE ATT&CK Framework for Threat Identification and Evaluation in Industrial Control System Simulations* **Conrad Ekisa (South East Technological University, Ireland)**, Diarmuid OBriain (Technological University of the Shannon, Ireland), Yvonne Kavanagh (South East Technological University, Ireland)
14:50 – 15:10	(#120) *Adaptive Terminal Sliding Mode Disturbance Observer Augmented Backstepping Integral Sliding Mode Control for Twin Rotor MIMO System* **Sagar (MNNIT, India)**

Session 5: Machine Learning and AI (2)

Room: LT1

Chair: Dr Haiying Wang

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15:30 – 15:50	(#35) *Modelling Activities of Daily Living Using Local Interpretable Model-Agnostic Explanation Algorithm* Henry Onyekwe (School of Computing, Ulster University), **Idongesit Ekerete (School of Computing, Ulster University)**, Matias Garcia-Constantino (School of Computing, Ulster University)
15:50 – 16:10	(#68) *Assessing Factors Influencing the Reliability of Smart Insole Measurements* **Alastair Martin (School of Computing, Ulster University, Belfast)**, Jane Zheng (School of Computing, Ulster University, Belfast)
16:10 – 16:30	(#82) *Optimizing Machine Learning For ResourceConstrained Devices: A Comparative Analysis Of Preprocessing Techniques and Machine Learning Algorithms* **Abdul Haseeb (School of Computing, Ulster University)**, Ian Cleland (School of Computing, Ulster University), Chris Nugent (School of Computing, Ulster University), James McLaughlin (School of Engineering, Ulster University)
16:30 – 16:50	(#110) *Interpretable machine-learning for predicting molecular weight of PLA based on artificial bee colony optimization algorithm and adaptive neuro-fuzzy inference system* **Amir Pouya Masoumi (Atlantic Technological University)**, Leo Creedon (Centre for Mathematical Modelling and Intelligent Systems for Health and Environment, Ireland), Ramen Ghosh (Centre for Mathematical Modelling and Intelligent Systems for Health and Environment, Ireland), Nimra Munir (Atlantic Technological University, Ireland), Marion McAfee (Atlantic Technological University, Ireland)
16:50 – 17:10	(#111) *LA-CNN: Load-Adjusted Video-on-Demand Prediction using CNNs* **Emmanuel Kimeli (Technological University Dublin)**, Ruairí de Fréin (Technological University Dublin)
17:10 – 17:30	(#19) *Predicting Football Match Outcomes using Event Data and Machine Learning Algorithms* **Peter Hassard (Ulster University)**

Session 6: Signal Processing (2)

Room: LT3

Chair: Dr Lu Bai

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15:30 – 15:50	(#107) *Data Selection Tool for Analysis of Time Synchronised Sampled Values (TSSV) in Power Systems* **David Laverty (Queen's University Belfast)**, Erik Tridianto (Queen's University Belfast), Kieran McLaughlin (Queen's University Belfast)
15:50 – 16:10	(#69) *Smart Insoles-based Gait Symmetry Detection for People with Lower-limb Amputation* **Luigi D'Arco (School of Computing, Ulster University)**, Haiying Wang (School of Computing, Ulster University), Carolyn Wilson (School of Computing, Ulster University), Ezio Preatoni (Department for Health, University of Bath), Grant Trewartha (School of Health and Life Sciences, Teesside University), Jill Cundell (School of Health Sciences, Ulster University), Jane Zheng (School of Computing, Ulster University)
16:10 – 16:30	(#34) *Experimental Evaluation of Horner's Method for CPU Energy Reduction in Nonlinear Modelling* **Jordan Browne (Maynooth University)**, Thalita Nazare (Maynooth University), Erivelton Nepomuceno (Maynooth University)
16:30 – 16:50	(#23) *3D LiDAR Data Augmentation for Off-Highway Vehicle Applications* **Mike Edgar (Munster Technological University)**, De Jong Yeong (Munster Technological University), Krishna Panduru (Munster Technological University), Daniel Riordan (Munster Technological University)
16:50 – 17:10	(#72) *An RC-based Dual Injection locked Delay Cell for High-Frequency Ring VCOs* **Mayank Kumar Singh (Indian Institute of Technology Ropar)**, Rajasekhar Nagulapalli (Oxford Brookes University), Devarshi Mrinal Das (Indian Institute of Technology, Ropar), Mahendra Sakare (Indian Institute of Technology Ropar) **VIRTUAL PRESENTATION**

Session 7: Cybersecurity and Cyberphysical Systems

Room: LT1

Chair: Dr Aftab Ali

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10:50 – 11:10	(#63) *Trust Management for Cyber Physical Systems and IoT Networks: New Model* **Kealan Mannix (University of Limerick)**, Aengus Gorey (Analog Devices), Donna O'Shea (Munster Technological University), Thomas Newe (University of Limerick)
11:10 – 11:30	(#6) *Modeling and Simulating Advanced Cyber-threats to Industrial Control Systems with an Emulated Testbed* **Conrad Ekisa (South East Technological University, Ireland)**, Diarmuid OBriain (Technological University of the Shannon, Ireland), Yvonne Kavanagh (South East Technological University, Ireland)
11:30 – 11:50	(#21) *An Evaluation of FNV Non-Cryptographic Hash Functions* **Catherine Hayes (Maynooth University)**, David Malone (Maynooth University)
11:50 – 12:10	(#65) *Authentication and Authorization in Zero Trust IoT: A Survey* **Meha James (Munster Technological University)**, Thomas Newe (University of Limerick), Donna O'Shea (Munster Technological University), George O Mahony (Munster Technological University)
12:10 – 12:30	(#90) *Behavior-Based Interpretable Trust Management for IoT Systems* **Muhammad Aaqib (School of Computing, Ulster University)**, Aftab Ali (School of Computing, Ulster University), Liming Chen (Dalian University of Technology, China), Omar Nibouche (School of Computing, Ulster University)

Session 8: Signal Processing (3)

Room: LT3

Chair: Dr Jose Santos

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10:50 – 11:10	(#58) *A Linearity Improved Equalizers for Short-Channel Communication Links* **Puneet Singh (Indian Institute of Technology Ropar)**, Rahul Walia (Indian Institute of Technology Ropar), Rajasekhar Nagulapalli (Oxford Brookes University), Mahendra Sakare (Indian Institute of Technology Ropar) **VIRTUAL PRESENTATION**
11:10 – 11:30	(#42) *Pitch response comparison of offshore platforms: a Lagrangian approach* **Matheus Costa (Maynooth University)**, Jander Santos (Universidade Federal de Sao Joao del-Rei, Brazil), Ariadne Bertolin (Maynooth University), Josefredo Silva (Maynooth University)
11:30 – 11:50	(#99) *Microsimulation modelling of familial hypercholesterolaemia inheritence Staging* **Chris Page (Ulster University)**, Jane Zheng (School of Computing, Ulster University, Belfast), Haiying Wang (School of Computing, Ulster University), Steven Watterson (Ulster University), Maurice O'Kane (Altnagelvin Area Hospital), Pádraig Hart (Belfast City Hospital), Shane McKee (Belfast City Hospital)
11:50 – 12:10	(#25) *Evaluation metrics: A review of decision methods for vibration-based condition monitoring* **Ietezaz Ul Hassan (Munster Technological University)**, Krishna Panduru (Munster Technological University), Joseph Walsh (Munster Technological University)
12:10 – 12:30	(#46) *Cholecystectomy Surgical Instrument Detection Using Variants of YOLOv8* **Muhammad Adil Raja (Dundalk Institute of Technology)**, Roisin Loughran (Dundalk Institute of Technology), Fergal Mc Caffery (Dundalk Institute of Technology) **VIRTUAL PRESENTATION**

June 14: Afternoon Sessions (13:30 – 16:00)

Session 9: Machine Learning and AI (3)

Room: LT1

Chair: Dr Idongesit Ekerete

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13:30 – 13:50	*(#37) Sustainability, Ethics and Artificial Intelligence in Computing Education* **Sam Moore (Ulster University)**, Paul McCullagh (Ulster University)
13:50 – 14:10	(#118) *Random Forest Approach to Identifying Microbial Biomarkers Relating to COVID-19 Severity* **Jialin Lyu (School of Computing, Ulster University)**, Haiying Wang (Ulster University), Taranjit Singh Rai (Ulster University), Jane Zheng (School of Computing, Ulster University)
14:10 – 14:30	(#88) *Embedded DNN Classifier for Five Different Cardiac Diseases* **Muhammad Shakeel Akram (School of Engineering, Ulster University, Belfast)**, Sharatchandra Varma Bogaraju (School of Engineering, Ulster University, Belfast), Dewar Finlay (Ulster University)
14:30 – 15:10	(#97) *Learning Exemplar Representations in Category Decoding* **Jack Kilgallen (Maynooth University)**, Barak Pearlmutter (Maynooth University), Jeffrey Siskind (Purdue University, USA)
14:50 – 15:10	(#94) *Green Machine Learning: Analysing the Energy Efficiency of Machine Learning Models* **Samara Santos (Maynooth University)**, Agustina Skiarski (Maynooth University), Daniel García-Núñez (Maynooth University), Victor Lazzarini (Maynooth University), Edgar Galvan (Maynooth University), André Ottoni (Federal Univ Reconcavo da Bahia, Brazil), Erivelton Nepomuceno (Maynooth University)

Session 10: Control Systems and Signal Processing

Room: LT3

Chair: Dr Muhammad Usman Hadi

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13:30 – 13:50	(#100) *Enhancing Signal Detection in 6G Networks through LSTM-based MIMO Technology* **Bibin Babu (School of Computing, Ulster University, Belfast),** Muhammad Yunis Daha (School of Engineering, Ulster University, Belfast), Muhammad Usman Hadi (School of Engineering, Ulster University, Belfast)
13:50 – 14:10	(#8) *Evaluation of Extreme Learning Machine and Graph Convolutional Neural Networks for Potential Use in Self-Calibration in Wireless Sensor Networks for Environmental Monitoring* **Asif Yar (Atlantic Technological University),** Shagufta Henna (Department of Computing, Atlantic Technical University, Donegal), Marion McAfee (Atlantic Technological University), Salem S. Gharbia (Atlantic Technological University, Ireland)
14:10 – 14:30	(#10) *MAD-STORM: Maneuverable Autonomous Drone with Sensing Technologies for Observing Rainfall and Meteorology in Northern Ireland* **Rajkamal Rajathanakodi (Ulster University),** Muhammad Usman Hadi (Ulster University)
14:30 – 14:50	(#47) *AI-Driven CHD Detection in Embedded Systems* **Emma Carroll (Electrical and Electronic Engineering, UCC),** Emanuel Popovici (University College Cork)
14:50 – 15:10	(#15) *The Trick of the Tail: Segmenting Heavy-Tailed Distributions* **Jonathan Dunne (IBM),** Sonya Leech (IBM), Markus Muller (IBM), Irene Manotas (IBM)