



Faculty of Computing,
Engineering and the
Built Environment



School of Computing

Research & Innovation
Annual Report

01 August 2021 - 31 July 2022



ULSTER UNIVERSITY
REF 2021



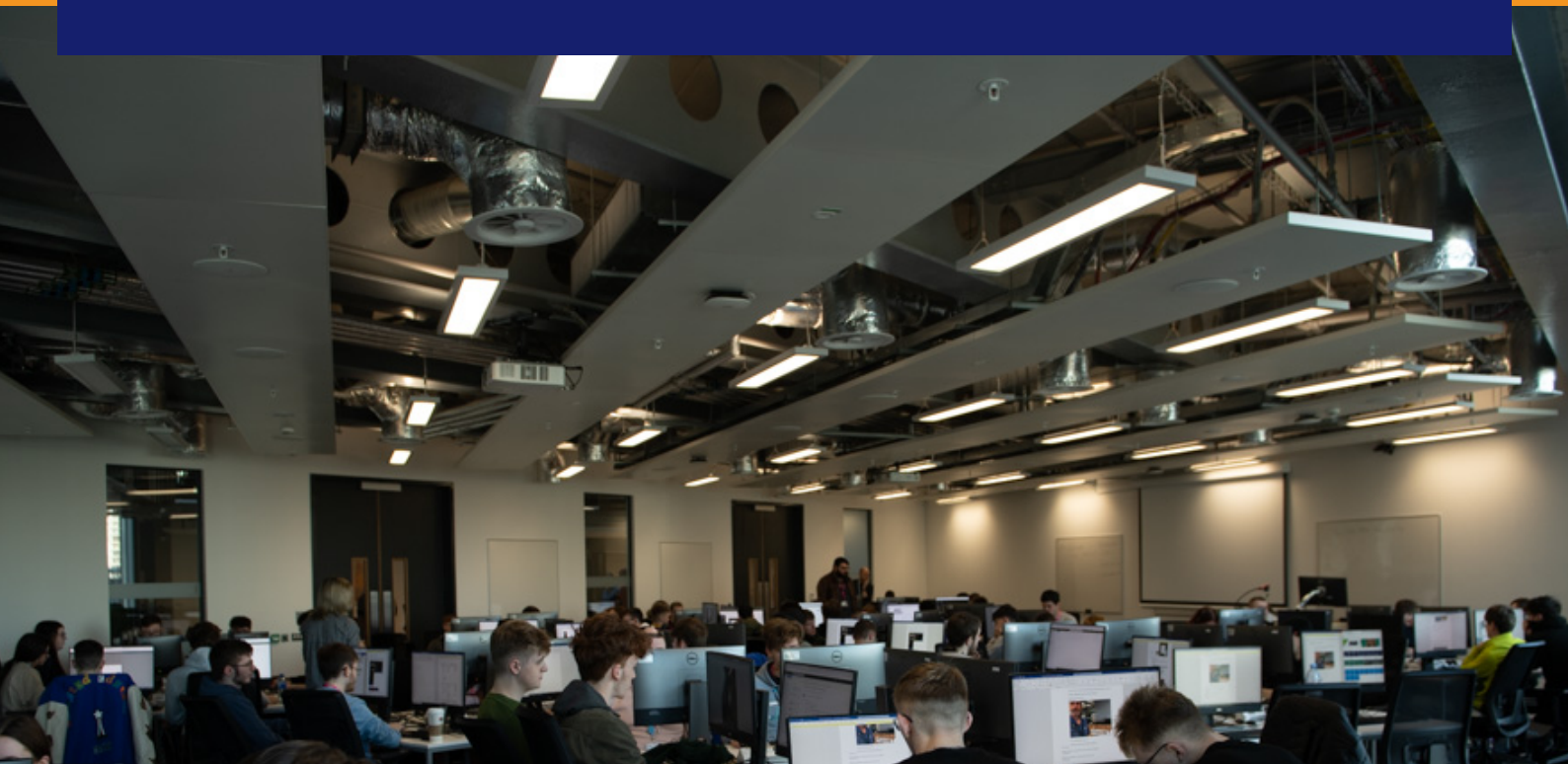
COMPUTER SCIENCE
& INFORMATICS
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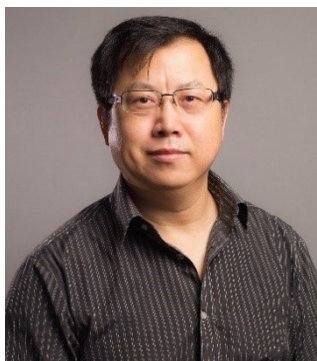
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Foreword





1. Foreword:
Research Director
Prof Luke Chen

In presenting the Annual Research Report for the School of Computing (SoC) for the academic year 2021-2022, I am pleased to report another year of impressive performance in research and innovation. This year, society in general and the research community in specific has started to emerge from the restrictions of the Covid-19 pandemic. Staff have continued to excel in research - productive in generating research outputs in top-tier journals, conferences and workshops; securing prestigious research grants from a wide range of funding bodies and industry, and delivering keynotes, talks and research presentations at local, national and international events. It is notable that, after years of working from home and restrictions on travel and face-to-face meetings, there have been a significant pickup of research activities involving conferences and meetings. These include research related trips, in particular, the delayed EU MSCA RISE secondments, field studies and conference attendance. The School has organised various physical or hybrid events for research dissemination and promotion, including the BT Ireland Innovation Centre Showcase 2022, the 23rd IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM2022) and the International Workshop on Trustworthy AI for the Future of Risk Management (TAI-RM2022).

The Connected Health Innovation Centre (CHIC) has come to its final stage and while concluding the project, significant work is being undertaken to transfer and translate the research outcomes towards innovation and impact. In particular, this is providing inputs and competences for the development of the Centre of Digital Health Technology (CDHT) within the Belfast Region City Deal. The BT Ireland Innovation Centre (BTIIC) has continued to produce substantial research results. As the project moved into an extension period of the 1st phase of funding it has shifted its focus towards technology down-streaming into BT products, systems and services. Significant progress has been made in collaboration with BT to design and develop the 2nd phase of the programme, which will take BTIIC forward for a further five-year period through to 2028. The Pervasive Computing Research Centre continues to expand its excellent research in terms of both its research scope and core areas of activity. The Advanced Research and Engineering Centre (ARC) – a high-profile academia-industry-government partnership among Ulster University, PWC and QUB, has formally commenced operations during the reporting period with activities such as workshops, project definition and development having been undertaken. The Artificial Intelligence Research Centre, has also advanced its areas of activity in this academic year with more visible, tangible research activities, such as organising public engagements via Belfast Festival, and scientific workshop for disseminating and promoting the AI research.

At School level, the move to the Belfast Campus with brand new research spaces and facilities has opened up new opportunities for collaborations and partnerships with the local business community. The School has established a strategic partnership with Kainos to create a joint 'AI Lab', and a further Computing Lab with Qualcomm is under discussion. The School has also launched two internal funding calls, one is to fund novel research ideas to support the proposal development for UKRI research grant application, and the other to support impact case studies. Both calls have stimulated interests from members of staff and offer timely support in the transition of research funding applications from EU research programmes to UKRI funding programmes.

The School has achieved excellent results in REF2021 with 38.7 FTE researchers from the School submitting 92 research outputs and 6 Impact Case Studies as part of the Ulster Unit of Assessment (UoA) 11 – Computer Science and Informatics submission. As a whole, UoA11 at Ulster has been assessed as being the 6th largest Computer Science and Informatics unit in the UK. Overall, 92% of the submitted papers were assessed as

reporting world-leading or internationally excellent research, leading to a ranking of 7th out of 90 universities in the UK; 100% of the research impact studies were assessed as outstanding or very considerable and 100% of our research environment rated world-leading or internationally excellent. This reflects the ever-increasing power, quality and reach of the School's research and its impact that has resulted from the intensive and extensive research and innovation activities undertaken by the dedicated members of staff from the School over the years. The School will use its analysis of the performance metrics and data to develop and to guide the School's future research as part of the wider University strategy.

In summary, the academic year 2021-2022 has been a period of change and transition in respect to moving from the pandemic working mode back to a new normality of hybrid working, from the end of REF2021 to the next REF cycle, and the adaption to the post-Brexit research funding landscape. The School has taken a proactive approach to embracing these changes and challenges, and we are confident the School will go from strength to strength in the time to come.



Further details of our REF2021 results can be found at [11. Computer Science and Informatics - REF 2021 \(ulster.ac.uk\)](#)

Further details can be found on the SoC website [School of Computing](#) or by contacting Mrs Ursula MacDonald (Academic Excellence Executive Assistant) at Email: u.macdonald@ulster.ac.uk; Ph: [+44 28 9536 5759](tel:+442895365759).

A handwritten signature in black ink, appearing to read 'Luke Chen', enclosed within a large, loopy, handwritten oval.

Professor Luke Chen
Research Director - Computer Science and Informatics

Research Students

The following research students were registered on research degree programmes during 2021-22.



2. Research Students

Name	Project Title
Aaqib, Muhammad	An IoT trust and reputation framework in an Edge Environment
Adams, Dawn	Wearable technologies for self-management of diabetes in pregnancy
Ahmad, Abrar	Drone based hotspot: an internet-on-the-go service for disaster management
Ahmad, Salman	BTIIC-02: Novel data analytics to automatically detect patterns in diverse customer data
Ajayi, Oluwashina	Securing Self-Organising Internet of Things (IoT) Ecosystem
Alam, Gulzar	An Approach for Constructing and Sharing Open Data Sets in Experimental Pervasive Computing
Asharinda, Fayas	A New Approach to Spectral Data Analysis for Food Quality Control
Black, Brendan	A meshed synchronous internet of medical things
Booth, Frederick	Analytics, Visualisation and Machine Learning of General Practitioner Prescribing using Open Health Data
Brisk, Rob	Intelligent systems to improve decision making in cardiovascular emergencies
Cai, Xin	Gaining a better understanding of our Planet through Deep Learning-based Data Analytics
Cameron, Gillian	Digitalising Employee Assistance Programmes - Evaluating the effectiveness and efficacy of digital mental health interventions in the workplace
Chen, Xianjiang	Development of computational and statistical models for prediction of nitrogen and energy utilisation efficiencies and methane emissions in cattle
Chen, Zhi	Big Data TV Analytics for service and customer improvement
Clare, Conor	Bayesian optimization using Student-t processes with gradient information
D'Arco, Luigi	CareBot: AI-powered Robot Care Systems in Smart Environments
Davies, Richard	Gait and limb analysis for post stroke rehabilitation
Donaghy, Philip	Discovering and understanding speech-derived vocal biomarker patterns related to mental health sciences
Ennis, Andrew	Situation aware content provisioning in mobile environments
Etumusei, Jonathan	Detecting Anomalies from Satellite and Terrestrial Data Sources by Data Analytics
Gebresilassie, Samson Kahsay	BTIIC-10: Managing Identities and risk in an Internet of Insecure devices
Haider, Abbas	Methods for reinforcement learning policy improvement for a single market maker
Hand, Rebecca	ThermAct: The use of thermal sensing technology to quantify wellbeing
Hussain, Tazar	BTIIC-07: An IoT management framework for decision making in instances of unreliability
Hyzy, Maciej	UX data analytics for the assessment, validation and regulation of digital health apps
Jasinska-Piadlo, Alicja	Heart failure data analytics
Kamal, Rashid	CHIC: Behavioural modelling based on opportunistic sensing techniques within IoT (Computing)
Kirk, Nathan	Sensing and Modelling Air Quality for Healthy Living (SMAQ)
Marshall, Fiona	Video-based Automatic Detection of Agitated Behaviours
McAllister, Anna	Computational and Mathematical Modelling of Predator-Prey Systems
McCalmont, Graham	Wearable Technologies to Support the Assessment of Physical Activity Functions for Stroke Rehabilitation
McGuigan, Liam	MAARRS: Multi-Agent Autonomic Robot/Rover Swarms

McHugh, Orla	Decision Analytic with Combined Data Driven Models and Domain Knowledge for Sustainable Land Management
Milliken, Michael	Intrusion detection from networks by using data mining and pattern recognition
Moore, Samuel	Improving Reliability in the Internet of Things Through Anomaly Detection
O'Hare, Stefan	Sensing human emotion within pervasive environments
Pavlovic, Maja	Anomaly Detection in MBES, SWARM and SENTINEL-3 Data using Data Analytics
Potts, Courtney	Advanced analytics and machine learning of real-world
Quigley, Bronagh	Computational monitoring and interpretation of social and communicative behaviours in autism
Rabbani, Kashif	BTIIC-11: Information SLAs for IoT Systems
Ramezani, Anousheh	BTIIC-04: Novel adaptive machine learning, for response to changes over time
Saedi, Mohammad	BTIIC-12: Secure real-time communications over 5G- Using Big Data Analytics, Fuzzy Set Techniques and Fuzzy Roles to evaluate and optimize network's parameter in 5G
Saunders, Catherine	Spaces: self-properties autonomic computing for exploring spaces
Shewell, Colin	Context aware reminder delivery with Google glasses
Sullivan, Keaton	Network Machine Learning Approach to Financial Crime Detection
Tariq, Zeeshan	Mining Complex Business Processes for Compliance Checking and End-state Prediction
Van Den Broek, Peter	Enhanced Augmented Reality with Data Engineering and AI for Smart Digital Education
Vincent, Jordan	Spectral Pattern Recognition
Wang, Mengyuan	Development of an integrated metagenomic analysis system using the microbial community, their genes and biological mechanisms to predict cattle phenotypes
Yang, Ling kai	BTIIC-01: Autonomous abnormality detection for informed data-driven decision making
Zi, Bingxin	AI Assistant Robots for Supporting Independent Living
Zia, Syed Muhammad Unsub	Novel Cryptographic Solutions for IoTs

Graduated December 2021

Name	Thesis Title
Irvine, Naomi	An end-to-end framework for the optimisation of human activity recognition
Turkington, Robin	Machine learning of anonymous call data from national suicide prevention helpline services: Understanding caller behaviour and policy implications

Graduated July 2022

Name	Thesis Title
Blair, Stuart	Sentiment mining from social media content using topic model ensembles
Burns, Matthew	Unobtrusive recognition of activities of daily living using thermal sensor data for monitoring a smart environment
Ekerete, Idongesit	Unobtrusive sensing solutions for home-based monitoring
Iftikhar, Aleeha	Digital data processing and analytics to support decision making in cardiac care
Rjoob, Khaled	Data analytics to augment decision making in cardiac care
Torney, Hannah	Usability engineering methods for assessing the human-machine interface of automated external defibrillators
Ullah , Hanif	Bridging and Real-time Swarm Collision Avoidance Protocols for UAV Deployment Scenarios

Publications

Details of all Publications by the School of Computing are on the Ulster University's Institutional Repository-PURE



3. Publications

This section reports those outputs published over the period of this report and classified as either journal articles, books/chapters in books and published conference papers.

<https://pure.ulster.ac.uk/>.

3.1 Journal Articles

Abernethy, GM & Glass, DH 2022, 'Optimal COVID-19 lockdown strategies in an age-structured SEIR model of Northern Ireland', *Journal of The Royal Society Interface*, vol. 19, no. 188, 20210896, pp. 1-11.

<https://doi.org/10.1098/rsif.2021.0896>

Ajayi, O, Rafferty, J, Santos, J, Garcia-Constantino, M & Cui, Z 2021, 'BECA: A Blockchain-Based Edge Computing Architecture for Internet of Things Systems', *MDPI IoT Journal - Special Issue on Emerging Trends and Challenges in Fog and Edge Computing for the Internet of Things*, vol. 2, no. 4, pp. 610-632.

<https://doi.org/10.3390/iot2040031>

Al-Zaiti, S, Alghwiri, AA, Hu, X, Clermont, G, Peace, A, Macfarlane, P & Bond, RR 2022, 'A clinician's guide to understanding and critically appraising machine learning studies: a checklist for Ruling Out Bias Using Standard Tools in Machine Learning (ROBUST-ML)', *European Heart Journal - Digital Health*, pp. 1-16.

<https://doi.org/10.1093/ehjdh/ztac016>

Ampomah, I, McClean, SI & Hawe, G 2021, 'Dual contextual module for neural machine translation', *Machine Translation*. <https://doi.org/10.1007/s10590-021-09282-0>

Bai, L 2021, 'A Sensor Based Assessment Monitoring System for Patients with Neurological Disabilities', *Journal of Robotics and Control*, vol. 2, no. 6, pp. 489-495. <https://doi.org/10.18196/jrc.26127>

Ben Brahim, G, Mohammad, N, El-Hajj, W, Parr, G & Scotney, B 2022, 'Performance evaluation and comparison study of adaptive MANET service location and discovery protocols for highly dynamic environments', *EURASIP Journal on Wireless Communications and Networking*, vol. 2022, no. 1, 6, pp. 1-21.

<https://doi.org/10.1186/s13638-021-02081-4>

Bi, Y 2021, 'Sentiment Classification in Social Media Data by Combining Triplet Belief Functions', *Journal of the Association for Information Science and Technology*, pp. 1-24. <https://doi.org/10.1002/asi.24605>

Bond, RR, Finlay, D, Al-Zaiti, SS & Macfarlane, P 2021, 'Machine learning with electrocardiograms: A call for guidelines and best practices for 'stress testing' algorithms', *Journal of Electrocardiology*, vol. 69, pp. 1-6.

<https://doi.org/10.1016/j.jelectrocard.2021.07.003>

Booth, FG, R Bond, R, D Mulvenna, M, Cleland, B, McGlade, K, Rankin, D, Wallace, J & Black, M 2021, 'Discovering and comparing types of general practitioner practices using geolocational features and prescribing behaviours by means of K-means clustering: A Comparison of Prescribing Behaviours Between Practice Types', *Scientific Reports*, vol. 11, no. 1, 18289, pp. 1-15. <https://doi.org/10.1038/s41598-021-97716-3>

Bouزيد, Z, Al-Zaiti, S, Bond, RR & Sejdic, E 2022, 'Remote and Wearable ECG Devices with Diagnostic Abilities in Adults: A State-of-the-Science Scoping Review', *Heart Rhythm*.

<https://doi.org/10.1016/j.hrthm.2022.02.030>

Brisk, R, Bond, RR, Finlay, D, McLaughlin, J, Jasinska-Piadlo, A & McEneaney, D 2022, 'WaSP-ECG: A Wave Segmentation Pretraining Toolkit for Electrocardiogram Analysis', *Frontiers in Physiology*, vol. 13, pp. 1-17.

<https://doi.org/10.3389/fphys.2022.760000>

- Cao, F, Xu, Y, Liu, J, Chen, S & Yi, J 2021, 'A multi-clause dynamic deduction algorithm based on standard contradiction separation rule', *Information Sciences*, vol. 566, pp. 281-299.
<https://doi.org/10.1016/j.ins.2021.03.015>
- Chen, X, Zheng, H, Wang, H & Yan, T 2022, 'Can machine learning algorithms perform better than multiple linear regression in predicting nitrogen excretion from lactating dairy cows', *Scientific Reports*, vol. 12, 12478 (2022), pp. 1-13. <https://doi.org/10.1038/s41598-022-16490-y>
- Chisari, C, McCracken, LM, Cruciani, F, Moss-Morris, R & Scott, W 2022, 'Acceptance and Commitment Therapy for women living with Vulvodynia: A single-case experimental design study of a treatment delivered online', *Journal of Contextual Behavioral Science*, vol. 23, pp. 15-30.
<https://doi.org/10.1016/j.jcbs.2021.11.003>
- Coulter, H, Donnelly, M, Mallett, J & Kernohan, G 2022, 'Heart Rate Variability Biofeedback to treat Anxiety in Young People with Autistic Spectrum Disorder: findings from a home-based pilot study', *JMIR Formative Research*, pp. 1. <https://doi.org/10.2196/37994>
- D'Arco, L, Wang, H & Zheng, H 2022, 'Assessing Impact of Sensors and Feature Selection in Smart-Insole-Based Human Activity Recognition', *Methods and Protocols*, vol. 5, no. 3, 5(3), pp. 45.
<https://doi.org/10.3390/mps5030045>
- Dhelim, S, Chen, L, Aung, N, Zhang, W & Ning, H 2022, 'A hybrid personality-aware recommendation system based on personality traits and types models', *Journal of Ambient Intelligence and Humanized Computing*. <https://doi.org/10.1007/s12652-022-04200-5>
- Diaz-Skeete, Y, McQuaid, D, Akinosun, A, Ekerete, I, Carragher, N & Carragher, L 2021, 'Analysis of Apps With a Medication List Functionality for Older Adults With Heart Failure Using the Mobile App Rating Scale and the IMS Institute for Healthcare Informatics Functionality Score: Evaluation Study', *JMIR mHealth and uHealth*, vol. 9, no. 11, e30674, pp. 1-12. <https://doi.org/10.2196/30674>
- Ekerete, I, Garcia-Constantino, M, Diaz-Skeete, Y, Nugent, CD & McLaughlin, J 2021, 'Fusion of Unobtrusive Sensing Solutions for Sprained Ankle Rehabilitation Exercises Monitoring in Home Environments', *Sensors*, vol. 21, no. 22, 7560, pp. 1-17. <https://doi.org/10.3390/s21227560>
- Ekerete, I, Garcia-Constantino, M, Konios, A, Mustafa, M, Diaz, Y, Nugent, C & McLaughlin, J 2021, 'Fusion of Unobtrusive Sensing Solutions for Home-Based Activity Recognition and Classification using Data Mining Models and Methods', *Applied Sciences*, vol. 11, no. 19, applsci-1390601, pp. 1-17.
<https://doi.org/10.3390/app11199096>
- Etumusei, J, Martinez Carracedo, J & McClean, SI 2022, 'A Novel Martingale Based Model Using a Smartphone to Detect Gait Bout in Human Activity Recognition', *Journal of Sensors*, vol. 2022, 4753732, pp. 1-24. <https://doi.org/10.1155/2022/4753732>
- Finlay, D, Bond, RR, Jennings, M, McCausland, C, Güldenring, D, Kennedy, A, Biglarbeigi, P, Al-Zaiti, S, Brisk, R & McLaughlin, J 2021, 'Overview of featurization techniques used in traditional versus emerging deep learning-based algorithms for automated interpretation of the 12-lead ECG', *Journal of Electrocardiology*, vol. 69, pp. 7-11. <https://doi.org/10.1016/j.jelectrocard.2021.08.010>
- Følstad, A, Araujo, T, Law, EL, Brandtzaeg, PB, Papadopoulos, S, Reis, L, Baez, M, Laban, G, Mcallister, P & Ischen, C et al. 2021, 'Future directions for chatbot research: an interdisciplinary research agenda', *Computing*. <https://doi.org/10.1007/s00607-021-01016-7>

- Fu, H, Liu, J, Wu, G, Xu, Y & Sutcliffe, G 2022, 'Improving probability selection based weights for satisfiability problems', *Knowledge-Based Systems*, vol. 245, 108572, pp. 1-17.
<https://doi.org/10.1016/j.knosys.2022.108572>
- Fu, H, Xu, Y, Wu, G, Liu, J, Chen, S & He, X 2021, 'Emphasis on the flipping variable: Towards effective local search for hard random satisfiability', *Information Sciences*, vol. 566, pp. 118-139.
<https://doi.org/10.1016/j.ins.2021.03.009>
- Fu, H, Zhang, W, Wu, G, Xu, Y & Liu, J 2021, 'Improving stochastic local search for uniform k-SAT by generating appropriate initial assignment', *Computational Intelligence*. <https://doi.org/10.1111/coin.12438>
- Galushka, M, Swain, C, Browne, F, Mulvenna, M, Bond, RR & Gray, D 2021, 'Prediction of chemical compounds properties using a deep learning model', *Neural Computing and Applications*, vol. 33, no. 20, pp. 13345–13366. <https://doi.org/10.1007/s00521-021-05961-4>
- Garcia-Constantino, M, Orr, C, Synnott, J, Shewell, C, Ennis, A, Cleland, I, Nugent, CD, Rafferty, J, Morrison, G & Larkham, L et al. 2021, 'Design and Implementation of a Smart Home in a Box to Monitor the Wellbeing Of Residents with Dementia In Care Homes', *Frontiers in Digital Health*, vol. 3, 798889, pp. 1-13.
<https://doi.org/10.3389/fdgth.2021.798889>
- Greer, K & Bi, Y 2022, 'Event-Based Clustering with Energy Data', *DESIGN, CONSTRUCTION, MAINTENANCE*, vol. 2, pp. 197-207. <https://doi.org/10.37394/232022.2022.2.26>
- Haider, A, Wang, H, Scotney, B & Hawe, G 2022, 'Predictive Market Making via Machine Learning', *Operations Research Forum*, vol. 3, no. 1, pp. 1-21. <https://doi.org/10.1007/s43069-022-00124-0>
- He, C, Duan, L, Zheng, H, Li-ling, J, Song, L & Li, L 2022, 'Graph convolutional network approach to discovering disease-related circRNA-miRNA-mRNA axes', *Methods*, vol. 198, pp. 45-55.
<https://doi.org/10.1016/j.ymeth.2021.10.006>
- Hernandez-Cruz, N, Nugent, C, Zhang, S & Mcchesney, I 2021, 'The Use of Transfer Learning for Activity Recognition in Instances of Heterogeneous Sensing', *Applied Sciences*, vol. 11, no. 16, 7660, pp. e7660.
<https://doi.org/10.3390/app11167660>
- Huang, Z, Guo, J, Zheng, W, Wu, Y, Lin, Z & Zheng, H 2022, 'A Calibration-free Approach to Implementing P300-based Brain-computer Interface', *Cognitive Computation*. <https://doi.org/10.1007/s12559-021-09971-1>
- Huang, Z, Jiang, K, Li, J, Zhu, W, Zheng, H & Wang, Y 2022, 'Discriminability of single-trial EEG during decision-making of cooperation or aggression: A study based on machine learning', *Medical and Biological Engineering and Computing*. <https://doi.org/10.1007/s11517-022-02557-5>
- Ienaga, N, Cravotta, A, Terayama, K, Scotney, B, Saito, H & Busa, MG 2022, 'Semi-automation of gesture annotation by machine learning and human collaboration', *Language Resources and Evaluation*.
<https://doi.org/10.1007/s10579-022-09586-4>
- Jasinska-Piadlo, A, Bond, RR, Biglarbeigi, P, Brisk, R, Campbell, P & McEneaney, D 2021, 'What can machines learn about heart failure? A systematic literature review', *International Journal of Data Science and Analytics*, pp. 1-21. <https://doi.org/10.1007/s41060-021-00300-1>

Jasinska-Piadlo, A, Bond, RR, Biglarbeigi, P, Brisk, R, Campbell, P, Browne, F & McEneaney, D 2022, 'Data-driven versus a domain-led approach to k-means clustering on an open heart failure dataset', *International Journal of Data Science and Analytics*. <https://doi.org/10.1007/s41060-022-00346-9>

Jennings, M, Turner, C, Bond, RR, Kennedy, A, Thantilage, R, Kechadi, MT, Le-Khac, N-A, McLaughlin, J & Finlay, D 2021, 'Code-Free Cloud Computing Service to Facilitate Rapid Biomedical Digital Signal Processing and Algorithm Development', *Computer Methods and Programs in Biomedicine*, vol. 211, 106398. <https://doi.org/10.1016/j.cmpb.2021.106398>

Jing, M, Bond, RR, Robertson, L, Moore, J, Kowalczyk, A, Price, RK, Burns, W, Nesbit, MA, McLaughlin, J & Moore, TCB 2022, 'User experience of home-based AbC-19 SARS-CoV-2 antibody rapid lateral flow immunoassay test', *Scientific Reports*, vol. 12, no. 1, 1173, pp. 1-18. <https://doi.org/10.1038/s41598-022-05097-y>

Jing, M, Bond, RR, Robertson, L, Moore, J, Kowalczyk, A, Price, RK, Burns, W, Nesbit, MA, McLaughlin, J & Moore, TCB 2022, 'User experience of home-based AbC-19 SARS-CoV-2 antibody rapid lateral flow immunoassay test', *Scientific Reports*, vol. 12, no. 1, 1173, pp. 1-18. <https://doi.org/10.1038/s41598-022-05097-y>

Jing, M, Ng, KY, Mac Namee, B, Biglarbeigi, P, Brisk, R, Bond, RR, Finlay, D & McLaughlin, J 2021, 'COVID-19 modelling by time-varying transmission rate associated with mobility trend of driving via Apple Maps', *Journal of Biomedical Informatics*, vol. 122, 103905, pp. 1-13. <https://doi.org/10.1016/j.jbi.2021.103905>

Knoery, C, Bloie, C, Iftikhar, A, Bond, RR, Manktelow, M, McGilligan, VE, Rjoob, K, Peace, A, McShane, A & Heaton, J et al. 2022, 'A nurse-led pre-hospital triage service for identifying patients with occlusive myocardial infarction: a service evaluation: a service evaluation', *British Journal of Cardiac Nursing*, vol. 17, no. 4, pp. 1-10. <https://doi.org/10.12968/bjca.2021.0082>

Knoery, C, McEwan, KA, Manktelow, M, Watt, J, Smith, J, Iftikhar, A, Rjoob, K, Bond, RR, McGilligan, VE & Peace, A et al. 2022, 'Using latent class analysis to identify clinical features of patients with occlusive myocardial infarction: pre-angiogram prediction remains difficult', *Clinical Cardiology*, vol. 45, no. 2, pp. 231-238. <https://doi.org/10.1002/clc.23755>

Krause, T, Wassan, JT, Mc Kevitt, P, Wang, H, Zheng, H & Hemmje, M 2021, 'Analyzing Large Microbiome Datasets Using Machine Learning and Big Data', *BioMedInformatics*, vol. 1, no. 3, pp. 138-165. <https://doi.org/10.3390/biomedinformatics1030010>

Li, C, McHugh, O, Martinez, L & Liu, J 2021, 'Environmental management efficiency evaluation based on indicator information integration and DEA-Malmquist index', *Journal of Smart Environments and Green Computing*, vol. 1, pp. 173-188. <https://doi.org/10.20517/jsegc.2021.12>

Li, J, Huang, S, Wang, F, Chen, S & Zheng, H 2022, 'Ergonomic Assessment Method of Risk Factors for Musculoskeletal Disorders Associated with Sitting Postures', *International Journal of Pattern Recognition and Artificial Intelligence*, vol. 36, no. 9, 2256017 (2022). <https://doi.org/10.1142/S0218001422560171>

Lubinda, J, Bi, Y, Haque, U, Lubinda, M, Hamainza, B & Moore, AJ 2022, 'Spatio-temporal monitoring of health facility-level malaria trends in Zambia and adaptive scaling for operational intervention', *Communications medicine*, vol. 2, pp. 1-12. <https://doi.org/10.1038/s43856-022-00144-1>

Luo, K, Chen, X, Zheng, H & Shi, Z 2022, 'A review of deep learning approach to predicting the state of health and state of charge of lithium-ion batteries', *Journal of Energy Chemistry*. <https://doi.org/10.1016/j.jechem.2022.06.049>

- Luo, Y, Luo, C, Min, G, Parr, G & McClean, SI 2021, 'On the Study of Sustainability and Outage of SWIPT-Enabled Wireless Communications', IEEE Journal of Selected Topics in Signal Processing, vol. 15, no. 5, pp. 1159-1168. <https://doi.org/10.1109/JSTSP.2021.3092136>
- Mahdi, AA, Ansari, JA, Chaurasiaa, P, Ahmad, MK, Kunwar, S, McClean, SI & Yogarajah, P 2022, 'A Study of Maternal and Umbilical Cord Blood Lead Levels in Pregnant Women', Indian Journal of Clinical Biochemistry. <https://doi.org/10.1007/s12291-022-01040-0>
- Martin-Baos, JA, Rodriguez-Benitez, L, Garcia-Rodenas, R & Liu, J 2022, 'IoT based monitoring of air quality and traffic using regression analysis', Applied Soft Computing Journal, vol. 115, 108282, pp. 1-48. <https://doi.org/10.1016/j.asoc.2021.108282>
- McCartney, B, Harvey, A, Kernaghan, A, Morais, S, McAlister, O, Crawford, P, Biglarbeigi, P, Bond, RR, Finlay, D & McEneaney, D 2022, 'Pediatric defibrillation shocks alone do not cause heart damage in a porcine model', Resuscitation Plus, vol. 9, 100203, pp. 1-9. <https://doi.org/10.1016/j.resplu.2022.100203>
- McCartney, M 2021, 'The solution of Lanchester's equations with inter-battle reinforcement strategies', Physica A: Statistical Mechanics and its Applications.
- McCartney, M 2022, 'Battling with Lanchester's equations in the classroom', International Journal of Mathematical Education in Science and Technology, pp. 1-11. <https://doi.org/10.1080/0020739X.2021.2022230>
- McCartney, M 2022, 'Textbooks and sea sickness: Belfast's first professor of mathematics', Mathematics Today, vol. 58, no. 3, pp. 90-91.
- McGuigan, L, Saunders, C, Sterritt, R & Wilkie, G 2022, 'Cooperation Strategies for Swarms of Collaborating Robots: Analysis of Time-Stepped and Multi-Threaded Simulations', International Journal on Advances in Systems and Measurements, vol. 14, no. 1, pp. 44-58. http://www.iariajournals.org/systems_and_measurements/tocv14n12.html
- McGuigan, L, Sterritt, R, Wilkie, G & Hawe, G 2022, 'Decentralised Autonomic Self-Adaptation in a Foraging Robot Swarm', International Journal On Advances in Intelligent Systems, vol. 15, no. 1&2, 14054, pp. 12-23.
- Mulvenna, M, Bond, RR, Delaney, J, Dawoodbhoy, FM, Boger, J, Potts, C & Turkington, R 2021, 'Ethical Issues in Democratizing Digital Phenotypes and Machine Learning in the Next Generation of Digital Health Technologies', Philosophy & Technology, vol. 34, pp. 1945–1960. <https://doi.org/10.1007/s13347-021-00445-8>
- Mustafa, M, Konios, A & Garcia-Constantino, M 2021, 'IoT-based Activities of Daily Living for Abnormal Behaviour Detection: Privacy Issues and Potential Countermeasures', IEEE Internet of Things Magazine, vol. 4, no. 3, pp. 90-95. <https://doi.org/10.1109/IOTM.0001.2000169>
- Neira-Rodado, D, Wilmer Escobar-Velasquez, J & McClean, SI 2022, 'Ambulances Deployment Problems: Categorization, Evolution and Dynamic Problems Review', ISPRS International Journal of Geo-Information, vol. 11, no. 2, 109, pp. 1-37. <https://doi.org/10.3390/ijgi11020109>
- O'Neill, S, Potts, C, Bond, RR, Mulvenna, M, Ennis, E, McFeeters, D, Boyda, D, Morrissey, J, Scowcroft, E & Isaksen, M et al. 2021, 'An analysis of the impact of suicide prevention messages and memorials on motorway bridges', Suicide and Life-Threatening Behaviour, vol. 51, no. 4, pp. 657-664. <https://doi.org/10.1111/sltb.12736>

Ortiz-Barrios, M, Garcia-Constantino, M, Nugent, CD & Alfaro-Sarmiento, I 2022, 'A Novel Integration of IF-DEMATEL and TOPSIS for the Classifier Selection Problem in Assistive Technology Adoption for People with Dementia', *International Journal of Environmental Research and Public Health*, vol. 19, no. 3, 1133, pp. 1-31. <https://doi.org/10.3390/ijerph19031133>

Ortiz-Barrios, M, Garcia-Constantino, M, Nugent, CD & Alfaro-Sarmiento, I 2022, 'A Novel Integration of IF-DEMATEL and TOPSIS for the Classifier Selection Problem in Assistive Technology Adoption for People with Dementia', *International Journal of Environmental Research and Public Health*, vol. 19, no. 3, 1133, pp. 1-31. <https://doi.org/10.3390/ijerph19031133>

Ortiz-Barrios, M, Järpe, E, García-Constantino, M, Cleland, I, Nugent, C, Arias-Fonseca, S & Jaramillo-Rueda, N 2022, 'Predicting Activity Duration in Smart Sensing Environments Using Synthetic Data and Partial Least Squares Regression: The Case of Dementia Patients', *Sensors*, vol. 22, no. 14, e5410. <https://doi.org/10.3390/s22145410>

Peace, A, Al-Zaiti, S, Finlay, D, McGilligan, VE & Bond, RR 2022, 'Exploring decision making 'noise' when interpreting the electrocardiogram in the context of cardiac cath lab activation', *Journal of Electrocardiology*. <https://doi.org/10.1016/j.jelectrocard.2022.07.002>

Peace, A, Al-Zaiti, S, Finlay, D, McGilligan, VE & Bond, RR 2022, 'Exploring decision making 'noise' when interpreting the electrocardiogram in the context of cardiac cath lab activation', *Journal of Electrocardiology*. <https://doi.org/10.1016/j.jelectrocard.2022.07.002>

Penichet, VMR, Lozano, MD, Garrido, JE, Albertos-Marco, F, Bond, RR & Mulvenna, M 2022, 'Designing postures for rehabilitation therapies in a multimodal system based on a 3D virtual environment and movement-based interaction', *Multimedia Tools and Applications*. <https://doi.org/10.1007/s11042-022-13292-2>

Peoples, C, Moore, A & Georgalas, N 2022, 'Port Sustainability as a Service: The Design of Bespoke Service Level Agreements (SLAs) to Improve Operational Efficiency at Harbours by Prioritising Social Satisfaction', *Frontiers in Sustainability*, vol. 3, 928994. <https://doi.org/10.3389/frsus.2022.928994>

Potts, C, Ennis, E, Bond, RR, Mulvenna, M, McTear, M, Boyd, K, Broderick, T, Malcolm, M, Kuosmanen, L & Nieminen, H et al. 2021, 'Chatbots to Support Mental Wellbeing of People Living in Rural Areas: Can User Groups Contribute to Co-design?', *Journal of Technology in Behavioral Science*, vol. 6, pp. 652–665. <https://doi.org/10.1007/s41347-021-00222-6>

Potts, C, Richardson, J, Bond, RR, Price, RK, Mulvenna, M, Zvolsky, P, Harvey, M, Hughes, C & Duffy, F 2021, 'Reliability of Addenbrooke's Cognitive Examination III in differentiating between dementia, mild cognitive impairment and older adults who have not reported cognitive problems.', *European Journal of Ageing*, pp. 1-13. <https://doi.org/10.1007/s10433-021-00652-4>

Qin, J, Zeng, X, Wu, S & Zou, Y 2022, 'Feature recommendation strategy for graph convolutional network', *Connection Science*, vol. 34, no. 1, pp. 1697-1718. <https://doi.org/10.1080/09540091.2022.2080806>

Rampun, A, Jarvis, D, Griffiths, PD, Zwigelaar, R, Scotney, BW & Armitage, PA 2021, 'Single-Input Multi-Output U-Net for Automated 2D Foetal Brain Segmentation of MR Images', *Journal of Imaging*, vol. 7, no. 10, e200. <https://doi.org/10.3390/jimaging7100200>

Rodriguez-Benitez, L, Moreno-Garcia, J, del Castillo-Herrera, E, Liu, J & Jimenez-Linares, L 2022, 'Aggregation and Definition of an Algebraic Framework for Fuzzy Time Series: An Application in the Supply-

Demand Domain', *International Journal of Approximate Reasoning*, vol. 149, pp. 104-115.

<https://doi.org/10.1016/j.ijar.2022.07.005>

Ronquillo-Canal, CJ, Pancardo, P, Silva, M, Hernández-Nolasco, JA & Garcia-Constantino, M 2022, 'Fuzzy System to Assess Dangerous Driving: A Multidisciplinary Approach', *Sensors*, vol. 22, no. 10, 3655, pp. 1-25.

<https://doi.org/10.3390/s22103655>

Shi, X, Nikolic, G, Fischhaber, S, Black, M, Rankin, D, Epelde, G, Beristain, A, Alvarez, R, Arrue, M & Pita Costa, J et al. 2022, 'System Architecture of A European Platform for Health Policy Decision Making: MIDAS', *Frontiers in public health*, vol. 10, 838438, pp. 1-13. <https://doi.org/10.3389/fpubh.2022.838438>

Song, W, Wang, H, Rahman, E, Barabas, J, Huang, J, Power, UF, Byrne, HJ, McLaughlin, J, Nugent, C & Maguire, P 2021, 'Rapid Classification of Respiratory Syncytial Virus and Sendai Virus by a Low-cost and Portable Near-infrared Spectrometer', 2021 IEEE SENSORS.

<https://doi.org/10.1109/SENSORS47087.2021.9639533>

Wang, M, Wang, H, Zheng, H, Uhrin, D, Dewhurst, R & Roehe, R 2021, 'Comparison of HPLC and NMR for quantification of the main volatile fatty acids in rumen digesta', *Scientific Reports*, vol. 11, no. 1, 24337, pp. 1-15. <https://doi.org/10.1038/s41598-021-03553-9>

Wang, R, Chen, L & Ayyesh, A 2022, 'Multimodal motivation modelling and computing towards motivationally intelligent E-learning systems', *CCF Transactions on Pervasive Computing and Interaction*.

<https://doi.org/10.1007/s42486-022-00107-4>

Wang, S, Ye, F, Yang, L-H, Liu, J, Wang, H & Martinez, L 2021, 'Micro-Extended Belief Rule-Based System with Activation Factor and Parameter Optimization for Industrial Cost Prediction', *International Journal of Machine Learning and Cybernetics*.

Wang, W, Ning, H, Shi, F, Dhelim, S, Zhang, W & Chen, L 2021, 'A Survey of Hybrid Human-Artificial Intelligence for Social Computing', *IEEE Transactions on Human-Machine Systems*.

<https://doi.org/10.1109/THMS.2021.3131683>

Wang, Z, Tian, J-Y, Fang, H, Chen, L & Qin, J 2021, 'LightLog: A lightweight temporal convolutional network for log anomaly detection on the edge', *Computer Networks*.

<https://doi.org/10.1016/j.comnet.2021.108616>

Wang, Z, Wang, Z, Li, X, Yu, Z, Guo, B, Chen, L & Zhou, X 2022, 'Exploring Multi-dimension User-Item Interactions with Attentional Knowledge Graph Neural Networks for Recommendation', *IEEE Transactions on Big Data*. <https://doi.org/10.1109/TBDATA.2022.3154778>

Wang, Z-M, Tian, J-Y, Qin, J, Fang, H & Chen, L-M 2021, 'A Few-Shot Learning-Based Siamese Capsule Network for Intrusion Detection with Imbalanced Training Data', *Computational intelligence and neuroscience*, vol. 2021, 7126913, pp. 1-17. <https://doi.org/10.1155/2021/7126913>

Wassan, JT, Zheng, H & Wang, H 2021, 'Role of deep learning in predicting aging-related diseases: A scoping review', *Cells*, vol. 10, no. 11, 2924. <https://doi.org/10.3390/cells10112924>

Wassan, JT, Zheng, H & Wang, H 2021, 'Role of deep learning in predicting aging-related diseases: A scoping review', *Cells*, vol. 10, no. 11, 2924. <https://doi.org/10.3390/cells10112924>

- Wei, D, Rong, Y, Garg, H & Liu, J 2022, 'An extended WASPAS approach for teaching quality evaluation based on pythagorean fuzzy reducible weighted Maclaurin symmetric mean', *Journal of Intelligent and Fuzzy Systems*, vol. 42, no. 4, pp. 3121-3152. <https://doi.org/10.3233/jifs-210821>
- Xu, W, Duan, L, Zheng, H, Li-Ling, J, Jiang, W, Zhang, Y, Wang, T & Qin, R 2021, 'An Integrative Disease Information Network Approach to Similar Disease detection', *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, pp. 1. <https://doi.org/10.1109/TCBB.2021.3110127>
- Yang, C, Zhu, T, Ning, H, Chen, L & Liu, Z 2021, 'Parallel particle swarm optimization based on spark for academic paper co-authorship prediction', *Information*, vol. 12, no. 12, 530, pp. 1-13. <https://doi.org/10.3390/info12120530>
- Yang, L, Liu, J, Ye, F, Wang, Y-M, Nugent, CD, Wang, H & Martinez, L 2022, 'Highly explainable cumulative belief rule-based system with effective rule-base modeling and inference scheme', *Knowledge-Based Systems*, vol. 240, 107805, pp. 1-26. <https://doi.org/10.1016/j.knosys.2021.107805>
- Yang, L, McClean, SI, Donnelly, MP, Burke, K & Khan, K 2022, 'Detecting and Responding to Concept Drift in Business Processes', *Algorithms*, vol. 15, no. 5, 174. <https://doi.org/10.3390/a15050174>
- Yang, L, Wang, Y, Hu, H-B, Feng, R-Y & Liu, J 2022, 'Fuzzy Multi-Context Systems', *IEEE Transactions on Fuzzy Systems*, pp. 1-15. <https://doi.org/10.1109/TFUZZ.2022.3189391>
- Yang, L, Ye, F, Liu, J, Wang, Y & Hu, H 2021, 'An improved fuzzy rule-based system using evidential reasoning and subtractive clustering for environmental investment prediction', *Fuzzy Sets and Systems*, vol. 421, pp. 44-61. <https://doi.org/10.1016/j.fss.2021.02.018>
- Yang, L-H, Liu, B & Liu, J 2021, 'Research and development talents training in China universities - based on the consideration of education management cost planning', *Sustainability*, vol. 13, no. 17, 9583. <https://doi.org/10.3390/su13179583>
- Yang, L-H, Liu, J, Wang, Y-M, Nugent, CD & Martinez, L 2021, 'Online Updating Extended Belief Rule-Based System for Sensor-Based Activity Recognition', *Expert Systems with Applications*, vol. 186, 115737. <https://doi.org/10.1016/j.eswa.2021.115737>
- Yang, L-H, Ren, T-Y, Ye, F-F, Nicholl, P, Wang, Y-M & Lu, H 2022, 'An Ensemble Extended Belief Rule Base Decision Model for Imbalanced Classification Problems', *Knowledge-Based Systems*, vol. 242, 108410, pp. 1-15. <https://doi.org/10.1016/j.knosys.2022.108410>
- You, Y, Lai, X, Pan, Y, Zheng, H, Vera, J, Liu, S, Deng, S & Zhang, L 2022, 'Artificial intelligence in cancer target identification and drug discovery', *Signal Transduction and Targeted Therapy*, vol. 7, 156, pp. 1-24. <https://doi.org/10.1038/s41392-022-00994-0>
- Zhao, G, Chen, L & Ning, H 2021, 'Sensor-Based Fall Risk Assessment: A Survey', *Healthcare*, vol. 9, no. 11, e1448. <https://doi.org/10.3390/healthcare9111448>
- Zia, SMU, McCartney, M, Scotney, B, Martinez Carracedo, J & Sajjad, A 2022, 'A Novel Pseudo-Random Number Generator for IoT based on a Coupled Map Lattice System using the Generalised Symmetric Map', *SN Applied Sciences*, vol. 4, no. 2, 48, pp. 1-17. <https://doi.org/10.1007/s42452-021-04919-4>

Zia, SMU, McCartney, M, Scotney, B, Martinez Carracedo, J, Abu-Tair, M, Memon, J & Sajjad, A 2022, 'Survey on Image Encryption Techniques using Chaotic Maps in Spatial, Transform and Spatiotemporal Domains', International Journal of Information Security, pp. 1-21. <https://doi.org/10.1007/s10207-022-00588-5>

3.2 Books/Chapters in Books

Al-Zaiti, S, Faramand, Z, Rjoob, K, Finlay, D & Bond, RR 2021, The role of automated 12-lead ECG interpretation in the diagnosis and risk stratification of cardiovascular disease. in AS El-Baz & J Suri (eds), Cardiovascular and Coronary Artery Imaging. vol. 1, Elsevier, pp. 45-87. <https://doi.org/10.1016/B978-0-12-822706-0.00005-6>

McCartney, M 2022, Interview with Nigel Hitchin. in R Wilson (ed.), Oxford's Savilian Professors of Geometry: First 400 years. Oxford University Press (OUP), Oxford, pp. 207-220.

Qiu, X, Lan, C, Liu, J & Chen, J 2022, Intelligent Course Design of Automatic Warehouse Based on Association Simulation. in Z Hu, Q Zhang, S Petoukhov & M He (eds), Lecture Notes on Data Engineering and Communications Technologies: Advances in Artificial Systems for Logistics Engineering. vol. 135, Lecture Notes on Data Engineering and Communications Technologies, vol. 135, Springer, pp. 367-378. https://doi.org/10.1007/978-3-031-04809-8_33

Qiu, X, Lan, C, Liu, J & Chen, J 2022, Intelligent Course Design of Automatic Warehouse Based on Association Simulation. in Z Hu, Q Zhang, S Petoukhov & M He (eds), Lecture Notes on Data Engineering and Communications Technologies: Advances in Artificial Systems for Logistics Engineering. vol. 135, Lecture Notes on Data Engineering and Communications Technologies, vol. 135, Springer, pp. 367-378. https://doi.org/10.1007/978-3-031-04809-8_33

Samuel, AM & Garcia-Constantino, M 2022, User-centred prototype to support wellbeing and isolation of software developers using smartwatches. in Advanced Notes in Information Science. vol. 1, ColNes Publishing, pp. 140-151. <https://doi.org/10.47909/anis.978-9916-9760-0-5.125>

3.3 Published Conference Papers

Black, B, Rafferty, J, Santos, J & Ennis, A 2021, Bluetooth RSSI Signal Chaining for Mesh Network Analysis. in 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI). IEEE, the 21st IEEE International Conference on Scalable Computing and Communications, Atlanta, United States, 18/10/21. <https://doi.org/10.1109/SWC50871.2021.00042>

Black, B, Rafferty, J, Santos, J & Ennis, A 2021, Bluetooth RSSI Signal Chaining for Mesh Network Analysis. in 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI). IEEE, the 21st IEEE International Conference on Scalable Computing and Communications, Atlanta, United States, 18/10/21. <https://doi.org/10.1109/SWC50871.2021.00042>

Booth, F, Mulvenna, M, Bond, RR, McGlade, K, Cleland, B, Rankin, D, Wallace, JG & Black, M 2021, COVID-19 and lockdown: The highs and lows of general practitioner prescribing. in Proceedings, IEEE EMBS International Conference on Biomedical and Health Informatics (BHI). IEEE Xplore, pp. 1-4, 2021 IEEE EMBS International Conference on Information Technology Applications in Biomedicine (ITAB), Athens, Greece, 27/07/21. <https://doi.org/10.1109/BHI50953.2021.9508575>

Chouhan, P, Chen, L, Hussain, T & Beard, A 2021, A Situation Calculus Based Approach to Cognitive Modelling for Responding to IoT Cyberattacks. in 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI). IEEE, 2021 IEEE Smart World Congress, Atlanta, United States, 18/10/21. <https://doi.org/10.1109/SWC50871.2021.00038>

Crick, T, Davenport, JH, Hanna, P, Hayes, A, Irons, A, Miller, K, Prickett, T, Ward, R, Allen, B & Patil, B et al. 2022, Co-Constructing a Community of Practice for Early-Career Computer Science Academics in the UK. in CEP 2022: Computing Education Practice 202. ACM International Conference Proceeding Series, Association for Computing Machinery, pp. 21-24, Computing Education Practice, Durham University, United Kingdom, 6/01/22. <https://doi.org/10.1145/3498343.3498349>

Cruciani, F, Moore, S, Quigley, B, Nugent, CD & Sani, S 2021, Semi-supervised detection of Algorithmically Generated Domains using Neural Network-based Autoencoders. in AI-CyberSec 2021. CEUR Workshop Proceedings, AI-Cybersec Workshop 2021, 14/12/21.

Etumusei, J, Martinez Carracedo, J & McClean, SI 2021, A Robust Martingale Approach for Detecting Abnormalities in Human Heartbeat Rhythm. in 7th Collaborative European Research Conference: CERC2021. CEUR Workshop Proceedings, 7th Collaborative European Research Conference (CERC 2021), Cork, Ireland, 9/09/21.

Etumusei, J, Martinez Carracedo, J & McClean, SI 2022, Estimating Change Intensity and Duration in Human Activity Recognition using Martingales. in The 7th International Online & Onsite Conference on Machine Learning, Optimization, and Data Science : LOD 2021: Machine Learning, Optimization, and Data Science. vol. LNCS, volume 13163, Springer, pp. 553-567, The 7th International Online & Onsite Conference on Machine Learning, Optimization, and Data Science , Lake District, United Kingdom, 4/10/21. https://link.springer.com/chapter/10.1007/978-3-030-95467-3_40

Gu, C & Bai, L 2021, Study of 140 GHz Waveguide Fed Lenses with Different Dielectric Constant. in 2021 IEEE Microwave Theory and Techniques in Wireless Communications (MTTW). IEEE, pp. 1-5, 2021 IEEE Microwave Theory and Techniques in Wireless Communications, Riga, Latvia, 7/10/21. <https://doi.org/10.1109/mttw53539.2021.9607185>

Irvine, N, Saunders, C, Garcia-Constantino, M, Moorhead, P, Branagh, D & Nugent, CD 2022, Design of a Rule-Based and ADL Analysis System to Support Care of the Elderly. in Pervasive Computing Technologies for Healthcare: 15th EAI International Conference, Pervasive Health 2021, Virtual Event, December 6-8, 2021, Proceedings. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Association for Computing Machinery, pp. 331-345, EAI PervasiveHealth 2021 - 15th EAI International Conference on Pervasive Computing Technologies for Healthcare, Tel Aviv, Israel, 6/12/21. https://doi.org/10.1007/978-3-030-99194-4_21

Khan, N, Tariq, Z, Ali, A, McClean, SI, Taylor, P & Nauck, D 2022, Early Prediction of Complex Business Processes Using Association Rule Based Mining. in KC Santosh, R Hegadi & U Pal (eds), International Conference on Recent Trends in Image Processing and Pattern Recognition. Communications in Computer and Information Science, vol. 1576 CCIS, Springer, pp. 183-194. https://doi.org/10.1007/978-3-031-07005-1_17

Ma, X, Wang, Z, Bai, L, Xu, B, Gao, J, Wen, B & Tao, J 2021, Implementation of a Federated Large-Scale Remote Sensing Data Sharing Platform. in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS. IEEE, pp. 5771-5774, IGARSS 2021 - 2021 IEEE International Geoscience and Remote Sensing Symposium, 11/07/21. <https://doi.org/10.1109/IGARSS47720.2021.9554247>

Merwick, F, Bi, Y & Nicholl, P 2021, Performance Evaluation of Multi-class Sentiment Classification Using Deep Neural Network Models Optimised for Binary Classification. in Knowledge Science, Engineering and Management : KSEM 2021. Lecture Notes in Computer Science, vol. 12816, pp. 624–635, The 14th International Conference on Knowledge Science, Engineering and Management (KSEM 2021), Tokyo, Japan, 14/08/21. https://doi.org/10.1007/978-3-030-82147-0_51

Pavlovic, M, Bi, Y & Nicholl, P 2021, Extracting Anomalous Pre-earthquake Signatures from Swarm Satellite Data Using EOF and PC Analysis. in Knowledge Science, Engineering and Management: KSEM 2021. Lecture Notes in Computer Science, vol. 12816, Springer, pp. 394-405, The 14th International Conference on Knowledge Science, Engineering and Management (KSEM 2021), Tokyo, Japan, 14/08/21. https://doi.org/10.1007/978-3-030-82147-0_32

Potts, C, Bond, RR, Mulvenna, M, Ennis, E, Bickerdike, A, Coughlan, E, Broderick, T, Burns, C, McTear, M & Kuosmanen, L et al. 2021, Insights and lessons learned from trialling a mental health chatbot in the wild. in 26th IEEE Symposium on Computers and Communications, ISCC 2021. Proceedings - IEEE Symposium on Computers and Communications, vol. 2021-September, IEEE Xplore, pp. 1-6, ICTS4eHealth, Athens, Greece, 5/09/21. <https://doi.org/10.1109/ISCC53001.2021.9631395>

Quinn, S, Bond, RR, Donnelly, MP, Davey, S, McLaughlin, J & Finlay, D 2021, A Review of Covid-19 Symptom Checker Mobile Applications. in C Stephanidis, M Antona & S Ntoa (eds), HCI International 2021 - Posters - 23rd HCI International Conference, HCII 2021, Proceedings. Communications in Computer and Information Science, vol. 1421, Springer Science and Business Media Deutschland GmbH, pp. 591-598, 23rd International Conference on Human-Computer Interaction, HCII 2021, Virtual, Online, 24/07/21. https://doi.org/10.1007/978-3-030-78645-8_75

Ren, T-Y, Ye, F-F, Yang, L-H, Liu, J & Wang, Y 2022, Dynamic Rule Activation Method Based on Activation Factor for Extended Belief Rule-based Systems. in 2021 16th International Conference on Intelligent Systems and Knowledge Engineering (ISKE). 2021 IEEE International Conference on Intelligent Systems and Knowledge Engineering, ISKE 2021, IEEE, pp. 82-86, 16th International Conference on Intelligent Systems and Knowledge Engineering, Chengdu, China, 26/11/21. <https://doi.org/10.1109/iske54062.2021.9755363>

Shi, K, Bai, L, Wang, Z, Tong, X, Mulvenna, M & Bond, RR 2022, 'PHOTOVOLTAIC INSTALLATIONS CHANGE DETECTION FROM REMOTE SENSING IMAGES USING DEEP LEARNING', Paper presented at 2022 IEEE International Geoscience and Remote Sensing Symposium IGARSS., Kuala Lumpur, Malaysia, 17/07/22 - 22/07/22.

Sweeney, C, Ennis, E, Bond, RR, Mulvenna, M & O'Neill, S 2021, Understanding a happiness dataset: How the machine learning classification accuracy changes with different demographic groups. in 2021 IEEE Symposium on Computers and Communications (ISCC): ICTS4eHealth-2021. Proceedings - IEEE Symposium on Computers and Communications, vol. 2021-September, IEEE Xplore, pp. 1-4, IEEE International Conference on ICT Solutions for e-Health, Athens, Greece, 5/09/21. <https://doi.org/10.1109/ISCC53001.2021.9631455>

Tariq, Z, Charles, DK, McClean, SI, McChesney, I & Taylor, P 2021, Proactive business process mining for end-state prediction using trace features. in The 7th IEEE Smart World Congress (SmartWorld 2021). Publ by IEEE, pp. 1-6, 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI), Atlanta, United States, 18/09/22.

- Turley, K, Rafferty, J, Bond, R, Mulvenna, M, Ryan, A, Topping, P & Crawford, L 2021, Biodynamic Lighting to Support the Wellbeing of People Living With Dementia in Care Facilities. in 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI). IEEE, pp. 310-219, 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, 18/09/22. <https://doi.org/10.1109/SWC50871.2021.00050>
- Wang, J, Scotney, B, Zhang, S, Martinez Carracedo, J & Yearling, D 2022, Novelty Prediction in Broadband Line Multi-variate Time Series Using a Deep Long Short-Term Memory Network. in International Conference on Electrical, Computer, and Energy Technologies, ICECET 2021. International Conference on Electrical, Computer, and Energy Technologies, ICECET 2021, IEEE, International Conference on Electrical, Computer and Energy Technologies , Cape Town, South Africa, 9/12/21. <https://doi.org/10.1109/icecet52533.2021.9698249>
- Wang, M, Zheng, H, Wang, H, Dewhurst, RJ & Roeheb, R 2022, Identifying hub nodes and sub-networks from cattle rumen microbiome multilayer networks. in D Garg, S Jagannathan, A Gupta, L Garg & S Gupta (eds), Advanced Computing - 11th International Conference, IACC 2021. vol. 1528, Communications in Computer and Information Science, vol. 1528 CCIS, Springer Cham, Cham, pp. 165–175, 11th International Advanced Computing Conference , Malta, Malta, 18/12/21. https://doi.org/10.1007/978-3-030-95502-1_13
- Wang, Z, Zhang, Z, Bai, L, Yang, Y & Ma, Q 2022, 'APPLICATION OF AN IMPROVED U-NET NEURAL NETWORK ON FRACTURE SEGMENTATION FROM OUTCROP IMAGES', Paper presented at 2022 IEEE International Geoscience and Remote Sensing Symposium IGARSS., Kuala Lumpur, Malaysia, 17/07/22 - 22/07/22.
- Yang, L, McClean, SI, Donnelly, MP, Burke, K & Khan, K 2021, Process Duration Modelling and Concept Drift Detection for Business Process Mining. in 2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI). IEEE, pp. 653-658, 2021 IEEE Smart World Congress, Atlanta, United States, 18/10/21. <https://doi.org/10.1109/SWC50871.2021.00097>
- Yu, Z, Wang, Z, Bai, L, Chen, L & Tao, J 2021, Remote Sensing Inversion of PM10 Based on Spark Platform. in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS. IEEE, pp. 1685-1688, IGARSS 2021 - 2021 IEEE International Geoscience and Remote Sensing Symposium, 11/07/21. <https://doi.org/10.1109/IGARSS47720.2021.9554323>
- Zhang, J, Wang, Z, Bai, L, Song, G, Tao, J & Chen, L 2021, Deforestation Detection Based on U-Net and LSTM in Optical Satellite Remote Sensing Images. in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS. IEEE, pp. 3753-3756, IGARSS 2021 - 2021 IEEE International Geoscience and Remote Sensing Symposium, 11/07/21. <https://doi.org/10.1109/IGARSS47720.2021.9554689>
- Zhu, M, Wang, Z, Bai, L, Zhang, J, Tao, J & Chen, L 2021, Detection of industrial storage tanks at the city-level from optical satellite remote sensing images. in Proceedings Volume 11862, Image and Signal Processing for Remote Sensing XXVII; 118620Y (2021). SPIE, Image and Signal Processing for Remote Sensing XXVII, 13/09/21. <https://doi.org/10.1117/12.2600008>

Research Funding

Ongoing and Active Research Projects



4. Research Funding

Ongoing and Active Research Projects, notably:

Unit of Assessment Member	Title of Award	Funding Body	Value	Project Dates
Prof Chris Nugent Prof Luke Chen Dr Jun Liu Dr Ian Cleland Dr Zeeshan Tariq And more	Advanced Research and Engineering Centre (ARC)	PwC	£3,300,000.00	10/2021-09/2026
Prof B Scotney Prof CD Nugent Prof SI McClean Prof Luke Chen Dr Shuai Zhang Dr Jorge Martinez Dr Darryl Charles Dr Joe Rafferty Dr AA Moore Dr Philip Perry	BT-Ireland Innovation Centre (BTIIC). An International Centre of Excellence for Industrial Research and Engineering	British Telecom	£6,193,427.00	10/2017 - 03/2023
Prof JAD McLaughlin Dr N Soin Prof D Finlay Dr I Cleland Dr PJ McCullagh Prof CD Nugent Dr J Synnott	CHIC Phase 2 Research - Connected Health Innovation Centre	Invest NI	£2,917,596.00	06/2019 – 05/2022
24 Prof H Wang Dr R Bond Prof B Scotney Prof MD Mulvenna	MVSE Multimodal Video Search by Example	EPSRC	£720,502.00	01/2021-12/2021

Dr M Huang Prof N Hewitt Dr Y Bi A Joyce, Laboratorio Nacional de Energia B Fox, LF Fasthouse C Walsh, Energy Co-Operatives Ireland E Strazzera, Uni Degli Studi Di Cagliari E Torralba Callega, Acondicion Tarrasens K Moosdorf, Assoc Portuguesa Das Empresa M Bottarelli, Uni Degli Studi Di Ferrara P Duff, Power Capital Renewable Energy P Lavin, APK Architects & Engineering P McHale, Mayo County Council Prof S Vranes, Institute Mihajlo S McCormack, Trinity College Dublin Z Ure, Phase Change Material Products	IDEAS	CEC-H2020-LC-SC3-RES-4-2018	£510,330.00	07/2019-03/2022
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Portfolio of Research Grants awarded during period 1 August 2021 - 31 July 2022

Unit of Assessment Member	Title of Award	Funding Body	Value	Date
Prof Tanya McCance Dr D Brown Dr I Cleland Mr A Ennis Prof CD Nugent	iMPAKT App 2 Development	New South Wales Health (NSW) Australia	£55,016.00	08/08/21
Prof Bryan Scotney Prof Sonya Coleman Dr Dermot Kerr	Prevention of Online Recruitment into Human Trafficking using Automated Solutions	EPSRC Engineering & Physical Sciences Research Council	£65,259.37	20/09/21
Prof R Bond Dr L Bai Prof MD Mulvenna	DfE CAST: UX data analytics for the assessment, validation and regulation of digital health apps	ORCHA	£34,062.00	01/10/21

Dr Yaxin Bi Prof Ming Jun Huang	Seismic Deformation Monitoring and Electromagnetism Anomaly Detection by Big Satellite Data Analytics with Parallel Computing	ESA European Space Agency	£85,346.08	15/11/21
Dr Trevor Cadden Dr Joseph Rafferty Prof Ronan McIvor	Protein-I: Shared Island Sustainable Healthy Nutrition	DAFM Ireland Government Department of Agriculture, Food and the Marine	£189,233.20	26/11/21
Joan Condell Ian Cleland	Homes for Healthy Ageing Draft Submission with Catapult	Catapult (Connected Places)	£50,000.00	17/12/21
Dr J Liu Dr G Hawe	KTP Programme between University of Ulster and Taranto Limited	Innovate UK/INI and Taranto Ltd	£184,066.00	08/02/22
Prof Malachy O'Neill Prof Liam Maguire Dr Laura Bradley-McCauley Prof Sandra Moffett Dr Kristel Miller Dr Trevor Cadden Dr Karen Bonner Prof Maurice Mulvenna Prof Siobhan O'Neill	Strand III: Atlantic Innovation Research Network	HEA Higher Education Authority	£983,756.65	27/04/22
Prof Michaela Black Deborah Rankin Prof Helene McNulty Dr Catherine Hughes Dr Leane Hoey Prof Jonathan Wallace Dr Adrian Moore	Artificial Intelligence approaches to addressing Mental Health inequalities in Ireland through improved diet and lifestyle: an interdisciplinary North-South investigation of the TUDA cohort integrating nutrition, environmental science and data analytics	HEA Higher Education Authority	£86,364.38	27/04/22