Conference Program

2024 13th International Conference on Software and Information Engineering
(ICSIE 2024)

Workshops

2024 7th International Conference on Network Technology
(ICNT 2024)

2024 5th International Conference on Electronic Engineering and Signal Processing
(EESP 2024)

December 2-4, 2024

Derby, UK

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Welcome Message

We are thrilled to invite you to the 13th International Conference on Software and Information Engineering (ICSIE 2024), along with its concurrent workshops: the 5th International Conference on Electronic Engineering and Signal Processing (EESP 2024) and the 6th International Conference on Network Technology (ICNT 2024). These events will take place from December 2-4, 2024, at Derby University, UK. This conference provides a unique opportunity for experts across fields to connect, engage in meaningful discussions, and collaborate on solutions to key industry challenges. We look forward to welcoming you!

ICSIE 2024 promises an engaging program tailored to both academic and industry participants. Highlights include distinguished keynote speakers, focused breakout sessions, and a lineup of stimulating talks aimed at enhancing skills and raising awareness of requirements engineering practices—an area of significant interest to industry. This annual conference centers on cutting-edge advancements in software engineering processes and methodologies, software deployment, operations and reusability, and computer science education, providing a platform for both researchers and practitioners to discuss emerging trends.

Young researchers are especially encouraged to contribute their work to the conference. This year's event will feature four keynote speakers, an invited speaker and four breakout sessions. The breakout sessions covering various topics as: Software and Data Engineering, Computational Models and System Management Based on Machine Learning, Software Testing and Information System Development and Modern Information Systems and Signal Analysis.

Bringing this conference to fruition has been a true team effort, and we extend our heartfelt thanks to all committee members who worked tirelessly to promote the event. We are also deeply grateful to the authors for submitting their work and collaborating closely with the organizing committee to ensure the conference's success. Special appreciation goes to the technical program committee members and session chairs for dedicating their valuable time to support the critical tasks of paper review and evaluation.

Finally, to all authors and attendees, thank you for your participation. We hope you find this experience both rewarding and memorable.

We look forward to welcoming you again next year!

Yours sincerely,

ICSIE General Chairs

Prof. Samir Abou ELSEOUD, The British University in Egypt, Egypt
Prof. Omar KARAM, The British University in Egypt, Egypt
Prof. Farid Meziane, University of Derby, UK (Head of the Data Science Research Centre)
Dr. Jack Sutton, University of Derby, UK

Conference Venue

Enterprise Centre, University of Derby

Address: Bridge Street, Derby, DE1 3LD, UK

Time Zone

UTC/GMT+0

Important Notes

✧ Please take care of your belongings during the conference. The conference organizer does not assume any possibility for the loss of personal belongings of the participants.

✧ Please wear delegate badge during the conference. There will be NO access for people without a badge. Never discard your badge at will.

✧ Accommodation is not provided. Early reservation is suggested to be made for delegates.

✧ Please show the badge and meal coupons during lunch and dinner.

✧ Don't stay too late in the city and don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at scenic spots. More Tourist Information and Security tips are available online.

✧ Delegates are advised to carry sufficient cash with them when travelling around.

Important Phone Numbers

Emergency alarm telephone: 999　　　　　　　Non-emergency alarm telephone: 101

Non-emergency medical helpline: 111

December Climate & Weather Averages in Derby

High Temp: 7 °C　　Low Temp: 3 °C　　Mean Temp: 5 °C

Online APP

ZOOM Download Link: https://zoom.us/download

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Authors: Paper ID-Name	DB3001-San Zhang
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Materials Prepared by the Presenters

✧ **Oral Presentation:**

PowerPoint or PDF files

PowerPoint Background Template: icsie.org/kits.rar

Duration of Each Presentation

✧ Keynote Speech: 40 Minutes of Presentation including Q&A.

✧ Invited Speech: 25 Minutes of Presentation including Q&A.

✧ Regular Oral Presentation: 15 Minutes of Presentation including Q&A.

Note

✧ The regular oral presentation time arrangement is for reference only. In case any absence or some presentations are less than 15 minutes, please join your session before it starts.

An excellent presentation will be selected from each session which will be announced and awarded an excellent presentation certificate.

Keynote Speaker I

December 3, Tuesday, 09:10-09:50, GMT+0, London Time
ZOOM Link: https://us02web.zoom.us/j/82122340691
Zoom ID: 821 2234 0691
Password: 120204
Meeting Room: G11 (The Ground Floor at the Enterprise Centre)

Assoc. Prof. Harry Yu

University of Derby, UK

Speech Title: Generative AI (LLM) for Software Engineering: Current Work and Challenges and Future Directions

Abstract: The keynote addresses the transformative role of Generative AI, particularly Large Language Models (LLMs), in revolutionizing software engineering. It explores how generative models are reshaping traditional development phases, from ideation and coding to testing and deployment. Tracing the evolution from Waterfall to Agile, and now to AI-driven software product engineering, we examine how generative AI supports development by automating complex tasks such as code generation, UI design, microservices management, and data orchestration. Practical applications demonstrate LLMs' capabilities in code completion, error detection, and natural language programming, which streamline development and increase productivity. Additionally, this presentation highlights enterprise-level integration, where AI-driven orchestration of multi-source data and cloud architecture enables the rapid development of tailored data products.

The presentation also addresses critical challenges: quality control, reliability, security, and ethical considerations. With unpredictability in output and potential vulnerabilities in AI-generated code, establishing quality control protocols and building trust is essential. Ethical concerns surrounding accountability and transparency are examined, underscoring the need for explainable AI in critical applications. Future directions are outlined, emphasizing the potential for new communication protocols and AI-enhanced security measures that will facilitate smoother integration within Software-as-a-Service (SaaS) frameworks. This keynote presents a comprehensive look at both the capabilities and the responsibilities associated with generative AI in software engineering, offering insights into its future potential and the evolving role of AI-assisted development.

Bio: Dr. Hongqing (Harry) Yu, a distinguished Associate Professor in Data Science at the University of Derby, serves as both the Chair of the Master's Teaching Committee and the leader of the master's degree portfolio within the School of Computing. His career is marked by leading several high-profile projects funded by European and UK bodies, including two pivotal Innovate UK research projects focused on digital twins in the aerospace sector and a

knowledge exchange partnership project dedicated to multimodal data analytics for rail inspection. With a Ph.D. in Data Science domain and MSc in Software Engineering from the University of Leicester, Dr. Yu has made significant contributions to the fields of data analytics and generative AI. His research ambitiously spans big data analytics, machine learning, service-oriented programming, and the practical application of Large Language Models (LLMs), achieving remarkable progress in healthcare system, digital twins for engineering, and sports analytics. Recent research on combining Natural Langue Processing and knowledge graph technologies for developing intelligent systems in bioengineering and automative data analysis published in high impact journals recently have create great impacts in both academia and industry. Since he joined University of Derby, his research is extended into more engineering and applied AI area with his extensive knowledge gained from his previous research. He is currently leading research projects with Bloc Digital on digital twins and knowledge exchange partnership project dedicated to multimodal data analytics for inspection problems illustrated the big achievements of gaining recognitions of his AI research. He also supervised 12 Ph.D. students, demonstrating his commitment to fostering the next generation of scientists in AI and data science. His academic prowess is further evidenced by his authorship of over 50 publications and his leadership roles in several internationally renowned, high-impact journals. Recognized for his groundbreaking work, Dr. Yu was honored with the University of Derby's Exceptional Contribution Award in 2023, underscoring his influential role in advancing the frontiers of computer science research and education.Some of his more recent work involves the use of AI to detect emergency vehicles approaching traffic lights and change the lights in favour of the emergency vehicle to speed up the response time to emergencies. With many other emerging technologies and innovations currently being developed, Steve is undoubtedly one of the key innovators in the UK.

Keynote Speaker II

December 3, Tuesday, 09:50-10:30, GMT+0, London Time

ZOOM Link: https://us02web.zoom.us/j/82122340691

Zoom ID: 821 2234 0691

Password: 120204

Meeting Room: G11 (The Ground Floor at the Enterprise Centre)

Dr. Branislav Vuksanovic

(Deputy Head of Department of Systems Engineering)

Military Technological College, Oman

Speech Title: Challenges and Advances in Facial Expression Recognition: From Manual Analysis to Deep Learning

Abstract: Facial expression recognition (FER) has evolved significantly from early manual recognition methods to sophisticated automatic systems powered by machine learning and deep learning. This keynote will explore the historical progression of FER, highlighting the shift from first attempts of manual recognition to hand-crafted feature-based algorithms to fully automatic approaches using Convolutional Neural Networks (CNNs). Key challenges, such as the limitations of existing databases, the complexity of real-world expression recognition, and the impact of variables like image resolution and ambiguous facial expressions, will be discussed. The talk will also address ongoing research efforts aimed at improving the accuracy of FER in dynamic and unconstrained environments, as well as the complexities of cross-database FER, recognition of mixed emotions and subtle expressions. Finally, the presentation will provide insights into the future of FER technology and its potential applications in real-world settings.

Bio: Dr. Branislav Vuksanovic is an Electrical and Power Engineer, with a long academic and professional career. He completed his undergraduate studies at the University of Belgrade, Serbia, and later earned his MSc degree in Measurement and Instrumentation at South Bank University in London, UK. He went on to complete his PhD in Active Noise Control at the University of Huddersfield, UK.

Dr. Vuksanovic has a career history, which includes working as a Project Engineer for the Croatian Electricity Board in Osijek, Croatia, and as a Research Fellow at Sheffield and Birmingham Universities on medical imaging research projects. At the University of Derby, he worked as a Lecturer and was a member of the Sensors and Controls Research Group. He moved to the University of Portsmouth where he first worked as a Senior Lecturer and later as an Associate Head of School for Research and Innovation at the School of Energy and Electronic Engineering. Currently he is a Deputy Head of Department of Systems Engineering at the Military Technological College in Oman.

He has written and published research papers, including those in the areas of active noise control, biomedical signal processing, and pattern recognition for intrusion detection and knowledge-based authentication. He has also authored a book in the Digital Electronics and Microcontrollers field, and organized and chaired several international conferences and workshops. Dr. Vuksanovic currently serves as an Editor-In Chief for the Journal of Image and Graphics and is a member of the IET and ASR. His current research interests revolve around the application of pattern recognition techniques for power systems, acoustic noise analysis and the processing of ground-penetrating radar data.

Keynote Speaker III

December 3, Tuesday, 13:30-14:10, GMT+0, London Time
ZOOM Link: https://us02web.zoom.us/j/82122340691
Zoom ID: 821 2234 0691
Password: 120204
Meeting Room: G11 (The Ground Floor at the Enterprise Centre)

Prof. Farid Meziane
(Head of the Data Science Research Centre)

University of Derby, UK

Speech Title: Exploiting Web Resources to Support Automatic Course Design

Abstract: With the rapid advances in E-learning systems, personalisation and adaptability have now become important features in the education technology. Furthermore, there are many countries that are struggling to attract teachers in some disciplines such as computer science. This talk will focus on the development of an architecture for A Personalised and Adaptable E-Learning System (APELS) that attempts to contribute to addressing some of these challenges.

APELS aims to provide a personalised and adaptable learning environment to users from the freely available resources on the Web. Hence allowing individuals and teaching institutions to take advantage of Artificial Intelligence and the availability of learning resources. The architecture makes use of an ontology to model a specific learning subject and to extract the relevant learning resources from the Web based on a learner's model (the learners background, needs and learning styles). The APELS system uses natural language processing techniques to evaluate the content extracted from relevant resources against a set of learning outcomes as defined by standard curricula to enable the appropriate learning of the subject. An application in the computer science field is used to illustrate the working mechanisms of the APELS system and its evaluation based on the ACM/IEEE computing curriculum. An experimental evaluation was conducted with domain experts to evaluate whether APELS can produce the right learning material that suits the learning needs of a learner. The results show that the produced content by APELS is of a good quality and satisfies the learning outcomes for teaching purposes.

Bio: Farid Meziane is a professor of Data Science, Head of the Data Science Research Centre, the University's lead for the Data Science academic research theme and the chair of the college of Science and Engineering Research Committee at the University of Derby, UK. He obtained a PhD in Computer Science from the University of Salford, UK on his work on producing formal specification from Natural Language requirements. The work was considered at that time as pioneering in the area and paved the way for a large interest in automating the production of software specifications from informal requirements.

He has authored over 200 scientific papers and participated in many national and international research projects. He is the co-chair of the international conference on application of Natural Language to information systems; co-chair of the international conference on Information Science and Systems. He is serving in the programme committee of over ten international conferences. He is an associate editor for the data and knowledge engineering (Elsevier) journal and the managing editor of the International Journal of Information Technology and Web Engineering (IDEA publishing). He was awarded the Highly Commended Award from the Literati Club, 2001 for his paper on Intelligent Systems in Manufacturing: Current Development and Future Prospects. His research expertise includes Natural Language processing, semantic computing, data mining and big data and knowledge Engineering.

Webpage: https://www.derby.ac.uk/staff/farid-meziane/

Keynote Speaker IV

December 3, Tuesday, 14:10-14:50, GMT+0, London Time
ZOOM Link: https://us02web.zoom.us/j/82122340691
Zoom ID: 821 2234 0691
Password: 120204

Prof. Tarek M. Sobh

(Fellow of African Academy of Sciences, Fellow of The Engineering Society of Detroit)

President
Professor of Electrical and Computer Engineering
Lawrence Technological University, USA

Distinguished Professor and Dean of Engineering Emeritus
University of Bridgeport, USA

Speech Title: The Future Reimagined: Disruptive Technologies and the Dawn of the Autonomous Age

Abstract: The world stands on the threshold of an era defined by extraordinary technological disruptions, poised to reshape every facet of life, industry, and education. Emerging innovations—from generative AI and autonomous robotics to personalized medicine and electric, sustainable mobility—are converging to create unprecedented transformations in the workforce, evolving job roles, and altering the way we approach learning, research, and daily interactions. As autonomous systems infiltrate fields once thought impossible to automate, new paradigms of smart cities, sustainable infrastructures, and personalized experiences are rapidly redefining modern existence. In this evolving landscape, traditional skill sets will be augmented by interdisciplinary agility, professional excellence, and deep technological acumen—hallmarks of the Lawrence Technological University approach.
In this keynote address, we will explore how these disruptive technologies are setting the stage for a radically reimagined future. We will delve into the transformative potential of these advancements, discussing not only the promise they hold but also the profound societal shifts they necessitate. By aligning our focus on technological eminence, industry immersion, and research-driven innovation, we, as educators and industry leaders, have the unique responsibility to equip the next generation for roles that are yet to be defined, guiding them to become leaders in a world where theory must not only meet practice but push the boundaries of what is conceivable.

Bio: Professor Tarek M. Sobh received the B.Sc. in Engineering degree with honors in Computer Science and Automatic Control from the Faculty of Engineering, Alexandria University, Egypt in 1988, and M.S. and Ph.D. degrees in Computer and Information Science from the School of Engineering, University of Pennsylvania in 1989 and 1991, respectively. He is currently the President and a Professor of Electrical and Computer Engineering at Lawrence Technological University (LTU), Michigan. He is also a Distinguished Professor and Dean of Engineering Emeritus at the University of Bridgeport, Connecticut. He was the Provost at LTU (2020-2021), and has served as the University of Bridgeport (UB) Executive Vice President, Research and Economic Development, and the Founding Dean of the College of Engineering, Business,

and Education (2018-2020), Interim Provost (2020), and Distinguished Professor of Engineering and Computer Science (2010-2020). He was the Founding Director of the Interdisciplinary Robotics, Intelligent Sensing, and Control (RISC) laboratory (1995-2020), the Founder of the High-Tech Business Incubator at UB (CTech IncUBator) (2010-2011), and the Founding Director of the UB Innovation Center (2019-2020). He was the Senior Vice President for Graduate Studies and Research (2014-2018), Vice President (2008-2014), Vice Provost (2006-2008), Dean of the School of Engineering (1999-2018), Interim Dean of the School of Business, Director of External Engineering Programs, Interim Chair of Computer Science and Computer Engineering, and Chair of the Department of Technology Management. He also served as a Professor of Computer, Electrical and Mechanical Engineering and Computer Science (2000-2010) and an Associate Professor of Computer Science and Computer Engineering (1995-1999) at UB, a Research Assistant Professor of Computer Science at the Department of Computer Science, College of Engineering, University of Utah (1992-1995), and a Research Fellow at the General Robotics and Active Sensory Perception (GRASP) Laboratory of the University of Pennsylvania from (1989-1991). His background is in the fields of computer science and engineering, STEM Education, control theory, robotics, automation, manufacturing, AI, computer vision and signal processing. He has published over 275 refereed journal and conference papers, and book chapters in these and other areas, in addition to 27 books. Dr. Sobh served or currently serves on the editorial boards of 18 journals, and has served as Chair, Technical Program Chair and on the program committees of over 300 international conferences and workshops in the Robotics, Computer Vision, Automation, Sensing, Computing, Systems, Control, Online Engineering and Engineering Education areas. He has presented more than 150 keynote speeches, invited talks and lectures, colloquia and seminars at research meetings, University departments, research centers, and companies. Professor Sobh has supervised over 50 award-winning graduate and undergraduate students working on different projects within robotics, prototyping, computer vision, control, and manufacturing; in addition to more than 300 undergraduate and graduate students working on their B.S. projects, Master's thesis or Ph.D. dissertations. Dr. Sobh is active in consulting and providing service to many industrial organizations and companies. He has consulted for several companies in the U.S., Switzerland, India, Malaysia, England, the United Arab Emirates, Kazakhstan and Egypt, to support projects in higher education, robotics, automation, manufacturing, sensing, and control. He has also worked at Philips Laboratories in New York, and a number of companies in Egypt. Dr. Sobh has been awarded over 60 research awards and grants to pursue his work in robotics, automation, STEM education, manufacturing, and sensing.

Dr. Sobh is a Fellow of the African Academy of Sciences, a member of the Connecticut Academy of Science and Engineering, and a Fellow of the Engineering Society of Detroit. Dr. Sobh is a recipient of the ASEE Northeastern U.S. Distinguished Engineering Professor of the Year award, the IEEE Northeast Technological Innovation Research Award, an ACE Higher Education Award and several other merits in recognition of his educational, research, scholarly and service activities in engineering, education, computing and diversity initiatives. Dr. Sobh is a Licensed Professional Electrical Engineer (P.E.), a Certified Manufacturing Engineer (CMfgE) by the Society of Manufacturing Engineers, a Certified Professional Manager (C.M.) by the Institute of Certified Professional Managers at James Madison University, a Certified Reliability Engineer (C.R.E.) by the American Society for Quality, a member of Tau Beta Pi (Engineering Honor Society), Sigma Xi (Scientific Research Society), Phi Beta Delta (International Honor Society), Upsilon Pi Epsilon (National Honor Society for the Computing Sciences), Phi Kappa Phi (Academic Honor Society), and an honorary member of Delta Mu Delta (National Honor Society for Business   Administration).

Dr. Sobh is a trustee, senior member, founding, executive, or board member of several professional organizations including; the Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers

(IEEE), International Society for Optical Engineering (SPIE), National Society of Professional Engineers (NSPE), American Society of Engineering Education (ASEE), American Association for the Advancement of Science (AAAS), Society of Manufacturing Engineers (SME), International Association of Online Engineering (IAOE), Bridgeport Discovery Museum, American University of Iraq – Baghdad (AUIB), Michigan College Access Network (MCAN), Michigan Independent Colleges and Universities Association (MICU), Detroit Economic Club (DEC), Association of Independent Technological Universities (AITU), Wolverine-Hoosier Athletic Conference (WHAC), Automation Alley, and the Centrepolis Accelerator. Dr. Sobh is a graduate of Victoria College, Alexandria, Egypt, in 1983 and a life member of the Old Victorians Association.

Invited Speaker

December 3, Tuesday, 15:20-15:45, GMT+0, London Time

ZOOM Link: https://us02web.zoom.us/j/82122340691

Zoom ID: 821 2234 0691

Password: 120204

Meeting Room: G11 (The Ground Floor at the Enterprise Centre)

Dr. Sokratis Karkalas

University of Derby, UK

Speech Title: SMILE: Building a SMart Interactive Learning Ecosystem for 21st-Century Education

Abstract: Global educational and industry agendas increasingly emphasize the importance of digital competencies and 21st-century skills. This talk focuses on the design and implementation of a learning platform that, through an innovative integration and interoperability mechanism, supports the creation of an ecosystem of diverse learning components. These components can be combined with emerging technologies to generate highly interactive, intelligent, and adaptable learning activities that address the needs of 21st-century learners.

The platform enables the seamless integration of heterogeneous components and transforms them into "factories" for generating personalized learning activities. These activities can be epiphytically enhanced with automated support and adaptability features. Furthermore, the platform captures learner interactions, providing teachers and learning designers with customizable analytics. These analytics allow for the refinement and optimization of learning scenarios and plans.

A key objective of this project is to democratize the use of technology by promoting the reusability and accessibility of existing tools. The platform enables freely available web-based tools to be reused, enhanced, and combined into dynamic learning ecosystems, fostering the creation of engaging and personalized learning experiences.

The web offers a vast array of components, from dynamic geometry and computational thinking tools to OWL reasoners and visualization frameworks. Integrating these components into a unified platform and making them interoperable enhances their value. Additionally, providing automated support, analytics, and authorability features for non-technical users reduces barriers to entry and increases accessibility, amplifying their impact.

Drawing on lessons from several EU Horizon and other projects, including the latest ExtenDT2 EU Horizon project, this talk will present insights and future directions for the development and implementation of such learning platforms.

Bio: Dr. Sokratis Karkalas has been working at the intersection of industry and education since 1991. He holds degrees in economics, business administration, computer science, and pedagogy. Currently, he is a Senior Lecturer in

Software Engineering at the University of Derby, where he leads two BEng degrees in Software Engineering and heads the Education and AI Research Group. He also serves as a Visiting Research Fellow at the UCL Knowledge Lab, University of London.

Dr. Karkalas earned his PhD in Computer Science from the University of London, where he was awarded the Best PhD Project Award by INSTICC (Institute for Systems and Technologies of Information, Control and Communication) in 2015. He is an accredited TOGAF Enterprise Architect, a member of the Association of Enterprise Architects (UK), an Associate Fellow of the Higher Education Academy (UK), and a member of the British Computer Society – The Chartered Institute for IT.

Prior to his academic career, Dr. Karkalas held the position of Group Chief Information Officer (CIO) for a multinational industrial group and worked as a senior / lead software engineer and project architect at major consulting firms. In these roles, he led the design and development of prototypes for R&D departments. He has contributed to numerous research projects - academic and industrial - funded by the EU, local governments (ESRC/EPSRC), and the private sector.

With over 25 years of academic experience, including 17 years at leading UK universities, Dr. Karkalas' research focuses on computer-supported education, particularly the application of artificial intelligence to improve learning. He applies machine learning techniques to provide personalized support to both students and educators. Dr. Karkalas also has extensive experience designing and implementing information systems for educational and industrial applications, as well as working on technologies that enable the semantic enhancement, integration, and interoperability of diverse components within learning platforms.

Day 1- December 2, 2024 (Monday, GMT+0, London Time)

Onsite Sign-in

Time	Event	Venue
13:00-17:00	Onsite Sign-in	G11 (The Ground Floor at the Enterprise Centre)
15:00-17:00	Visit activities	Gather at the Main Reception at 15:00

Online Pretest

Time	Presenters	ZOOM Information
09:00-12:00	Keynote Speakers (Online), Session Chairs (Online), Committee Members (Online)	ZOOM Link: https://us02web.zoom.us/j/82122340691
09:00-12:00	**Online Session 1: Software Testing and Information System Development** DB3008, DB3017, DB3035, DB3025, DB3006, DB3029, DB3031, DB3016	ZOOM ID: 821 2234 0691
	Online Session 2: Modern Information Systems and Signal Analysis DB3007, DB3022, DB3023, DB504, DB507, DB510, DB3020	Password: 120204

Online Test Tips:

✧   Please get your presentation file ready for the pretest.

✧   Please unmute audio and start video while your presentation.

✧   It's suggested to use headset with microphone or earphone with microphone.

Day 2- December 3, 2024 (Tuesday, GMT+0, London Time)

Opening Ceremony and Keynote Speeches

Onsite Meeting Room –G11 (The Ground Floor at the Enterprise Centre)
Zoom ID: 821 2234 0691
Zoom link: https://us02web.zoom.us/j/82122340691 Password: 120204

Host: Dr. Jack Sutton, University of Derby, UK

09:00-09:05	**Welcome Message** Prof. Farid Meziane Head of the Data Science Research Centre University of Derby, UK
09:05-09:10	**Opening Remarks** Prof. Samir Abou ELSEOUD The British University in Egypt, Egypt
09:10-09:50	**Keynote Speech I** Assoc. Prof. Harry Yu University of Derby, UK **Speech Title: Generative AI (LLM) for Software Engineering: Current Work and Challenges and Future Directions**
09:50-10:30	**Keynote Speech II** Dr. Branislav Vuksanovic Deputy Head of Department of Systems Engineering Military Technological College, Oman **Speech Title: Challenges and Advances in Facial Expression Recognition: From Manual Analysis to Deep Learning**
10:30-10:50	**Group Photo & Coffee Break**
10:50-12:05	**Onsite Session 1 -Software and Data Engineering** **Session Chair:** Assistant Professor SOKRATIS KARKALAS, University of Derby, United Kingdom DB3005, DB3004, DB3014, DB3024, DB508
12:05-13:30	**Break & Lunch**
13:30-14:10	**Keynote Speech III** Prof. Farid Meziane Head of the Data Science Research Centre University of Derby, UK **Speech Title: Exploiting Web Resources to Support Automatic Course Design**

14:10-14:50	**Keynote Speech IV** Prof. Tarek M. Sobh (Fellow of African Academy of Sciences, Fellow of The Engineering Society of Detroit) President Professor of Electrical and Computer Engineering Lawrence Technological University, USA Distinguished Professor and Dean of Engineering Emeritus University of Bridgeport, USA **Speech Title: The Future Reimagined: Disruptive Technologies and the Dawn of the Autonomous Age**
14:50-15:20	**Group Photo & Coffee Break**
15:20-17:00	**Onsite Session 2 -Computational Models and System Management Based on Machine Learning** **Session Chair:** Assoc. Prof. Harry Yu, University of Derby, UK **Invited Speaker:** SOKRATIS KARKALAS, University of Derby, United Kingdom DB3028, DB3013, DB3019, DB502, DB3037
17:30-19:00	**Dinner**

Day 3 –December 4, 2024 (Wednesday, GMT+0, London Time)

Online Sessions Zoom link: https://us02web.zoom.us/j/82122340691 Zoom ID: 821 2234 0691 Password: 120204	
09:30-11:30	**Online Session 1 –Software Testing and Information System Development** Session Chair: Assoc. Prof. Bilal Al-Nassar, The World Islamic Sciences & Education University (WISE), Jordan DB3008, DB3017, DB3035, DB3025, DB3006, DB3029, DB3031, DB3016
11:30-13:00	**Break Time**
13:00-14:45	**Online Session 2 –Modern Information Systems and Signal Analysis** Session Chair: Assoc. Prof. Abdallah Qusef, Princees Sumaya University for Technology, Jordan-Amman DB3007, DB3022, DB3023, DB504, DB507, DB510, DB3020

Onsite Session 1

Time: 10:50-12:05 (GMT+0, London Time) **Date:** Tuesday, December 3 **Venue**: G11 (The Ground Floor at the Enterprise Centre) **Topic:** Software and Data Engineering **Chaired by:** Assistant Professor SOKRATIS KARKALAS, University of Derby, United Kingdom	
DB3005 **10:50-11:05**	**Title: Privacy by Design: A Systematic Literature Review of European and British Regulatory Perspectives for Software and Information Engineering** **Authors:** Mevre Tunca **Presenter:** Mevre Tunca, Fraunhofer Institut FOKUS, Germany **Abstract:** This systematic literature review examines the key recommendations for the implementation of Privacy by Design and Data Protection by Design principles of the European data protection authorities, including the European Free Trade Association countries and the United Kingdom. The introduction of the General Data Protection Regulation in May 2018 was a pivotal moment for data protection. As a result, the European data protection authorities have significantly intensified their publication efforts and issued more documents about Privacy by Design and Data Protection by Design. The results of the systematic literature review data minimisation and the implementation of technical and organisational measures as key recommendations for the effective integration of data protection principles in software development. Despite these efforts, user privacy remains at risk, as evidenced by emerging threats. This emphasises the need to further strengthen efforts to protect data. This overview could serve as an incentive to intensify work on Privacy by Design and develop innovative approaches to address the growing challenges of data protection. It is important to note that this study has its limitations. Future research could focus on analysing documents in national languages or documents published by other European authorities. It would also be beneficial to investigate the challenges and requirements of software engineers when implementing data protection policies, in particular how local differences and specific requirements affect the application of Privacy by Design and Data Protection by Design. A detailed study of country-specific policies and the development and validation of concrete methods and tools to support software engineers should also be pursued more intensively.
DB3004 **11:05-11:20**	**Title: Case Studies on LLM Centric and Services Oriented Data Analytics Agent Development** **Authors:** Hong Qing Yu, Jack Sutton, Sam O'Neill and Stephan Reiff-Marganiec **Presenter:** Hong Qing Yu, University of Derby, School of Computing, UK **Abstract:** This paper presents a novel service orchestration framework for a chatbot application focused on data analytics questions. The framework integrates Large Language Models (LLMs) with service-oriented computing to transform data analytics into a dynamic, conversational experience. The approach leverages advancements in LLM technology to enable real-time, automated data insights via chatbot interfaces, making complex data analytics accessible across various industries. In addition, the data will be processed and analysis at edge-machine rather than post all the data directly to the LLMs on the cloud. Therefore, the Central to the framework is the local Micro Analytics Service (MAS) and a dynamic service-data coordination framework, which together facilitate the decoupling of data from business logic, allowing for intuitive engagement with analytics processes. Through two case studies, retail data analysis and regional healthcare planning, the ability of the framework to provide actionable insights through natural language prompts is demonstrated, showcasing its potential to significantly reduce barriers to sophisticated data analytics. The evaluation reveals strong performance in data connection and code generation, with identified areas for improvement in visualizations and handling complex data scenarios

DB3014 11:.20-11:35	**Title: Enabling AI-Driven Customer Experiences in Fashion E-Commerce through an End-to-End ML Software Development Framework** **Authors:** Hareesh Pallikara Bahuleyan, Yevgeniy Puzikov, Evgenii Koriagin, Julia Lasserre, Rodrigo Weffer, Reza Shirvany **Presenter:** Hareesh Pallikara Bahuleyan, Zalando SE, Germany **Abstract:** Artificial Intelligence (AI) and Machine Learning (ML) solutions are transforming fashion e-commerce by enhancing various aspects of the customer journey, such as product recommendations, virtual try-ons, and size and fit assistance. While there are many innovative AI-driven solutions being developed, not all of them successfully make it to the market as customer-facing products. Key underlying reasons for this are the uncertainty around the infrastructure needs, customer experience requirements, and a lack of systematic alignment between algorithmic and business metrics. These challenges are significant in the context of fashion e-commerce due to the dynamic nature of the industry and the importance of personalized customer experiences. To address these challenges in a scalable and repeatable manner, it is critical to establish ML software development processes and frameworks that can be applied consistently across projects. In this work, we explore these challenges in detail and provide insights and recommendations based on real-world experiences. We propose a comprehensive framework that outlines a structured approach to taking AI/ML models from initial experimental projects to live customer-facing software products at a scale of millions of customers, where multidisciplinary teams with expertise in data science, software engineering, business strategy, and product development collaborate.
DB3024 11:35-11:50	**Title: A review of practices suitable for ethics-aware software engineering** **Authors:** Senyeki Milton marebane, Ernest Mnkandla **Presenter:** Senyeki Milton marebane, Tshwane University of Technology, South Africa **Abstract:** Research shows that the lack of ethical practices for regulating human behaviour and ethical judgment in software development is a concern. The lack of ethical practices lead to the development of software which is not in line with the ethical needs of software stakeholders. The consideration of the ethical needs of stakeholders and their integration into the software process requires knowledge of the relevant practices. This study sought to identify ethical practices applicable in supporting ethical software development. To achieve the objective of this study literature review was conducted based on search keywords. This study determined that ethics awareness, enforcement, decision-making, evaluation, and governance are integral ethical practices for achieving ethics-aware software engineering practice to cater to stakeholder ethical needs. Although the findings of this study are based on literature sources, future empirical studies should be conducted to validate the combination of these ethical practices to determine how they can support ethical software development and create frameworks for ethics-aware software engineering practice.
DB508 11:50-12:05	**Title: Implementation of Digital Image Zooming On DSK6713 DSP Platform For Real-Time Applications** **Authors:** Abdellah Skoudarli, Lina Kebri, Yasser Bouzaza **Presenter:** Abdellah Skoudarli, University of Science & Technology Houari Boumediene (USTHB), Algeria **Abstract:** Digital image zooming is very important process in image processing. Basically, zooming process consist of two steps: the creation of new pixels locations and the assignment of intensity of gray level to those new location. In general, zooming process provides an enlarged image to get better view of the original digital image with preserving as much as possible the information content of the original image. In fact, Digital image zooming operation requires a high storage size and computational complexity. In this paper, we consider an interpolation method for zooming digital images 16 times because of their inherent abilities to preserve sharp edges and

detail. In order to achieve real time application, the interpolation algorithm based on 15 filters has been implemented on DSK6713 Platform. According to the experimental results our implementation on DSK6713 platform is able to perform digital image zooming for 32x32 size in real time by using DSP internal memory. For larger sizes 64x64 and 128x128, we propose DSK6414 with high DSP frequency and larger internal memory.

Onsite Session 2

Time: 15:20-17:00 (GMT+0, London Time) **Date:** Tuesday, December 3rd **Venue:** G11 (The Ground Floor at the Enterprise Centre) **Topic:** Computational Models and System Management Based on Machine Learning **Chaired by:** Assoc. Prof. Harry Yu, University of Derby, UK	
Invited Speech **15:20-15:45**	**Title: SMILE: Building a SMart Interactive Learning Ecosystem for 21st-Century Education** **Author:** SOKRATIS KARKALAS **Presenter:** Dr. SOKRATIS KARKALAS, University of Derby, United Kingdom **Abstract:** Global educational and industry agendas increasingly emphasize the importance of digital competencies and 21st-century skills. This talk focuses on the design and implementation of a learning platform that, through an innovative integration and interoperability mechanism, supports the creation of an ecosystem of diverse learning components. These components can be combined with emerging technologies to generate highly interactive, intelligent, and adaptable learning activities that address the needs of 21st-century learners. The platform enables the seamless integration of heterogeneous components and transforms them into "factories" for generating personalized learning activities. These activities can be epiphytically enhanced with automated support and adaptability features. Furthermore, the platform captures learner interactions, providing teachers and learning designers with customizable analytics. These analytics allow for the refinement and optimization of learning scenarios and plans. A key objective of this project is to democratize the use of technology by promoting the reusability and accessibility of existing tools. The platform enables freely available web-based tools to be reused, enhanced, and combined into dynamic learning ecosystems, fostering the creation of engaging and personalized learning experiences. The web offers a vast array of components, from dynamic geometry and computational thinking tools to OWL reasoners and visualization frameworks. Integrating these components into a unified platform and making them interoperable enhances their value. Additionally, providing automated support, analytics, and authorability features for non-technical users reduces barriers to entry and increases accessibility, amplifying their impact. Drawing on lessons from several EU Horizon and other projects, including the latest ExtenDT2 EU Horizon project, this talk will present insights and future directions for the development and implementation of such learning platforms.
DB3028 **15:45-16:00**	**Title: Comparing the Performance of a CDC Questionnaire with Machine Learning Models in Predicting Diabetes** **Authors:** Yusuf Alatawi, Hasan Kadhem **Presenter:** Yusuf Alatawi, American University of Bahrain, Bahrain **Abstract:** This paper addresses the pressing issue of diabetes, a primary global health concern, by comparing machine learning models and a Cen- ters for Disease Control and Prevention (CDC) questionnaire for diabetes diagnosis based on nutritional data. Utilizing the National Health and Nutrition Examination Survey (NHANES) dataset, the study highlights the limited of Machine Learning (ML) research fo- cusing solely on nutritional features. The machine learning models, including K nearest neighbor (KNN) and support vector machine (SVM), are evaluated for recall, precision, and other performance metrics. Notably, KNN and SVM outperform the CDC questionnaire, obtaining F1 scores of more than 60% compared to about 40% for the questionnaire. In addition to that, they achieved recall scores of more than 80%, while the questionnaire only managed a recall of about 30%. These results suggest that machine learning models based on nutrition and diet could serve as more effective diabetes screening tools.

DB3013 **16:00-16:15**	**Title: Multi-Step Ahead Battery SOC Estimation Using Data-Driven Prognostics and Health Management** **Authors:** Juliano Pimentel; Alistair A. McEwan; Hong Qing Yu **Presenter:** Juliano Pimentel, University of Derby, UK **Abstract:** This paper proposes a data-driven multi-step ahead battery state of charge (SOC) forecasting system that can be used for prognostics and health management (PHM) of a battery management system (BMS). Two long short-term memory (LSTM) recurrent neural networks (RNN) are implemented and tested, due to their unique capability to, at the same time, use a high number of past time steps and forecast a horizon of interest at real-time. This online inference is then capable to provide an advisory window in case the BMS needs to take any preventive action. The LSTM models, a stacked-LSTM and a Bidi-LSTM, are compared to a statistical-based algorithm which uses a combination of autoregressive integrated moving average (ARIMA) with a polynomial regressor that fits measured variables into the battery SOC. The three methods are tested and validated against a wealthy battery dataset and results demonstrate the feasibility of using the Bidi-LSTM RNN as multi-step ahead SOC forecast estimator.
DB3019 **16:15-16:30**	**Title: Designing a Tool that automatically translates Makaton signs from live video streams into written English** **Authors:** Sokratis Karkalas, Omotayo Emmanuel Omoyemi **Presenter:** Sokratis Karkalas, University of Derby, United Kingdom **Abstract:** This paper presents the design process for a tool intended to automatically translate Makaton signs from live video streams into written English. Makaton, a communication system utilising signs and symbols to assist individuals with communication difficulties, requires an effective translation system to improve accessibility. To guide the design of this tool, we conducted a thematic analysis of information collected from experts in the field. This analysis identified key themes and needs, which were used to develop design specifications for the tool. The output was evaluated and validated through member checking, confirming that the results accurately reflected the experts' knowledge, experiences, and needs. Feedback from participants was incorporated to refine the design specifications, ensuring they were grounded in practical application and user expectations. The refined specifications will inform the subsequent development of a prototype. This paper outlines the methodological approach, including thematic analysis, member checking, and the formulation of design specifications. It highlights the role of iterative feedback in enhancing the tool's relevance and effectiveness, and underscores the importance of user-centered design in assistive technology development. The study provides a framework for future research and development in this area.
DB502 **16:30-16:45**	**Title: Unsupervised and supervised machine learning model for cross-terms suppression in Wigner-Ville distribution of non-stationary signals** **Author:** Aditya Shirish Kamat, Julio Gustavo Fernando Sa, Anurag Nishad and Abhay Upadhyay **Presenter:** Anurag Nishad, Birla Institute of Technology and Science, Pilani K.K. Birla Goa Campus, India **Abstract:** In this paper, we present a novel method based on unsupervised and supervised machine learning model for crossterm suppression in the Wigner-Ville distribution (WVD) of nonstationary multi-component signals. In this study, we considered the linear frequency modulated (LFM) mono-components that are either overlapped or non-overlapped in the time-frequency (T-F) plane. In this methodology, the WVD of the multicomponent signal is computed. Then the k-means clustering based unsupervised learning algorithm is applied to the computed WVD to form the clusters in the T-F plane. The clusters are grouped into mono-components and cross-terms. Further, the linear regression model is used to estimate the missing samples of mono-components in WVD. The efficacy of the proposed method is evaluated by comparing the normalized Renyi entropy under different

	signal-to-noise (SNR) conditions with another existing method. The simulation results show that the proposed method is superior to the compared method when mono-components are overlapped and comparable when mono-components are non-overlapped in the T-F plane in terms of normalized Renyi entropy.
DB3037 **16:45-17:00**	**Title: Innovative Application of Matlab Grader in Addressing Plagiarism and Assessing Partially Correct Answers in Engineering Education** **Author:** Branislav Vuksanovic, Mohamed Al-Mosawi **Presenter:** Branislav Vuksanovic, Systems Engineering Department, Military Technological College, Muscat, Oman **Abstract:** This paper explores the use of Matlab Grader as an educational tool in technical subjects. It proposes some novel, machine learning based methods to mitigate plagiarism in coursework assignments and evaluate partially correct answers in technical examinations. Focusing on the engineering modules delivered on Masters Level, this study delves into the challenges faced and the novel solutions devised to tackle these issues. The discussion focuses on the utilization of text comparison techniques, particularly the application of the Jaccard method, to assess similarity in student submissions and determine appropriate grading for answers lacking a definitive final solution. Preliminary findings indicate promising results, suggesting the potential for further exploration and refinement of these methodologies in educational assessment

Online Session 1

Time: 9:30-11:30 (GMT+0, London Time)
Date: Wednesday, December 4
ZOOM Link: https://us02web.zoom.us/j/82122340691
ZOOM ID: 821 2234 0691
Password: 120204
Topic: Software Testing and Information System Development
Chaired by: Assoc. Prof. Bilal Al-Nassar, The World Islamic Sciences & Education University (WISE), Jordan

DB3008 09:30-09:45	**Title: Exploring Gamification Risks and Implications in Agile Software Development Enterprises: An Empirical Study** **Author:** Fayrouz M. Elsalmy, Nada H.Sherief, Walid R. Abdelmoez **Presenter:** Fayrouz M.Elsalmy, The Arab Academy for Science, Technology and Maritime Transport, Egypt **Abstract:** This research highlights a gap in applying gamification to agile software development enterprises. While gamification risks and negative side effects have been addressed in principle, limited research explored their impact on software development, specifically agile gamification. The paper aims to: 1) identify gamification risks and risk factors for software development enterprises 2) provide a gamification risk taxonomy 3) design context-inclusive risk profiles to identify the cause-effect of the potential risks for the agile roles, and 4) present the impact of gamification on agile software development roles and tasks. The research employs qualitative methods to uncover risk factors and identify gamification risks from software engineers and scrum teams, providing insights from experts to confirm and refine gamification risks within the agile software development context. We aim to help project managers and scrum masters with task assignments and improve the employee's well-being and team performance during the gamified agile software development process.
DB3017 09:45-10:00	**Title: Streamlining Test Execution: A Case Study on the Use of Automated Testing to Enhance Productivity** **Authors:** Rhuan Viana, Flavia Oliveira, Lennon Chaves **Presenter:** Rhuan Viana, Sidia Science and Technology Institute, Brazil **Abstract:** An increase in the velocity of project delivery in the technology industry necessitates the adoption of novel methodologies by software development companies. In response, software testing underwent a significant paradigm shift to synchronize with expedited project timelines. The convergence of high-priority tests with tight deadlines has become increasingly common. To address this challenge, an Institute of Technology developed the AutoBOT Tool for automated functional testing of Android smartphones and tablets. Based on the Theory of Acceptance Model (TAM) and Goal-Question-Metric (GQM), the study collected qualitative and quantitative data to assess the impact of automation tools on delivery strategies in test teams. The results demonstrated that the adoption of AutoBOT resulted in a significant reduction of 2074 h in tester effort and an increase in productivity.
DB3035 10:00-10:15	**Title: PM4Flower: A Scriptable Parametric Modeling Interface for Procedural Flower Generation Using PM4VR** **Author:** Wanwan Li **Presenter:** Wanwan Li, University of Tulsa, USA **Abstract:** In this paper, we introduce PM4Flower, a novel scriptable parametric modeling interface providing users with a flexible system for procedurally generating diverse flower models through parametric controls. PM4Flower allows users to write intuitive scripts to craft realistic flower

models for a wide range of applications, from VR/AR environments to visual effects in film and games. This research outlines the design principles behind PM4Flower, the procedural techniques employed, and the parametric scripting interface that empowers users to define detailed, customized flower structures. We also demonstrate the effectiveness of generating different types of realistic flower models using the PM4Flower interface, highlighting its strengths in creativity and flexibility.

DB3025 **10:15-10:30**	**Title: Software Bug Count Prediction Using Abstract Syntax Trees (ASTs)** **Authors:** Rahmeh Ibrahim, Abdallah Qusef **Presenter:** Rahmeh Ibrahim, Computer Science Department in Princess Sumaya University for Technology, Jordan-Amman **Abstract:** Predicting software defects is important for ensuring high-quality software delivery. This proposed study investigates the effective ness of deep learning models in predicting software bug counts compared to traditional machine learning models. We concentrated our investigation on two fundamental questions: (1) Can deep learn ing techniques surpass traditional machine learning approaches in accurately predicting bug counts in software modules via re gression analysis? (2) In the context of regression-based bug count prediction, does a deep learning model that leverages features ex tracted from Abstract Syntax Trees (ASTs) demonstrate superior performance compared to one that relies on Object-Oriented (OO) metrics? To address RQ-1, we trained layered Long Short-Term Memory (LSTM) networks and Convolutional Neural Networks (CNNs) on (17) OO metrics from the PROMISE and SPSC datasets and compared their performance. For RQ-2, we extracted relevant features from ASTs using specific node types and combined them with the OO metrics to train the LSTM and CNN models. Four experiments were conducted: LSTM on OO metrics, LSTM on AST features, CNN on OO metrics, and CNN on AST features. Evalua tion using Mean Absolute Error (MAE) and Mean Relative Error (MRE) showed that deep learning models outperformed traditional machine learning models, with layered LSTM and CNN models trained on combined OO metrics and AST features achieving the best defect predictive accuracy. These findings highlight the po tential of deep learning approaches in software defect prediction and show the importance of feature selection in achieving optimal results.
DB3006 **10:30-10:45**	**Title: A Case Study on a New Testing Strategy in the Scope of IMS Service Requirements Applied to Mobile Devices** **Authors:** Gapasr Henrique Alves Mota, André José de França, Flávia Camila M. de Oliveira **Presenter:** Gaspar Mota, Sidia Institute of Science and Technology Manaus, Amazonas, Brazil **Abstract:** In this paper, the authors describe a case study of the software development industry. They discuss the issues related to testing the Android operating system facing the Software Engineering Laboratory (SEL) team with respect to IP Multimedia Subsystem (IMS) services and personalizing them according to carrier requirements. These tests are crucial for the approval of each new model and software update because telecommunications carriers differentiate their services through the personalization of the embedded software in the mobile device. Driven by the growing demand, the authors proposed reducing the scope of tests and developed an automation tool called IMS Deep Assertion (IDeAs) to validate each applied requirement. It was verified that this new process can result in a considerable reduction in the testing time when its use is planned in a high-demand scenario. As a result, it was found that this new approach can have a positive impact, which can allow for up to a 77% reduction in laboratory availability and, consequently, in a high-demand scenario, can reduce the delivery time of test requests.

DB3029 **10:45-11:00**	**Title: De anonymization of Bitcoin addresses based on concept lattice** **Authors:** Yuhao Jin, Zhuo Zhang, Yang Lin **Presenter:** Yuhao Jin, Zhengzhou University, China **Abstract:** This study aims to explore a method for the de-anonymization of Bitcoin addresses based on Formal Concept Analysis (FCA). Although Bitcoin, as a decentralized cryptocurrency, offers user privacy protection, its anonymity has also been exploited by criminals, leading to an increase in illegal activities such as money laundering and terrorist financing. To address this challenge, we propose a novel de-anonymization framework that constructs a formal context using Bitcoin transaction data and generates the corresponding concept lattice. By extracting the attribute weight vectors for each category, our model can effectively classify Bitcoin addresses, thereby identifying potential high-risk addresses.
DB3031 **11:00-11:15**	**Title: Automated Test Case Output Generation Using Seq2Seq Models** **Authors:** Edipcan Özer, Muhammet Ali Akçayol **Presenter:** Edipcan Özer, Gazi University, Turkey **Abstract:** The aim of this paper is to present a creative approach to generate test case outputs for a given input automatically for software testing. Sequence-to-sequence (seq2seq) model is applied. Our approach aims to address the challenge of creating meaningful test case outputs for input variations in software testing, improving efficiency and accuracy in test automation. With the help of natural language processing techniques, the model is trained on an original dataset of test inputs and their corresponding outputs, predicting the output for a given test case input. We employ evaluation metrics including BLEU, ROUGE, and JACCARD similarity scores to assess the quality of generated outputs, comparing them against reference outputs. Our initial results show that the seq2seq model has a huge potential of producing accurate test case outputs, significantly reducing manual effort in test case generation. This work demonstrates the potential for integrating Recurrent Neural Network techniques into software testing and providing a scalable solution for automated test case output generation.
DB3016 **11:15-11:30**	**Title: Requirements Engineering for Effective Construction Claims Management-Based Software in Saudi Arabia: A Systematic Mapping Study** **Authors:** KHALED A ELSAMAN, TAREK A ALY, AL-SAYED A KHATER **Presenter:** KHALED A ELSAMAN, Worley, Worley Limited Australian engineering professional services company, Egypt **Abstract:** Construction Claims Management-Based Software (CCMBS) is a relatively new application area for requirements engineering (RE) methods. However, existing RE techniques face challenges when applied to CCMBS in Saudi Arabia due to the system's complexity. This study aimed to identify gaps in current RE practices for CCMBS by integrating and customizing the FIDIC (International Federation of Consulting Engineers) claims management principles with modern software capabilities. By systematically examining existing research, we identified and analyzed 270 primary sources, focusing on methodologies, models, tools, and techniques used for specifying, engineering, and modeling requirements in practical scenarios. Moreover, we discovered significant shortcomings in how requirements are defined and managed for this type of software. Our findings highlight the critical need for tailored RE methods and tools to enhance CCMBS effectiveness. Ultimately, the successful implementation of CCMBS in Saudi Arabia's construction sector depends on robust RE. By addressing the identified challenges and adopting best practices, we can improve project outcomes, reduce disputes, and increase overall efficiency

Online Session 2

Time: 13:00-14:45 (GMT+0, London Time)
Date: Wednesday, December 4
ZOOM Link: https://us02web.zoom.us/j/82122340691
ZOOM ID: 821 2234 0691
Password: 120204
Topic: Modern Information Systems and Signal Analysis
Chaired by: Assoc. Prof. Abdallah Qusef, Princees Sumaya University for Technology, Jordan-Amman

DB3007 **13:00-13:15**	**Title: Enhancing Multipath Traffic Management with Adaptive SDN Dynamics: A Comparative Study** **Authors:** Mahitab Salah El-Attar, Mostafa Hossam Eldin, Seif Tarek Nassar **Presenter:** Mostafa H. Eldin, British University in Egypt (BUE), Egypt **Abstract:** Next-generation networks (NGNs) are evolving with trends like 6G technology, which offers high capacity and low latency. Our work explores the integration of 6G with Software-Defined Networking (SDN) and Multipath Traffic Controllers (MTCs) to distribute traffic over multiple paths, mitigating congestion and enhancing transmission speeds. This is crucial for bandwidth-intensive multimedia services like live gaming and streaming. Our contribution is a dynamic adaptive multipath routing (DAMR) strategy using SDN architecture that aims at minimizing end-to-end delays while maximizing throughput and optimizing resource utilization. Simulations with OMNeT++ demonstrate significant improvements in these areas compared to existing methods, enhancing service quality for end users. The paper advocates transitioning from single path to multipath SDN architecture, offering increased adaptability, resilience, and efficiency. We provide guidelines for network administrators to facilitate this transition, improving traffic management, reliability, resource utilization, and scalability.
DB3022 **13:15-13:30**	**Title: A Federated Learning Framework with Self-Attention and Deep Reinforcement Learning for IoT Intrusion Detection** **Authors:** Eslam Hesham, Abeer Hamdy, Khaled Nagaty **Presenter:** Eslam Hesham, The British University in Egypt, Egypt **Abstract:** In this research, we introduce a novel Network Intrusion Detection System (NIDS) called FedAtten-DRL, designed specifically for IoT networks. This system addresses the challenge of detecting attacks in these networks, particularly new or zero-day threats that traditional NIDS struggle to identify due to insufficient and imbalanced training data. Our framework uses Deep Reinforcement Learning (DRL) to build more adaptive models that enhance detection capabilities. To boost initial performance, we incorporate pre-trained layers from supervised learning and apply an additional attention mechanism on key features, improving the system's ability to detect complex attacks. Furthermore, federated learning (FL) is employed to reduce communication overhead and protect data privacy by enabling collaborative training across devices. We evaluate the system on real-time datasets, specifically Edge-IIoTset, which simulates critical security challenges in edge-based industrial IoT environments. The results demonstrate that our framework supports continuous learning and improves detection performance, even against evolving threats in resource-constrained IoT domains.

DB3023 **13:30-13:45**	**Title: Rule-Based Process Patterns for Responsibility Coordination in e-Health Solution Designing** **Author:** Gilmini Dantanarayana **Presenter:** Gilmini Dantanarayana, University of Ruhuna, Sri Lanka **Abstract:** Requirement engineering in Healthcare (HC) system designing is complex mainly due to evolving nature of governance procedures connected to several different stakeholder collaborations. Most e-Health system deployments suffers from misalignment of these governing requirements with underlying e-Health solutions. This is due to the various responsibility delegation, governance, and procedural changes in clinical workflow. In order, to capture and represent these dynamic and evolving governance directives, it is necessary to provide a sound and complete approach, i.e. first to capture and then to represent different responsibility types and coordination patterns resulted based on situational changes in HC service procedures. The adopted research method is mainly based on comprehensive literature review and a case study completed at a medical service center. The research method adopted is founded on well-known design science research methodology and case-based approach. Rule-based process modeling has proven success mostly in business contexts, has been extended in this work for HC domain. Initially the different responsibility type classification is proposed for HC as an adaptation of Responsibility Assignment Matrix (RAM). A set of HC service rules have been then proposed considering the different coordination types identified with the RAM adaptation of HC and considering fundamental situational changes in HC service process. Finally, process modeling patterns have been devised for each rule type. The proposed approach consists of set of phases initiating from different coordination types then extended towards rule-based process models. Further, HC solution process designing is to derive by means of rule-based process patterns. The approach significantly enables domain experts and software designers to understand and realize the higher-level policy requirement and realization in e-Health solutions meeting HC stakeholder needs completely.
DB504 **13:45-14:00**	**Title: Myoelectric Control of a Robotic Manipulator Using Processed Electromyography Signals** **Author:** Huazhu Su **Presenter:** Huazhu Su, Nanjing University of Posts and Telecommunications, China **Abstract:** The purpose of this paper is to address the limitations by simulating human hand movements using an Arduino Uno, OLIMEX SHIELD-EMG-EKG, and steering gear, aiming to enhance the precision and reliability of biomedical applications. The proposed system captures surface electromyography (sEMG) signals and processes them with advanced filtering techniques to reduce power line interference and motion artefacts. These refined signals are then used to control a robotic hand, aiming for accurate real-time replication of human hand movements, focusing on overcoming the challenges of intuitive, adaptive, and robust control. Despite promising laboratory results, many systems in the literature fail to meet the stringent criteria for widespread patient acceptance, such as low sensitivity to electrode repositioning and minimal training requirements. However, this study presents a low-cost, flexible solution that demonstrates significant potential in bridging this gap. The system has successfully tracked and reproduced complex hand movements, proving its effectiveness as a platform for further research in human-machine interfaces and neurorehabilitation technologies. The findings suggest that this approach could offer a viable path forward in enhancing the precision and dependability of prosthetic control systems, thus contributing to the ongoing efforts to meet the critical demands of real-world biomedical applications.

DB507 14:00-14:15	**Title: User Position-Driven Resource Allocation for Beam Hopping in Low Earth Orbit Satellite** **Authors:** Zhaobing Sun, Chen Wang, Chi Zhang, Zhicong Han, Zhichao Qin,Yichen Lv **Presenter:** Zhaobing Sun, China Satellite Network Innovation Co.,Ltd, China **Abstract:** In low earth orbit (LEO) satellite communications, beam-hopping technology has gained significant attention in recent years due to its ability to dynamically adjust the spatial and temporal allocation of beams, thereby maximizing resource utilization and improving system performance. To maximize the aggregate link rate, increase the number of served users, and achieve beam load balancing, we propose a user position-driven beam hopping resource allocation strategy. First, we analyze the communication link between the LEO satellite and its users. Then, a joint beam positioning and transmission power control optimization algorithm based on particle swarm optimization (JBPTPC-PSO) is introduced. This algorithm dynamically adjusts the beam positioning center and transmission power based on the spatial distribution of ground users, ultimately forming user clustering results through joint optimization. Each cluster center acts as the beam's positioning center, with transmission power distributed according to the user distribution within that cluster. Simulation results demonstrate that this algorithm significantly outperforms the K-means algorithm in terms of aggregate link rate, load balancing, and the number of users served.
DB510 14:15-14:30	**Title: Alzheimer Disease Detection using Convolutional Neural Network and Particle Swarm Optimization** **Authors:** Iheb Chemss El Dine Hagani, Nacéra Benamrane **Presenter:** Iheb Chemss El Dine Hagani, University of Sciences and Technology of Oran-Mohamed Boudiaf., Algeria **Abstract:** Alzheimer's disease (AD) is a major global health concern, particularly with aging populations. Early detection and diagnosis play a critical role in managing the progression of the disease. Advances in neuroimaging have enabled the use of 3D brain images, which offer valuable insights into disease biomarkers. This paper proposes a specialized Con-volutional Neural Network (CNN) models for interpreting 3D brain MRI scans in the context of Alzheimer's disease detection. By training distinct models for the axial, coronal, and sagittal orientations, we aimed to capture the unique anatomical features and variations inherent to each plane, which enhanced feature extraction and classification accuracy. Our approach contrasts with traditional unified models by focusing on optimizing the individual contributions of each orientation. Furthermore, we employed a Particle Swarm Optimization (PSO) algorithm to assign coefficients to each model, enabling a refined integration of their outputs. This approach facilitated a notable improvement in overall performance, reflecting the advantages of combining specialized CNN architectures with optimization techniques for medical image analysis.
DB3020 14:30-14:45	**Title: SUDCOPA: WSN-based IoT Energy Optimization and Load Balancing through a Context-Sensitive Minimum Clustering Radius** **Authors:** Foudil Mir, Ahcene bounceur, Farid Meziane **Presenter:** Foudil Mir, university of bejaia, Algérie **Abstract:** In Wireless Sensor Networks for the Internet of Things (WSN-Based IoT), energy optimization and load balancing are essential to maximize network lifetime and performance. The DCOPA protocol, used to elect Cluster Heads (CHs), employs a fixed Radius of Clustering (RC) for all CHs, which can lead to energy inefficiencies and load imbalance. To overcome these limitations, we developed UDCOPA, a protocol that introduces an adjustable Adaptive Radius of Clustering (ARC) depending on the Residual Energy ($Renrg$) and Distance to the Base Station (DistBS) of each CH. However, UDCOPA keeps the minimum communication Radius ($RMin$) the same for all CHs, which is not fair given that CHs have different performances. This

uniformity can be detrimental to energy efficiency and network load balancing. In response to these challenges, we propose Sensitive Unequal-DCOPA (SUDCOPA), a new method that dynamically adapts $RMin$ according to the specific performance of each CH, including residual energy and the number of times the node has been elected CH. This approach, centered on a context-sensitive minimal clustering radius, aims to optimize energy and ensure better load balancing in WSN-Based IoT.

Introduction to University of Derby and The British University in Egypt

The University of Derby (English: University of Derby) is located in Derby, Derbyshire, England. It is a new university established in 1992. The university's main campus is located on Kedleston Road in Alestri, northwest of Derby, close to the A38. The university's other campus is located in Buxton. The buildings owned by the campus are rated as national Grade II listed buildings, and the 145-foot-diameter dome is the largest in the UK, better than St. Peter's Church in London. In 2006, the groundbreaking ceremony of the new campus was attended by Prince Charles.

The university offers nearly 300 undergraduate courses, as well as short courses, pre-university and postgraduate courses. The university's curriculum is relatively flexible, allowing students to freely choose and combine more than 40 subjects offered by the four campuses. Domestic rankings are generally around 90th.

The British University in Egypt (BUE; Arabic: الجامعة البريطانية فى مصر, romanized: Al-Jāmiʻa al-Bāritāneya fe-Mīsr) is a private Egyptian university in El Shorouk City, Cairo, Egypt. Founded in September 2005, through an inter-governmental agreement, it provides a British education style and awards degrees validated by its partner UK universities and the Egyptian Supreme Council of Universities.

The main university campus is located approximately 30 km (19 mi) from downtown Cairo, the campus covers about 40 acres (16 ha) of land with some 27,000 m2 (290,000 sq ft) of space of modern purpose-built teaching facilities. According to the Center for World University Ranking (CWUR), the BUE was ranked in 2020 among the top 10 universities in Egypt. In December 2022, Sir Magdi Yacoub, an internationally renowned cardiologist, has been selected to serve as the first honorary chancellor of the university.

Memo