I2MTC 2024

Instrumentation and Measurement for a Sustainable Future

May 20-23, 2024 || Glasgow, Scotland

INSTRUMENTATION AND MEASUREMENT FOR A SUSTAINABLE FUTURE

CONFERENCE PROGRAM

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Welcome Message from the General Chairs

On behalf of the Organizing Committee of the IEEE International Instrumentation and Measurement Technology Conference (I²MTC) 2024, the I²MTC Board of Directors, and the IEEE Instrumentation and Measurement Society (IMS), we are delighted to welcome you to Glasgow, Scotland's largest city, and the host of I²MTC 2024. I²MTC is the Society's flagship conference, tracing its origins as far back as 1966, and one of the top international conferences in the areas of instrumentation and measurement.

We are excited to be given another chance, within the span of four years, to host the conference in Glasgow. As you may recall, the 2021 I2MTC Glasgow edition transitioned into a virtual event due to safety concerns and travel restrictions amid another pandemic flare-up. This time, however, we're delighted to invite you to experience Glasgow's hospitality in person – admire its rich historical heritage, listen to bagpipes, learn to dance ceilidh, and taste Scottish whisky! Moreover, our excitement is doubled as IMS begins celebrating its 75th anniversary in 2024, coinciding with IEEE's impressive 140-year milestone. We eagerly anticipate joining in the celebrations at I2MTC 2024 as we commemorate the anniversaries of IMS and IEEE.

The theme of I2MTC 2024 is "Instrumentation and Measurement for a Sustainable Future". "Sustainability" and "net-zero" are attracting significant attention among world leaders and politicians in light of the effects of human activity on our planet, which we are witnessing in our daily lives. Importantly, Glasgow was a host of the United Nations Climate Change Conference (COP26) in late 2021. This conference marked the first gathering since COP21's Paris Agreement, which called for heightened commitments from participating parties to combat climate change. The outcome of COP26 was the "Glasgow Climate Pact", which was reached through consensus among the representatives of the 197 attending parties. Notably, the pact stands as the initial climate deal to support reductions in coal usage.

As experts in instrumentation and measurement, we play our part in the progress towards a sustainable future. A sustainable future refers to a vision of societal development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" . Achieving a sustainable future requires addressing persistent global challenges such as climate change, resource depletion, biodiversity loss, pollution, poverty, and inequality. Instrumentation and measurement play a crucial role in achieving a sustainable future by providing essential data, monitoring tools, and feedback mechanisms that inform decision-making, track progress, and facilitate accountability. Accordingly, I2MTC 2024 will comprise tutorials, keynotes, industry discussions, and special sessions that are dedicated to the role of instrumentation and measurement in securing a sustainable future.

We are delighted to report that the conference received a very high number of paper submissions. There were 526 papers under review. Of those, 375 were accepted for the regular and special sessions, 11 were accepted for the Transactions in Instrumentation and Measurement (TIM) Poster Session, 18 for the Late Results Poster Session, and 7 as Live Demos. In total, 411 authors will present their technical papers as either oral, poster, or live demo contributions. We extend our heartfelt thanks to the authors of all the papers for their dedication to adhere to the very high standards required to produce papers for I2MTC.

We have a great pleasure to announce three outstanding, high-caliber plenary speakers at the conference. On Tuesday, we will have the opportunity to listen to Professor Richard Syms from Imperial College London. He will deliver a talk on "Metamaterial Internal Receivers for Magnetic Resonance Imaging". On Wednesday, Professor Deepak Uttamchandani from the University of Strathclyde, the recipient of the 2024 Joseph Keithly Award, will deliver a keynote presentation entitled "Towards

Sustainable Development – the Role of Photonics-based Instrumentation and Measurement". Finally, on Thursday, Professor Josephine Bunch from National Physical Laboratory (NPL) will give a keynote presentation on "Mass Spectrometry Imaging – Powerful Methods for Biomedical Research". We express our sincere appreciation to these esteemed speakers for graciously dedicating their time to participate in the conference and to share invaluable insights, inspiring us with the latest advancements in their respective fields of research.

We are also excited to announce the Plenary Industry Panel Discussion which will take place on Tuesday afternoon. The theme of this session is on "The role of instrumentation and measurement in delivering the energy system of the future". The panel of top experts from both industry and academia will explore how instrumentation and measurement can help improve data sharing and usage in the energy sector. The panel will discuss how this applies to different parts of the energy industry and how innovation communities can help speed up the development of new tools to support reaching net zero emissions. The discussion will be moderated by Richard Knight, Director for Strategy & Technology at the Power Network Demonstration Centre (PNDC).

The conference will comprise the host of other exciting activities. On Wednesday afternoon, we have planned a plenary Diversity, Equity & Inclusion (DEI) event organized by our DEI Chair Kristen Donnell from Missouri University of Science and Technology. The event is entitled "How to share your ideas with courage, confidence and passion". Linking with the DEI theme, our Junior I&M Chairs, Morag MacDougal and Elizabeth Robertson will run an educational event involving a practical laboratory session and a competition for secondary school girls at the University of Strathclyde, outcomes of which will be reported on during the conference. Finally, as part of I2MTC Social Program, we have planned a Visit to Clydeside Distillery and Riverside Museum which will take place on Friday after the conference. We hope those able to stay after the busy conference can relax, admire the vistas of the River Clyde, learn how Scottish whisky is produced, and appreciate Glasgow's shipbuilding, train manufacturing, and engineering heritage that have been "frozen in time" in the award-winning Riverside Museum.

We extend our sincere gratitude to our sponsors and exhibitors. These include the continuous valued conference sponsors, IEEE and IEEE IMS. Additionally, we would like to express our appreciation to our exhibitors: SmartAct, NARlabs, NEXTRON, and Xian Jiaotong University. Our esteemed sponsors and exhibitors will have the opportunity to deliver a 2-minute pitch to promote their company/institution during a plenary session on Tuesday afternoon.

On Tuesday evening, the City of Glasgow will host the City Council's Civic Reception, where delegates will receive an official welcome from the Lord Provost or a representative at the Glasgow City Chambers. This historic building, located less than 500 meters from the main conference venue, provides a stunning setting for the event. We extend our sincere gratitude to the City of Glasgow for their generous support of the conference.

This conference could not go ahead without the immense effort of the Organizing Committee, giving freely and generously their time, often during unsociable hours. We would like to acknowledge the contributions of the following members of the Organizing Committee: Ferdinanda Ponci, Bruno Ando and Gordon Flockhart for the high-level oversight in coordinating and organizing the Special Sessions; Octavian Postolache and Luco De Vito for organizing an outstanding program of Conference Tutorials; Gaetano Di Caterina and Carmine Clemente, our Exhibition and Patron Chairs who led the effort to secure conference sponsorship; Shirley Kirk, our Local arrangement Chair who competently looks after our social program; our Publicity Chairs, Yong Yan, James Smith, and Theodosia Stratoudaki who did

an outstanding job at promoting the conference; Ralf Bauer, Grzegorz Fusiek, and Wuliang Yin for overseeing the organization of an engaging Demo Session; our Junior I&M Chairs, Morag MacDougall and Elizabeth Robertson for their innovative ideas how to promote the topic of I&M among secondary school female pupils; Ferdinanda Ponci for kindly acting as our Conference Treasurer; and Kristen Donnell, our Diversity Equity & Inclusion Chair for organizing an engaging plenary DEI activity.

Thanks to Wendy Russell, Evie Mauchan, Laura MacKay, Lisa Kerr, and Karla Cunningham at the Glasgow City Convention Bureau for their outstanding support throughout the organization of I2MTC 2024.

Many thanks to Laura LeBlanc of the Conference Catalysts for her exemplary performance as the Conference Manager, for keeping the conference to schedule and dealing competently with countless requests and issues. Thanks also goes to Madison Musselman for her valuable support.

Finally, and most importantly, we must recognize the immense effort of the incredible Technical Program Committee (TPC): Melanie Ooi, Sabrina Grassini and Mohamed A. Abou-Khousa (AK). Given the unprecedented number of paper submissions post-pandemic, true innovation was required to not only fit all the papers in the conference schedule but to create an outstanding technical program. Many hours of effort went into selecting appropriate Associated Technical Program Committee (ATPC) members and paper reviewers and then working with them to achieve timely high-quality reviews. At this point, we also gratefully acknowledge the work of ATPC and reviewers, without whom this successful outcome would not be possible.

We hope you have a wonderful time at the conference, where you will have the opportunity to reconnect with familiar faces, catch up with professional colleagues, stay updated on the latest developments in your research field, and forge new connections and relationships that could potentially lead to fruitful collaborations in the future.

We trust that you'll enjoy your time in Glasgow and Scotland, and that the conference proves to be a memorable experience for you.

Pawel Niewczas and Deepak Uttamchandani, General Co-Chairs

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- Yunjie Yang
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- Shiming Zhang

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- Weihua Li
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- Der-Chen Huang
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- Huan Liu

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- Alessio De Angelis
- Mirko Marracci

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- Ghada Bouattour

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Keynote Speakers

Professor Richard Syms
Imperial College London
Electrical and Electronic Engineering Department

Metamaterial Internal Receivers for Magnetic Resonance Imaging

Abstract: Cancer of the biliary ductal system (cholangiocarcinoma) is rare in the West but one of the major disease problems in South-East Asian countries such as Cambodia, Laos, Myanmar, Thailand, and Vietnam. The cause is endemic liver fluke infestation, which follows from the consumption of raw and partly cooked river fish according to local dietary customs. The disease typically presents late and has a very poor prognosis. Currently surgical resection offers the only possibility of a cure, but staging and pre-operative planning are difficult because of the low resolution offered by computed tomography and magnetic resonance imaging (MRI) with external receiver coils. Internal receivers potentially offer higher signal-to-noise ratio (SNR) and resolution in MRI. Their limited reception pattern reduces the field-of-view for thermal noise from the body, the dominant noise source, but may be compensated by employing T2 mapping rather than imaging. The receivers must be low cost, disposable, compatible with endoscopes and catheters, and intrinsically MRI-safe. This talk will describe the development of receivers based on magneto-inductive waveguides, a form of one-dimensional metamaterial. The waveguides are batch-fabricated as smooth, flexible thin film circuits by lithographically patterning copper clad Kapton, and need no additional components. The use of figure-of-eight coils and the segmentation inherent in MI waveguides provide decoupling from magnetic and electric fields during excitation. The design principles will be outlined, and the local SNR advantage will be explained and demonstrated using phantoms. High-resolution 1H T2 maps will be presented at 3T for ex-vivo specimens from Thai cholangiocarcinoma patients and correlated with histopathology.

Biography: Richard Syms has been Professor of Microsystems Technology in the Department of Electrical and Electronic Engineering at Imperial College London since 1996. He was awarded BA and DPhil degrees from Oxford University in 1979 and 1982, respectively, both in Engineering Science. After postdoctoral positions at University College London, Oxford University, and the Rutherford Appleton Laboratory, he joined Imperial College in 1987 where he headed the Optical and Semiconductor Devices Group for almost 30 years. His research interests lie in electromagnetic theory, RF and optical engineering, metamaterials, sensors, and micro and nano technology. In 2001 he co-founded the Imperial College spin-out company Microsaic Systems, which developed the world's first desktop electrospray mass spectrometers based on MEMS technology. He has collaborated widely with industry in the UK and US on integrated devices and with hospitals in the UK and Thailand on electrosurgery and MRI. He has worked on the development of MR-imaging catheters and endoscopes for many years. A key aim has been to improve the diagnosis of cholangiocarcinoma, a deadly cancer that is widespread throughout SE Asia. Prof. Syms is a Fellow of the Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronic Engineers and an Honorary Fellow of the Royal College of Physicians.

Keynote Speakers (continued)

Professor Josephine Bunch
National Physical Laboratory, London, UK

Mass Spectrometry Imaging – Powerful Methods for Biomedical Research

Abstract: As our knowledge of systems biology rapidly advances, we learn more and more about alterations in gene expression patterns and genetic mutations driving alterations in protein function. In contrast to the recent advancements in functional genomics, the actual molecular mechanics of most diseases remain poorly understood.

Mass spectrometry imaging (MSI) is a powerful suite of techniques for mapping elements and molecules directly in tissue. Analysis of elements and metals, as well as small and large molecules, can be achieved using sampling approaches operating in vacuo and at atmospheric pressure. Recent examples of multimodal approaches, which combine several modalities to survey complex problems, include the Rosetta Cancer Grand Challenge programme.

The project established a multiscale approach with a range of MSI techniques (MALDI, DESI, SIMS, ICP MS and REIMS) and an information directed approach to additional omics surveys (e.g. transcriptomics). The optimised pipeline was designed to enable a systems-level review of genes, proteins, metabolites and the role of the immune system in cancer development and growth.

In this presentation, highlights from the Rosetta programme will be reviewed alongside an overview of ongoing measurement challenges associated with large scale imaging endeavours e.g. determining uncertainties in the techniques, repeatability of measurements and the long term challenge of delivering traceable measurements for life science research.

Biography: Professor Josephine Bunch is an NPL Fellow and Co-Director of NiCE MSI at the National Physical Laboratory (NPL) and holds the Chair of Biomolecular Mass Spectrometry at Imperial College London. She is currently delivering a Cancer Research UK Grand Challenge Award programme delivering a multiscale and multimodal imaging pipeline for studying tumour metabolism. Josephine is an active member of several international standards committees.

Before joining NPL she led a research group in mass spectrometry imaging (MSI) at the University of Birmingham where she was a Lecturer in Chemistry and Imaging in the School of Chemistry and PSIBS Doctoral Training Centre (2009-2013).

Josephine has published ~100 articles on mass spectrometry imaging of lipids, drugs, proteins, peptides and metabolites using a range of dedicated MS techniques. Her research group at NPL comprises a multidisciplinary team of physicists, chemists, computer scientists and biomedical scientists. Current research interests of the group include metabolic imaging, mass spectrometry instrument and method development, fundamentals of ion formation and desorption ionisation, development of data processing methods for mass spectrometry imaging.

2024 Joseph F Keithley Award in Instrumentation and Measurement

Deepak Uttamchandani
University of Strathclyde, Glasgow, Scotland

Towards Sustainable Development – the Role of Photonics-based Instrumentation and Measurement

Citation: "For contributions to photonics-based optical frequency and wavelength domain instrumentation and measurement."

Abstract: The theme of the I2MTC 2024 conference is 'Instrumentation and Measurement for a Sustainable Future'. A sustainable future is where society can meet its current needs without compromising the ability of future generations to meet their own needs. The right choices have to be made today to secure a liveable tomorrow. In 2015 the United Nations adopted the '2030 Agenda for Sustainable Development' to be actioned through 17 Sustainable Development Goals (SDGs). These addressed reducing the adverse impact of human activity on the planet's complex natural systems, and also identified topics such as improving health and education, reducing inequalities and creating opportunities as being part of sustainable development. Science, engineering, technology and innovation have already played a significant role in contributing towards the SDGs, and will continue to do so. For me, this has triggered two questions: 'how have instrumentation and measurement technologies contributed towards attainment of the SDGs?', and 'which of the SDG themes have benefitted directly and explicitly from I&M, and which have benefitted indirectly or less explicitly?'. My colleagues and I set out to seek answers to these questions, with the extra condition that we would concentrate only on photonics-based I&M, which includes optics and imaging-based approaches. I will share our findings in the talk, with an emphasis on photonics so that the talk aligns with the citation of the 2024 IEEE Joseph F Keithley Award.

Biography: Deepak Uttamchandani is at the Centre for Microsystems and Photonics, Department of Electronic and Electrical Engineering, University of Strathclyde, Glasgow, UK. He has over 40 years of research expertise and leadership in photonics-based instrumentation, measurement and sensing. He has also contributed extensively in the area of optical MEMS. He received his MSc degree from University College London (1980) and his PhD from the same institution (1985). He is a Life Fellow of IEEE, and Fellow of the Royal Society of Edinburgh, Fellow of the Institution of Engineering and Technology, Fellow of the Institute of Physics and is a Professional Member of the IEEE Eta Kappa Nu (HKN) Honour Society. He was recipient of the IEEE Sensors Council Technical Achievement Award for work on photonics-based systems for healthcare, and the Thales Scottish Technology Prize for Laser Technology and Applications for innovative work on advanced laser systems. His early and fundamental research contributions in laser-based measurements have led to the development of commercial eye-scanners, used by high-street optometrists, which generate detailed retinal images for early identification of retinal diseases, including macular degeneration. The same technologies have also been used for detecting manufacturing-defects in optical telecommunication components installed in aerospace platforms and data-centres. His pioneering work on surface plasmon resonance based measurements has led to instrumentation for use in biopharmaceutical drug discovery.

Industry Panel Discussion

The role of instrumentation and measurement in delivering the energy system of the future

The urgency to deliver major reductions in global greenhouse gas (GHG) emissions is increasing significantly in response to climate change and the growing number of extreme climate events. The scientific community is clear that the speed at which net zero emissions is achieved will be crucial. As one of the major sources of global GHGs, the energy sector has a critical role to play in driving innovation and the rapid deployment of novel low carbon technology solutions and services to support the delivery of net zero emissions across power, heat and transport.

The transition to a net zero energy sector will require some very profound changes to the way that energy is generated, distributed and consumed, and new approaches to ensuring system robustness and resilience will also be required. Increasing interactions between the different parts of the energy system (electricity, heat and transport) is highly likely, and data – its collection, processing and utilisation - will be at the centre of this transformation.

With a panel of leading industry and academic experts, this plenary session will explore how instrumentation and measurement will be able to contribute to the growth of data provision and use in the energy sector, how this relates to the different parts of the energy sector, and how the innovation community can support industry to accelerate new instrumentation and measurement solutions to support the delivery of net zero emissions.

Session Participants:

- Chair
  - Richard Knight, Director for Strategy & Technology, PNDC (University of Strathclyde)
- Panelist
  - Fraser MacIntyre (Scottish and Southern Energy)
  - Luís Caseiro (Eneida.IO)
  - Marc Costatini, SP Energy Networks
  - Professor Federico Coffele, Professor of Practice, PNDC (University of Strathclyde)
  - Dr Bruce Stephen (University of Strathclyde)

How To Share Your Ideas with Courage, Confidence and Passion

With Clare Josa MEng, Best-selling author of Ditching Imposter Syndrome

Clare Josa's 2024 international research study found that 62% of people struggle daily or regularly with Imposter Syndrome, to an extent that it impacts their performance and their wellbeing.

It's the secret fear of others finding you out as somehow not being good enough, even if the outside world thinks you're confident.

It causes people to self-sabotage, by holding back with their ideas, toning down their opinions, not going for opportunities to be more visible, and lying awake at 3am, beating themselves up, worrying that they made a mistake in hiring you. People put on masks and armour to feel safe, and change who they are, to fit in.

Clare's research also shows that it's directly linked to burnout and can turn a thriving team toxic in as few as six weeks.

But it doesn't have to be that way.

In this inspirational, interactive session, Clare is going to take you through the essentials from science and her research, so you can spot the early warning signs in yourself or in others in your teams. And she'll share with you practical actions you can take to start turning things around, in minutes, not months.

By the end of the session you'll have already taken the first steps towards being able to share your ideas with more courage, confidence and passion, helping those around you to do that, too.

Biography: Clare Josa is considered a global authority on Imposter Syndrome and preventing burnout, having spent over 20 years specialising in the field.

As a Six Sigma Mechanical Engineer and former Head of Market Research for Dyson, as well as a certified NLP Trainer with 20 years' experience in the field of Imposter Syndrome and burnout, Clare's session will be interactive, upbeat, and will share strategies that delegates can use both 'in the moment' with Imposter Syndrome, as well as to prevent it in future.

Clare Josa is considered a global authority on Imposter Syndrome, having spent over 20 years specialising in the field, as well as leading two landmark international research studies, and writing the best-selling book: Ditching Imposter Syndrome, which has readers in over 50 countries.

An expert in the neuroscience and psychology of performance, her original training as a Mechanical Engineer, specialising in Six Sigma and Lean Manufacturing, means her inspirational approach is grounded in practical common sense, creating breakthroughs not burnout.

She is the author of ten books and has been interviewed by the likes of The Independent, The Daily Telegraph and Radio 4, amongst others. Clare speaks internationally on how to change the world by changing yourself.

Before the conference, you'll be sent a link to take Clare's research-backed, quiz-style assessment, which gives you your Imposter Syndrome score and a personalised action plan, plus a link to a mini-training that you can do, even before the conference.

And there's a world of difference between information and implementation, so Clare is giving all attendees a full month's access to her life-changing app - Imposter Syndrome Hacks™. This contains mini-trainings for the core techniques she'll share in her talk, as well as the digital and audiobook versions of Ditching Imposter Syndrome, and a whole training on supporting others with Imposter Syndrome, too.

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I²MTC Tradition

The first IEEE Instrumentation and Measurement Technology Conference was held in 1984 aboard the Queen Mary in Long Beach, California. But its origins stretch back nearly 20 years earlier to the Electrical and Electronic Measurement and Test Instrument Conference held each year from 1966 until 1981 in Ottawa, Canada. The latter was revived by the IEEE Instrumentation and Measurement Society with a new focus on all aspects of instrumentation and measurement. The following list contains locations and themes of the I²MTC conferences:

1984 – Long Beach, CA, USA, Automation-Quality-Productivity
1985 – Tampa, FL, USA, Measurement Science
1986 – Boulder, CO, USA, Standards of Excellence
1987 – Boston, MA, USA, The Changing Face of I&M Technologies
1988 – San Diego, CA, USA, Intelligence in Instrumentation
1989 – Washington, DC, USA, Persuasive I&M Technology – A Resource
1990 – San Jose, CA, USA, Emerging Measurement Technologies
1991 – Atlanta, GA, USA, Enhancing Productivity with Instrumentation and Measurement Technologies
1992 – Meadowlands, NJ, USA, Smart People, Smart Instruments, Smart Measurements
1993 – Irvine, CA, USA, Innovative Ideas for Industry
1994 – Hamamatsu, Japan, Advanced Technologies in Instrumentation and Measurement
1995 – Waltham, MA, USA, I3C – Integrating Intelligent Instrumentation and Control
1996 – Brussels, Belgium, Quality Measurements – The Indispensable Bridge between Theory and Reality (No Measurements? No Science!)
1997 – Ottawa, Canada, Sensing, Processing, Networking
1998 – St. Paul, MN, USA, Where Instrumentation is Going
1999 – Venice, Italy, Measurements for the New Millennium
2000 – Baltimore, MD USA, Smart Connectivity: Integrating Measurement and Control
2001 – Budapest, Hungary, Rediscovering Measurement in the Age of Informatics
2002 – Anchorage, AK, USA, The Frontier of Instrumentation and Measurement
2003 – Vail, CO, USA, Instrumentation and Measurement at the Summit
2004 – Lake Como, Italy, From the Electrometer to the Networked Instruments: A Giant Step toward a Deeper Knowledge
2005 – Ottawa, Canada, The 22nd Reunion
2006 – Sorrento, Italy, A View on the New Technologies for Instrumentation and Measurement
2007 – Warsaw, Poland, Synergy of Science and Technology in Instrumentation and Measurement
2008 – Victoria, British Columbia, Canada, Advances in the Science of Measurement Technology
2009 – Singapore, Always On: Instrumentation and Measurement in the Networked World
2010 – Austin, TX, USA, Innovative and Integrated Applications of I&M
2011 – Binjiang, Hangzhou, China, Instrumentation and Measurement for Improving Quality of Life
2012 – Graz, Austria, Smart Measurements for a Sustainable Environment
2013 – Minneapolis, MN, USA, Instrumentation and Measurement for Life
2014 – Montevideo, Uruguay, Instrumentation and Measurement for Sustainable Development
2015 – Pisa, Italy, The "Measurable" of Tomorrow: Providing a Better Perspective on Complex Systems
2016 – Taipei, Taiwan, Measuring the Pulse of Industries, Nature and Humans
2017 – Torino, Italy, “Man is the measure of all things” - Protagoras
2018 – Houston, TX, USA, Discovering New Horizons in Instrumentation and Measurement
2019 – Auckland, New Zealand, The Lords of the IMS: Expanding the Frontiers of Metrology Innovations
2020 – Dubrovnik, Croatia (Moved Fully Virtual), Technology Advancement Through Strong Foundation and Persistent Innovation
2021 – Glasgow, Scotland (Moved Fully Virtual), To Measure Is To Know
2022 – Ottawa, Canada, Instrumentation & Measurement Under Pandemic Constraints
2023 - Kuala Lumpur, Malaysia, Instrumentation and Measurement: Rising Above Covid-19
2024 – Glasgow, Scotland, Instrumentation and Measurement for a Sustainable Future

Awards and Distinctions

2023 IEEE Transactions on I&M Outstanding Associate Editors

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2023 IEEE Open Journal of I&M Outstanding Associate Editors

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2023 I&M Society Awards

IEEE Instrumentation and Measurement Society Career Excellence Award

Alessandro Ferrero, Politecnico di Milano, Italy

"For his exceptional career achievements in the Instrumentation and Measurement field and his outstanding leadership and mentorship qualities."

IEEE Instrumentation and Measurement Society Best Application Award

Carlo Trigona, University of Catania, DIEEI, Italy

"For his innovative sensors that incorporate the response of plants to a wide range of environmental factors, becoming low, environmentally friendly, biodegradable instruments."

IEEE Instrumentation and Measurement Society Outstanding Young Engineer Award

Jay McDaniel, University of Oklahoma, United States

"For outstanding contributions to the advancement of wideband radar cross section measurements in cluttered environments."

IEEE Instrumentation and Measurement Society Technical Award

Shervin Shirmohammadi, University of Ottawa, Canada

"For contributions to the advancement of machine learning-assisted measurements."

IEEE Instrumentation and Measurement Society Distinguished Service Award

Kristen Donnell, Missouri University of Science & Technology, United States

"For outstanding contributions to the IEEE Instrumentation and Measurement Society (IMS) for more than 16 consecutive years as a member of the IMS Administrative Committee and in leadership roles in Membership Development, Education, Finance, and Women in Instrumentation and Measurement."

2023 Instrumentation and Measurement Society Fellows

Elevated by IMS:

Alessandra Flammini
"For contributions to wireless distributed measurements for industrial systems."

Massood Zandi Atashbar
"For contributions to flexible hybrid electronics."

2023 Instrumentation and Measurement Society Senior Member Elevations

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General Conference Information

Venue:

- University of Strathclyde, The Technology and Innovation Centre
- 99 George St, Glasgow G1 1RD, United Kingdom

Registration & Information Desk:

The Registration & Information desk is located at the registration counter outside the Plenary Theatre room. Name Badges can be picked up at registration and are required for access to all conference events.

Registration Hours:

Monday, May 20	8:00 – 17:00
Tuesday, May 21	8:00 – 17:00
Wednesday, May 22	8:00 – 17:00
Thursday, May 23	8:00 – 17:00

Electronic Proceedings:

A download link for the conference proceedings will be emailed to registered attendees. The proceedings download link will be available from May 20-June 20.

Conference Attire:

Attire during the duration of the conference is business casual.

Cellular Phones:

As a courtesy to fellow attendees, please silence electronic devices.

Conference App:

Instructions to download and access the conference app will be emailed to registered attendees within 72 hours of the start of the conference.

I²MTC 2024 Program Grid – Tutorials – Monday, May 20th

Registration will open at 8:00 AM
Exhibitor Set-Up: 1:30 – 5:00 PM

	Room 2	Room 3	Room 4/5	Room 6/7
8:30 – 10:00 AM	Intelligent Healthcare: prospects and limits of Generative Artificial Intelligence for medical systems	Artificial Intelligence for Image Synthesis in Smart Manufacturing and Environmental Applications	Instrumentation and measurements contribution to the sustainable development	Technical Paper Publishing Review Process Guidelines and Tips for Authors, Editors and Reviewers
10:00 – 10:30 AM	Coffee Break (Foyer)			
10:30 – 12:00 PM	Signal Processing for Detection and Classification of Human Activity Monitoring through Privacy-Preserving Remote Measurements	Measurements Applications in Autonomous Systems	AI for Calibration & Blind Calibration of Sensors	Measurement Fundamentals
12:00 – 1:30 PM	Lunch (Foyer)			
1:30 – 3:00 PM	Machine Learning for Industrial Condition Monitoring - how to?	Observation of Structural Change Inside a Metal Pipe by Applying Millimeter-wave Antennas to the Pipe Ends	Development of Data-Driven Soft Sensors for Better Industrial Processes: From Python to Structured Text	Quantifying Uncertainty in Measurement Devices
3:00 – 3:30 PM	Coffee Break (Foyer)			
3:30 – 5:00 PM	Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption Spectroscopy	Smart Sensing Systems and AI for Precision Agriculture	Theory and Applications of Fiber Optic Sensors	Detection Theory: from Statistics to Measurement Applications
5:00 – 6:30 PM	Tutorial/Young Professional Reception (Foyer)			

I²MTC 2024 Program Grid – Tuesday, May 21st

Registration will open at 8:00 AM

	Room 2	Room 3	Room 4/5	Room 6/7	*Level 1 Auditorium*	*Room 1*
8:30 – 9:00 AM	Opening Ceremony (Main Auditorium)					
9:00 - 10:00 AM	Plenary Speaker: Professor Richard Syms (Main Auditorium)					
10:00 - 10:30 AM	Coffee Break (Foyer)					
10:30 - 12:30 PM	SPS: Cyber-Physical Systems for present and next-generation batteries: sensors, measurement-based modeling, diagnostics, and related instrumentation	Sensors and Transducers	Instrumentation and Measurement for Non-Destructive Testing and Evaluation (IMNDE) 1	SPS: Sensors, Instrumentation, and Artificial Intelligence Technologies for Environmental Measurement and Modeling	Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 1	Image Processing and Vision Based Measurement 1
12:30 – 1:30 PM	Lunch (Foyer)					
1:30 - 2:30 PM	Plenary Industry Panel Discussion (Main Auditorium)					
2:30 - 3:30 PM	Coffee Break (Foyer)	Tuesday Poster Session & TIM/OJIM Poster Session (Foyer)				
3:30 - 5:30 PM	SPS: The forthcoming era of battery-free measurement systems: Progress in methodologies and devices for energy harvesting and wireless power transmission	Instrumentation and Measurement for Industry 4.0	Instrumentation and Measurement for Energy Systems	Instrumentation and Measurement for Communications and IoT	Instrumentation and Measurement for Chemical and Biological Quantities	Circuits and Embedded Systems for Instrumentation and Measurement 1
6:00 – 8:00 PM	Welcome Reception (City Chambers)					

I²MTC 2024 Program Grid – Wednesday, May 22nd

Registration will open at 8:00 AM

	Room 2	Room 3	Room 4/5	Room 6/7	*Level 1 Auditorium*	Room 1
8:30 - 10:30 AM	SPS: Waveform acquisition and analysis	Image Processing and Vision Based Measurement 2	Instrumentation and Measurement for Non-Destructive Testing and Evaluation (IMNDE) 2	Signal Processing for Instrumentation and Measurement 1	Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 2	Machine Learning and Big Data for Instrumentation and Measurement 1
10:30 – 11:00 AM	Coffee Break (Foyer)					
11:00 - 12:00 PM	Plenary Speaker: 2024 Joseph F Keithley Award in Instrumentation and Measurement (Main Auditorium)					
12:00 - 12:30 PM	Award Ceremony (Main Auditorium)					
12:30 – 1:30 PM	Lunch (Foyer)					
1:30 - 2:00 PM	Exhibitor Pitch (Main Auditorium)					
2:00 - 3:00 PM	How To Share Your Ideas with Courage, Confidence and Passion (Main Auditorium)					
3:00 - 4:00 PM	Coffee Break (Foyer)		Wednesday Poster Session (Foyer)		Live Demonstrations (Foyer)	
4:00 – 6:00 PM	SPS: Instrumentation and measurement for reliable, safe and sustainable applications	SPS: Interpretable, efficient deep learning for intelligent monitoring of industrial equipment 1	Instrumentation and Measurement for the Oil and Gas Industry	Machine Learning and Big Data for Instrumentation and Measurement 2	Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 3	Optical and Fiber Optic Instrumentation and Measurement
6:00 – 6:30 PM	Break					
6:30 - 10:30 PM	Gala Dinner (DoubleTree by Hilton Glasgow Central)					

I²MTC 2024 Program Grid – Thursday, May 23rd

Registration will open at 8:00 AM
Exhibitor Clean-Up: 3:30 – 5:30 PM

	Room 2	Room 3	Room 4/5	Room 6/7	Room 8	Foyer
8:30 – 10:30 AM	SPS: Recent Advances in Process Tomography	SPS: Optical Imaging for Flow-Field Diagnosis	SPS: Low noise instrumentation, noise measurements and applications	Signal Processing for Instrumentation and Measurement 2	Circuits and Embedded Systems for Instrumentation and Measurement 2	Thursday AM Poster Session
10:30 – 11:00 AM	Coffee Break (Foyer)					
11:00 – 12:00 PM	Plenary Speaker: Professor Josephine Bunch (Main Auditorium)					
12:00 – 1:00 PM	Lunch (Foyer)					
1:00 - 2:00 PM	Advances in Measurement Theory and Metrology	Instrumentation and Measurement for Advanced Manufacturing	SPS: Interpretable, efficient deep learning for intelligent monitoring of industrial equipment 2	Instrumentation and Measurement Systems for Robotics	Automotive	
2:00 - 3:00 PM	Coffee Break (Foyer)		Thursday PM Poster Session (Foyer)		Late Result Poster Session (Foyer)	
3:00 - 5:00 PM	Signal Processing and Data Acquisition Systems	Instrumentation and Measurement in Agriculture, Food Production and Food Safety	SPS: Ophthalmic instrumentation and measurement methods	Instrumentation and Measurement for Physical and Electromagnetic Quantities	SPS: Flexible sensing and imaging for embodied intelligence	
5:00 - 5:30 PM	Junior I&M Event Update & Closing Ceremony & 2025 Announcement (Main Auditorium)					

Monday, May 20 8:30 - 10:00
Intelligent Healthcare: prospects and limits of Generative Artificial Intelligence for medical systems.
Conference Room 2

Abstract: The growing number of elderly people, the decrease in resources available for healthcare, together with the pathologies (COVID 19) that make contact between doctor and patient dangerous are now a strong signal for a change in the model of medicine currently used. But which new model? Artificial Intelligence (AI) is now the basis of every change in life today and promises to be a revolution for both patient care and the healthcare system. But the real challenge is to find a useful model to prevent the growing number of operations required for the elderly: more people but with fewer health problems. Generative Artificial Intelligence may represent the new frontier for creating new data and models for future healthcare systems. These systems can be used to implement and interpret results and generate personalized medicine. Digital twins can be used to develop models to understand the effects of treatment choices in patients using their digital twin. Virtual hospitals will be used to monitor multiple patients in their own houses using AI wearable technology. But a common question is: how these systems can be trusted in medicine? What can we say about the Accuracy, Precision, Sensitivity, ROC curve and F-score of the data generated by a generative A. I.? The second part of the tutorial will make a contribution to these analyses using a metric typical of the Instrumentation and Measurement world.

Instructor: Prof. Eros Pasero, Neuronica lab, DET, Politecnico of Turin, Italy

Monday, May 20 8:30 - 10:00
Artificial Intelligence for Image Synthesis in Smart Manufacturing and Environmental Applications
Conference Room 3

Abstract: Nowadays, advanced manufacturing and environmental monitoring strongly rely on artificial intelligence (AI) for improving both production processes and the efficacy of proposed solutions. Therefore, it is essential to gain insights into how deep-learning models can operate in challenging real-world scenarios. In these contexts, standard large-scale datasets cannot be employed for spotting anomalies, recognizing objects, or performing change detection, primarily due to the inherently different characteristics of the domains. The adaptation of these datasets to practical scenarios may also be costly. Furthermore, the lack of high-quality annotated data, power-constrained hardware, and privacy-preserving solutions could limit the usability of data-driven architectures, leading to the development of both hardware-and domain-specific solutions, with a great impact on the overall performance. This tutorial will shed light on current challenges in the field of image synthesis in both the industrial and environmental domain. Hands-on activities will spotlight the main characteristics of image generation models tailored for industrial scenarios, with a specific focus on addressing challenges posed by limited annotated data and analyzing the impact of optimized models on resource-constrained hardware.

Instructor: Pasquale Coscia, Universitá degli Studi di Milano

Monday, May 20 8:30 - 10:00
Instrumentation and measurements contribution to the sustainable development
Conference Room 4/5

Abstract: The purpose of the tutorial is based on idea of presenting topics related to sustainable development, to provide definitions and to indicate the main assumptions of principles of sustainable development in the modern world, providing specific examples of the contribution of Instrumentation and Measurements, such as sensorized buoys for sea water environmental control.

A general illustration will be given on the sustainable development, a broad term to describe policies, projects and investments that provide benefits today without sacrificing environmental, social and personal health in the future. These policies, described as green, focus mainly on limiting the impact of development on the environment, as well as extending their benefits on a wide cross section of human health and well-being, including reductions in pollution and environment-related disease, improved health outcomes and decreased stress.

The problem of marine monitoring, of interest for sustainable development will be illustrated. Coastal marine systems are particularly vulnerable to the effects of human activity due to industrial, tourist and urban development, consequently these ecosystems became a primary concern for learning more about the behaviour of the marine environment. It is essential to gather information on large enough spatial and time scales to assure effective monitoring and to be able to produce solutions that as far as possible reduce the negative impact of human activity on these ecosystems.

Instructors: Professor Emma ANGELINI, Politecnico di Torino
Professor Luca LOMBARDO, Politecnico di Torino

Monday, May 20 8:30 - 10:00
Technical Paper Publishing Review Process Guidelines and Tips for Authors, Editors and Reviewers
Conference Room 6/7

Abstract: There has been an astronomical increase in the number of technical paper submissions in the past decade. Some of the reasons include:

pressure to publish, as the success indicator, for promotion and professional advancement,
universities moving away from the traditional M.S. Theses and Ph.D. Dissertations to instead a compilation of several peer-reviewed journal papers,
creation of new journals, and
the open-access publishing “economy”.
Journals are ranked according to certain “indicators” that may or may not be objective. Everyone wants to publish in the highest-ranking journals exasperating the situation for some. However, we wish to think that “Quality” is the number one “indicator” of a journal. “Quality” is not a “measurable” and is difficult to define. However, there are ways by which to positively influence the “Quality” of a journal beyond those indicators.

Instructor: Reza Zoughi, at Iowa State University

Monday, May 20 10:00 - 10:30
Monday AM Coffee Break
Room: Foyer

Monday, May 20 10:30 - 12:00
Signal Processing for Detection and Classification of Human Activity Monitoring through Privacy-Preserving Remote Measurements
Conference Room 2

Abstract: The human population in the world is aging fast. More than 15% of the human population will be above 65 years by 2050. With the increase in life expectancy and aging population, the world may be witnessing health and socio-economic burdens. As the citizens age, they may suffer from neuro-cognitive impairments leading to dementia, and possible postural instabilities. Along with frailty, falls, and hospitalization due to falls may become more prevalent. In order not to burden the medical system, it may be necessary to have a reliable privacy-preserving monitoring system that would require no compliance from the elderly. This could lead to a continuous monitoring of their activities and vital signs. Further, such a system can also lead to senior citizens aging well in their homes which would help them to retain their independence and avoid depression. Radar sensors offer privacy-preserving remote monitoring of the elderly. Using appropriate advanced signal processing techniques, it would be possible to continuously and reliably monitor elderly citizens for their well-being in the comfort of their homes. The time has come to understand and evaluate the various techniques and understand the advantages and disadvantages that come along with them. This tutorial will motivate researchers in the field of instrumentation and measurements to explore this fascinating area that encompasses multiple areas of engineering.

Instructors: Prof. Sreeraman Rajan, Carleton University, Ottawa, Canada
Ms. Ankita Dey, Carleton University, Ottawa, Canada

Monday, May 20 10:30 - 12:00
Measurements Applications in Autonomous Systems
Conference Room 3

Abstract: Autonomous systems are nowadays having an undisputed pervasiveness in the modern society. Autonomous driving cars as well as applications of service robots (e.g. cleaning robots, companion robots, intelligent healthcare solutions, tour guided systems) are becoming more and more popular and a general acceptance is now developing around such systems in the modern societies. Nonetheless, one of the major problems in building such applications relies on the capability of autonomous systems to understand their surroundings and then plan proper counteractions. The most popular solutions, which are gaining more and more attention, rely on artificial intelligence and deep learning as a means to perceive the structured and complex natural environment. Nonetheless, besides the importance of such complex tools, classical concept of metrology, such as standard uncertainty, accuracy and precision, are still unavoidable for a clear and effective understanding of modern autonomous systems applications.

At the end of this tutorial the attendee will be able to answer such questions as: what are the tools and the methods of major relevance for autonomous systems applications? How do concepts as uncertainty map in the autonomous systems realm?

Instructor: Daniele Fontanelli, University of Trento - Italy

Monday, May 20 10:30 - 12:00
AI for Calibration & Blind Calibration of Sensors
Conference Room 4/5

Abstract: The current wave of machine learning and artificial inteligence solutions depend heavily on data. Data quality depends heavily on how well calibrated the sensors are which generate the data. In this tutorial, the speaker will start with the basics of sensor calibration. Then he will discuss about blind calibration and conditions that facilitate blind calibration. This will be followed by a review of some of the popular AI based techniques to calibrate sensors and some of the new AI-based techniques for blind-calibration of sensors developed by the speaker's team. If you are responsible for installing sensors in your project or are concerned about the quality of the data coming from your sensors then this tutorial is for you. Blind calibration of sensors would be a major enabling solution in both Industry 4.0 as well as achieving sustainable development goals (SDGs).

Instructor: Amit Kumar Mishra, Aberystwyth University, UK

Monday, May 20 10:30 - 12:00
Measurement Fundamentals
Conference Room 6/7

Abstract: The acquisition of information about physical quantities by means of sensors historically fostered the interpretation of measurement as a merely experimental activity. Conversely, measurement is a complex activity, far more complex than suitably connecting and reading an instrument. Indeed, measurement always requires descriptive activities to be performed prior of the execution of empirical activities to ensure both the correct implementation of the experiments and the interpretation of the obtained information. In this tutorial, the basis concepts involved in any measurement are presented and discussed. The tutorial contents support a methodologically correct development of any measurement, regardless the kind of involved quantities (either physical or non-physical) or the field of application.

At the end of this tutorial the attendee will be able to answer such questions as: Which informative empirical processes can be considered measurements? How do I identify an adequate model for a given measurement? How do I estimate and express the quantity of information I can obtain through measurement?

Instructor: Dario Petri, University of Trento, Italy

Monday, May 20 12:00 - 13:30
Monday Lunch
Room: Foyer

Monday, May 20 13:30 - 15:00
Machine Learning for Industrial Condition Monitoring - how to?
Conference Room 2

Abstract: Condition monitoring (CM) of components and processes using machine learning (ML) is one of the central promises of Industry 4.0. Many successful examples have been demonstrated under laboratory conditions. However, the transfer to actual industrial application is proving difficult. The main challenge remaining is the data quality required for developing a meaningful and robust ML model: in industrial applications, most data represent the “good” condition, while samples for different fault scenarios are typically scarce. Furthermore, comprehensive training data are required covering all relevant circumstances to allow successful CM under changing environmental conditions and other causes of domain shift. Even if extensive data are available, most effort is spent on their organization to delete outliers, ensure correct labeling etc. The tutorial will address these issues with two main approaches. The first is a checklist to guide users through the complete process of an ML project, starting with project, measurement, and data planning proceeding to data acquisition, checking and pre-processing up to finally building and validating the ML model. This checklist specifically supports users with little experience in ML to be successful. The second approach is classical process optimization based on insights gained using explainable machine learning methods.

Instructors: Prof. Dr. Andreas Schütze, Saarland University
Tizian Schneider, Centre for Mechatronics and Automation Technology

Monday, May 20 13:30 - 15:00
Observation of Structural Change Inside a Metal Pipe by Applying Millimeter-wave Antennas to the Pipe Ends
Conference Room 4/5

Abstract: Metal pipes are used in building construction like mechanical supports, plumbing, ducting, heating, harness and electrical engineering. Power systems and RF equipment, radars have metal pipes. Since the performances are affected by change in the internal structure of the pipe such as clogging and deformation, we must know conditions like defects inside the pipe without disbanding it.

We propose two methods that use millimeter-wave band signals applied to both the ends of the pipe. One method is to design two high directive antennas working at the millimeter-wave band and let the antennas positioned at both the ends and send and get the signal between the two sides. This has benefits of being relatively free from impedance mismatch at the two ends due to non-contact, higher resolution obtained at high directivity and small dispersion by the CW signal propagating smoothly The other method is to put special metal caps at both the ends of the pipe and let the signal enter the pipe and move along the channel. The special metal cap has a monopole in front of a slot coupling the millimeter-wave signal from the monopole into the inside of the pipe, which is applicable to practices requiring pipes.

Instructors: Sungtek Kahng, Incheon Nat'l University
Changhyeong Lee, Corning Technology Center Korea

Monday, May 20 13:30 - 15:00
Development of Data-Driven Soft Sensors for Better Industrial Processes: From Python to Structured Text
Conference Room 4/5

Abstract: Soft sensors are models that allow estimating the values of a variable based on other process information, without having to measure this variable directly. The main benefits of soft sensors are (1) they represent a low-cost alternative when compared to physical sensors, (2) they can work together with physical sensors, including to identify when they fail, (3) they allow implementation on existing devices, and (4) they provide real-time estimates, being an option for measurements where physical sensors depend on time-consuming analysis. In this tutorial, we are going to learn how to develop a data-driven soft sensor using Python taking into account data-driven techniques such as neural networks, decision trees, and other regression techniques. Besides the Python development, we will learn how to perform attribute selection and feature engineering aiming to improve the accuracy of the model. We will also understand how a neural network and a decision tree can be interpreted and translated to simpler programming form, such as Structured Text, therefore, transforming the generated Python models to be deployed in devices that does not run Python, such as industrial computers. Real data from two processes will be used in this hands-on tutorial, one from a mining process that involves a conveyor belt, motors, and time-displaced scales, and other from a large solar energy area that uses solar irradiance to estimate generated potency.

Instructor: Prof. Dr. Gustavo Pessin, Full Researcher, Instituto Tecnológico Vale (ITV)

Monday, May 20 13:30 - 15:00
Quantifying Uncertainty in Measurement Devices
Conference Room 6/7

Abstract: This tutorial is designed for industry professionals and researchers interested in quantifying uncertainties in complex systems. Uncertainty propagation allows us to provide estimates of the quantity of interest that are not just single numbers (point estimates) but provide confidence intervals or some other statistical measure. It is a fundamental component of any measurement system. We will provide a practical overview of uncertainty propagation followed by a number of computational examples in Matlab and/or Python. We will start first with the uncertainty propagation through simpler functions such as functions used to compute oxygen saturation in pulse oximeters. We will then show an example of uncertainty propagation through a circuit model of a simple differential amplifier. We will also present a complex model of a blood pressure measurement device that includes the pressure sensor, conditioning electronics and the estimation algorithm that can be based on signal processing or machine learning. In that case, uncertainty propagation allows us to estimate confidence intervals of systolic and diastolic blood pressure. The tutorial is built upon and adapted from the recently published book by Dr. Bolic, "Pervasive Cardiovascular and Respiratory Monitoring Devices: Model-Based Design."

Instructor: Dr. Miodrag Bolic, Ottawa in Canada

Monday, May 20 15:00 - 15:30
Monday PM Coffee Break
Room: Foyer

Monday, May 20 15:30 - 17:00
Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption Spectroscopy
Conference Room 2

Abstract (Part 1 Theory): This tutorial is presented in two parts. Part 1 presents the fundamental concepts and engineering design principles for the measurement of the gas parameters of pressure, temperature and concentration based on laser absorption spectroscopy. Methods for the extraction of the gas parameters from absorption line measurements are explained in detail with tuneable diode laser sources, quantum cascade lasers and frequency combs. These methods include harmonic ratio detection, acoustic signal detection and dual comb spectroscopy. The relative merits of near-IR or mid-IR operation in terms of cost, flexibility and sensitivity are discussed as well as the practical issues of referencing, calibration and signal-to-noise considerations. The various measurement systems that may be deployed in practice are reviewed, including open-path and multi-pass systems, fibre optic networks and recent developments in silicon photonic chips. The variety of system designs and measurement techniques presented in this tutorial provide the framework for understanding how laser-based gas measurements systems may be deployed in a wide variety of industrial and environmental settings including the harsh environments of combustion and emissions monitoring.

Abstract (Part 2 Experimental): This tutorial builds on the learning experience gained from the principles and theory of tuneable diode laser spectroscopy (TDLS) presented by Professor George Stewart in Part 1 of the same topic. Part 2 (here) addresses the practical application and deployment of fully engineered TDLS systems in extreme environments. It covers system design, component and system characterisation, validation in the laboratory, deployment and use. Particular issues, such as signal noise, signal to noise ratio optimisation, calibration and calibration-free approaches, and data-acquisition bottlenecks are addressed. Case studies on fully deployed systems for measurement of methane and water vapour in operating solid oxide fuel cells and carbon dioxide and water vapour in the exhaust plumes of gas turbine (aero) engines under operational testing are presented. System extension to achieve multi-beam, tomographic species imaging is also addressed, with particular focus on the complexities of upscaling data-acquisition systems and optical distribution.

Instructor: Professor George Stewart, University of Strathclyde

Monday, May 20 15:30 - 17:00
Smart Sensing Systems and AI for Precision Agriculture
Conference Room 3

Abstract: The precision agriculture (PA) combines technologies and practices that assure the optimization of the operations associated agricultural production through specific farm management.

Regarding the employed technologies distributed smart sensing systems characterized by fixed and mobile nodes (based on remote sensing and Unnamed Aerial Vehicle (UAV))) are used to turn the farming operations into data, and to optimize the future operation based on data driven models. Edge and cloud computing platforms that are capable to run AI/ML algorithms may contribute to help on human decisions.

The tutorial focusses on digital transformation of the agriculture in the context of heavily uncertainty associated with climate change. The IoT ecosystem technologies for precision agriculture will be discussed including multimodal sensing and artificial intelligence. In-situ and remote sensing are considered special attention being granted to the soil characteristics monitoring (moisture and macronutrients concentration). The agriculture UAV imagery and satellite imagery solutions as so as the relation between the data coming from the in-situ distributed smart sensors and acquired images using multispectral and thermographic camera and imagery techniques will be part of the presentation. AI multiple sources data driven models for an increased crops quality through the optimization of farming operations as so as examples of data driven models for smart irrigation and nutrients will be discussed.

Instructor: Dr. Octavian Postolache
ISCTE- Instituto Universitário de Lisboa, Portugal
Instituto de Telecomunicações, Lisboa, Portugal

Monday, May 20 15:30 - 17:00
Theory and Applications of Fiber Optic Sensors
Conference Room 4/5

Abstract: Prepared by a top expert in the field with many developments, real world applications and patents, this lecture will be an invaluable resource for physicists, electronics engineers, teachers, students, technicians and anyone working in the field of sensors. In this presentation, the advantages and possibilities of fiber optic sensors in research and industry will be presented, including two technologies, plastic optical fiber (POF) and the silica fiber. In addition to presenting various technologies that use POF as a sensor, this tutorial will also focus on another type of technology, Fiber Bragg Grating (FBG). FBGs can be found in many industrial applications and we will present our experiences in applying FBGs in many types of sensors for the power industry.

The tutorial will start with the theory of fiber optic sensors using both POF and FBG. It will then cover various practical applications of sensors, including successful field applications developed by our lab in areas such as oil & gas, biotechnology and electrical energy.

The following topics will be presented and discussed in the lecture: Fiber optic sensing technologies; temperature sensing; strain and force sensing; refractive index sensing; high voltage switch monitoring; current and voltage sensing; gas sensing; chemical and biological sensing; oil leak detection; high voltage and high current sensing; gas flow velocity sensing.

Instructor: Marcelo Martins Werneck, Universidade Federal do Rio de Janeiro

Monday, May 20 15:30 - 17:00
Detection Theory: from Statistics to Measurement Applications
Conference Room 6/7

Abstract: Many engineering applications require to detect and to discriminate useful signals from noise or nuisance prior to measuring one or more quantities of interest. Some relevant examples of applications in which detection theory plays a crucial role are (but not limited to): digital communication systems, radars and sonars, Non-Destructive Testing (NDT) techniques, power quality event detectors, biomedical measurement systems. This tutorial provides an overview of classic detection theory solutions based on hypothesis testing. Starting from the classic Neyman-Pearson (NP) theorem (that can be applied when the probability density functions of each assumed hypothesis are completely known) the tutorial moves step-by-step towards the more realistic case in which the probability density functions of binary and multiple hypotheses are no longer completely known. Special attention will be devoted to composite hypothesis testing based on the Bayesian approach and to the Generalized Likelihood Ratio Test (GLRT). For each type of detection problem, a possible state-of-the-art solution shall be presented and clarified through application examples in the field of measurement science and technology.

Instructor: David Macii, University of Trento

Monday, May 20 17:00 - 18:30
Tutorial/Young Professional Reception
Room: Foyer

Tuesday, May 21 8:30 - 9:00
Opening Ceremony
Room: Main Auditorium

Tuesday, May 21 9:00 - 10:00
Metamaterial Internal Receivers for Magnetic Resonance Imaging
Plenary Speaker: Professor Richard Syms
Room: Main Auditorium

Tuesday, May 21 10:00 - 10:30
Tuesday AM Coffee Break
Room: Foyer

Tuesday, May 21 10:30 - 12:30
SPS: Cyber-Physical Systems for present and next-generation batteries: sensors, measurement-based modeling, diagnostics, and related instrumentation
Conference Room 2
Session Chairs: Marco Crescentini, Mirko Marracci and Alessio De Angelis

Transient Removal in Electrochemical Impedance Spectroscopy for Battery Testing
Paolo Carbone, Alessio De Angelis, Valerio Brunacci, Francesco Santoni and Antonio Moschitta (University of Perugia, Italy)

State of Health prediction of batteries for smart energy grids based on multiple features
Marcantonio Catelani, Lorenzo Ciani, Cristian Garzon Alfonso, Francesco Grasso and Gabriele Patrizi (University of Florence, Italy)

Novel Approach for Battery State of Charge Evaluation through Inductive Sensing
Carmine Bourelly and Filippo Milano (University of Cassino and Southern Lazio, Italy); Luigi Ferrigno (University of Cassino, Italy); Marco Laracca (Sapienza University of Rome, Italy); Guiyun Tian (Newcastle University & University of Electronic Science and Technology of China, United Kingdom (Great Britain))

Modeling the Battery Pack in an Electric Car Based on Real-Time Time-Domain Data
Paolo Carbone and Alessio De Angelis (University of Perugia, Italy); Mirko Marracci and Bernardo Tellini (University of Pisa, Italy); Pier Andrea Traverso and Marco Crescentini (University of Bologna, Italy); Valerio Brunacci, Francesco Santoni and Antonio Moschitta (University of Perugia, Italy)

EWLS State Estimator Performance for Bad Data Detection and Identification
Gabriele D'Antona (Politecnico di Milano & Department of Energy, Italy); Simone Carnì (ABB, Italy & Politecnico di Milano, Italy); Camilo Trujillo Arboleda (Politecnico di Milano, Italy)

Hybridized Piezoelectric and Electromagnetic based Vibration Energy Harvester with Self-powered SSHI Interface
Mukunda Mahato, Souvik Khan and Aakash Kumrawat (Indian Institute of Technology Kharagpur, India); Banibrata Mukherjee (IIT Kharagpur, India)

Tuesday, May 21 10:30 – 12:30
Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 1
Level 1 Auditorium
Session Chairs: Joseph Cortner and Gianni Cerro

Integrating radiomics and immunology: non-invasive assessment of CD8+ T cell levels
Amir Laraki Rifi (Vrije Universiteit Brussel, Belgium); Camille Raets (Vrije Universiteit Brussels, Belgium); Inès Dufait (Vrije Universiteit Brussel, Belgium); Mark De Ridder (UZ Brussel, Belgium); Kurt Barbé (Vrije Universiteit Brussel & Faculty of Sciences, Belgium)

Deep Neovascularization Segmentation by Learning Graphical Connectivity in Optical Coherence Tomography
Lin Ding, Shangjie Ren and Feng Dong (Tianjin University, China)

Real-Time Implementation of Spatial Convolutional Network to Control Myoelectric Prostheses
Milad Jabbari (University of Edinburgh, United Kingdom (Great Britain)); Hancong Wu (South China University of Technology, China); Kianoush Nazarpour (University of Edinburgh, United Kingdom (Great Britain))

A novel energy-based composite index for assessing motor state in Parkinson's disease by means of IMU-based Digital Health Technology
Chiara Carissimo and Gianni Cerro (University of Molise, Italy); Luigi Ferrigno (University of Cassino, Italy); Alessandro Marino and Gianfranco Miele (University of Cassino and Southern Lazio, Italy); Silvia Del Din, Heloise Debelle, Emma Packer, Lynn Rochester, Lisa Alcock, Alison Yarnall and Javad Sarvestan (Newcastle University, United Kingdom (Great Britain))

Magnetic Particle Imaging Using an Optically Pumped Magnetometer and a Flux Transformer
Teruyoshi Sasayama (Kyushu University, Japan); Shuji Taue (Kochi University of Technology, Japan); Takashi Yoshida (Kyushu University, Japan)

Taylor-Fourier Analysis of Photoplethysmography Signals for Heart Rate Measurement
Sahar Rahbar and Roberto Ferrero (University of Liverpool, United Kingdom (Great Britain)); Paolo Attilio Pegoraro (University of Cagliari, Italy); Sergio Toscani (Politecnico di Milano, Italy)

Tuesday, May 21 10:30 – 12:30
Instrumentation and Measurement for Non-Destructive Testing and Evaluation (IMNDE) 1
Conference Room 4/5
Session Chairs: James Smith and Carlos Juan

Fatigue Crack Inspection using Microwave Resonator Probe
Mohammed Saif ur Rahman and Mohamed A Abou-Khousa (Khalifa University of Science and Technology, United Arab Emirates)

An Accurate and Efficient Measurement System for Identifying Conductive Textile Traces
Phillip Petz, Florian Eibensteiner, Stephan Schuler and Josef Langer (University of Applied Sciences Upper Austria, Austria)

Physical Model Study on Subsurface Defects Detection in Eddy Current Pulsed Thermography
Chenyang Li, Shiji Xiahou, Lulu Tian, Yiping Liang, Min MA and Cong Chen (University of Electronic Science and Technology of China, China)

1.5-µm Optical Coherence Tomography for Quality Inspection of 3D-printed Scattering Phantoms
Janne Lauri, Tatiana Avsievich, Oleksii Sieryi, Alexander Bykov and Tapio Fabritius (University of Oulu, Finland)

Solid-phase Fraction Computation in Unevenly distributed Field by Electrical Resistance
Xinshan Zhu (Tianjin University, China); Shenglu Yue (China); Kun Li (Tianjin University, China); Benyuan Sun (School of Electrical and Information Engineering Tianjin University Tianjin, China)

System-Based Monitoring Approach for Mechanical Seals Using Excited Mechanical Resonances by an Electromagnetic Acoustic Transducer
Alexander Siegl, Stefan Leithner, Bernhard Schweighofer and Hannes Wegleiter (Graz University of Technology, Austria)

Tuesday, May 21 10:30 – 12:30
SPS: Sensors, Instrumentation, and Artificial Intelligence Technologies for Environmental Measurement and Modeling
Conference Room 6/7
Session Chairs: Lee Barford and Chi Hung Hwang

INVITED TALK: Advancing Electrochemical Screening for Pesticides in Thai Agricultural Products and Natural Water Resources
Angkana Phongphut1, Bralee Chayasombat1,*, Kroekchai Inpor1, Onuma Santawitee1, Seeroong Prichanont1, Hsin-Yi Tsai2, Yu-Hsuan Lin2, Keng-Ku Liu3, Ruey-an Doong4 and Chanchana Thanachayanont1
1 MTEC, National Science and Technology Development Agency (NSTDA), Pathum Thani, Thailand
2 Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan
3 Department of Biomedical Engineering and Environmental Sciences, National Tsing Hua University, Hsinchu, Taiwan
4 Institute of Analytical and Environmental Sciences, National Tsing Hua University, Hsinchu, Taiwan

Low-cost SCADA/HMI with Tiny Machine Learning for Monitoring Indoor CO2 Concentration
I Nyoman Kusuma Wardana (University of Warwick, United Kingdom (Great Britain) & Politeknik Negeri Bali, Indonesia); Julian Gardner (University of Warwick, United Kingdom (Great Britain)); Suhaib A. Fahmy (King Abdullah University of Science and Technology, Saudi Arabia)

Selection and Aggregation of Multiple Low-cost Particle Sensors for Outdoor Particulate Matter Measurement
Jie Li (Nanjing University of Aeronautics and Astronautics, United Kingdom (Great Britain)); Zhengjia Xu, Zaheer Nasar, Valerio Ferracci and Neil Harris (Cranfield University, United Kingdom (Great Britain))

Pervasive Monitoring in the Context of Precision Agriculture: Using Low-Cost LDR Sensors for Solar Intensity Measurement
Irene Cappelli and Lorenzo Parri (University of Siena, Italy); Marco Tani (University of siena, Italy); Valerio Vignoli and Ada Fort (University of Siena, Italy)

An ANN-based Electronic Nose for Monitoring Pollutant Gases in Landfills
Juliene S. D. Muniz (Federal University of Paraiba, Brazil); Francisco A. F. M. Junior (State University of Paraíba, Brazil); Cleonilson Protasio de Souza (Federal University of Paraiba, Brazil); William Paiva (State University of Paraíba, Brazil)

A Hall-effect based sensor for the detection of concentrations of ferromagnetic materials in water
Ada Fort, Enza Panzardi, Stefano Parrino and Valerio Vignoli (University of Siena, Italy); Alessandro Pozzebon (University of Padova, Italy)

Tuesday, May 21 10:30 – 12:30
Sensors and Transducers
Conference Room 3
Session Chairs: Chenhui Huang and Marco Carratù

Dynamic temperature test of gyroscope for automotive applications
Marcantonio Catelani, Lorenzo Ciani, Gabriele Patrizi and Roberto Singuaroli (University of Florence, Italy); Marco Carratù (University of Salerno, Italy); Antonio Pietrosanto (University of Salerno & CEO of Metering Research srl, Italy); Paolo Sommella (University of Salerno, Italy)

A Smart Combined Wireless Sensor for Vibration and AE Signals Measurement
Zhaoyu Zhang (Xi'an Jiaotong University, China & Politecnico di Torino, Italy); Luca Lombardo (Politecnico di Torino, Italy); Tianyi Shi and Xutao Han (Xi'an Jiaotong University); Marco Parvis (Politecnico di Torino, Italy); Junhao Li (Xi'an Jiaotong University)

A method to design open loop current transducers for busbar applications
Federico Carere, Marco Laracca, Silvia Sangiovanni and Davide Saccavini (Sapienza University of Rome, Italy)

Printed Circuit–based Thermoelectric Sensor Film for Temperature Distribution Measurements
Antti Immonen (LUT University, Finland); Priyanka Goel and Tomi Koskinen (Aalto University, Finland); Matias Pekkanen (LUT University, Finland); Ilkka Tittonen (Aalto University, Finland); Tommi J. Kärkkäinen and Pertti Silventoinen (Lappeenranta University of Technology, Finland); Mikko P. J. Kuisma (LUT University, Finland)

Additively Manufactured Aperture-Based FSS
Alexander Hook and Kristen M Donnell (Missouri University of Science and Technology, USA); Doyle Motes and Cody Morrow (Texas Research Institute, USA)

A Capacitively Coupled Sensing Approach for Copper Ore Quality Assessment: A feasibility Study
Catherine Thomas and Boby George (Indian Institute of Technology Madras, India)

Tuesday, May 21 10:30 – 12:30
Image Processing and Vision Based Measurement 1
Conference Room 1
Session Chairs: Jordi-Roger Riba and Luca De Vito

Automated Colony Detection: Evaluating U-Net Models with DenseNet Backbone
Simon-Johannes Burgdorf (University of Rostock & Center for Life Science Automation CELISCA, Germany); Thomas Roddelkopf (University of Rostock, Germany); Kerstin Thurow (Center for Life Science Automation - CELISCA, Germany)

Lightweight Object Detection Networks Oriented for Embedded Weeding
Yushuo Hu and Qiang Wang (Harbin Institute of Technology, China)

SEC-UNet: SE-ViT and Cross Attention Method in UNet for Electrical Impedance Tomography
Zichen Wang (TianGong University, China); Tao Zhang (Tiangong University, China); Qi Wang (Tianjin Polytechnic University, China); Ronghua Zhang (Tianjin Polytechnic University School of Artifical Intelligence, China)

An adaptive algorithm for bubble identification and visualization utilizing laser scanning
Songlin Li, Ting Xue and Jinshun Liu (Tianjin University, China)

Dimensional accuracy assessment of 3D models based on photogrammetry and 3D scanner: a case study from the Museo Egizio of Turin
Sara Croci (Politecnico di Torino, Italy & Centro per La Conservazione Ed Il Restauro Dei Beni Culturali "La Venaria Reale", Italy); Leila Es Sebar and Luca Lombardo (Politecnico di Torino, Italy); Federico Di Iorio (Politecnico di Torino & Centro per La Conservazione Ed Il Restauro Dei Beni Culturali "La Venaria Reale", Italy); Paola Buscaglia (Centro Conservazione e Restauro "La Venaria Reale", Venaria Reale, Torino, Italy); Federico Taverni and Sara Aicardi (Museo Egizio di Torino, Italy); Sabrina Grassini (Politecnico di Torino, Italy)

Accelerated Aging Quantification of XL-ETFE Wires in Low-Pressure Aircraft Environments
Jordi Roger Riba-Ruiz, Pau Bas-Calopa and Manuel Moreno-Eguilaz (Universitat Politècnica de Catalunya, Spain)

Tuesday, May 21 12:30 - 13:30
Tuesday Lunch
Room: Foyer

The technical committee, TC-01: Nondestructive Evaluation and Industrial Inspection (NDE&II), will be having a meeting at I2MTC in Glasgow. The meeting will be a lunch meeting held in the Level 3 Foyer on Tuesday May 21. If you would like more information about TC-01 NDE&II, please feel free to contact James Smith (James.Smith@INL.gov) or Helena Geirinhas Ramos (hgramos@ist.utl.pt). The goal of NDE&II is to develop, promote, and support research and development on measurements, instrumentation, and systems for non-destructive evaluation and industrial inspection. We would welcome your participation.

Tuesday, May 21 13:30 - 14:30
Plenary Industry Panel Discussion
Room: Main Auditorium

The role of instrumentation and measurement in delivering the energy system of the future

The urgency to deliver major reductions in global greenhouse gas (GHG) emissions is increasing significantly in response to climate change and the growing number of extreme climate events. The scientific community is clear that the speed at which net zero emissions is achieved will be crucial. As one of the major sources of global GHGs, the energy sector has a critical role to play in driving innovation and the rapid deployment of novel low carbon technology solutions and services to support the delivery of net zero emissions across power, heat and transport.

The transition to a net zero energy sector will require some very profound changes to the way that energy is generated, distributed and consumed, and new approaches to ensuring system robustness and resilience will also be required. Increasing interactions between the different parts of the energy system (electricity, heat and transport) is highly likely, and data – its collection, processing and utilisation - will be at the centre of this transformation.

With a panel of leading industry and academic experts, this plenary session will explore how instrumentation and measurement will be able to contribute to the growth of data provision and use in the energy sector, how this relates to the different parts of the energy sector, and how the innovation community can support industry to accelerate new instrumentation and measurement solutions to support the delivery of net zero emissions.

Chair
- Richard Knight, Director for Strategy & Technology, PNDC (University of Strathclyde)

Panelists
- Federico Coffele, Professor of Practice, PNDC (University of Strathclyde)

Tuesday, May 21 14:30 - 15:30
Tuesday Poster Session & Tuesday PM Coffee Break
Room: Foyer
Session Chairs: Logan Wilcox and Antonio Pietrosanto

1: Delamination Detection in CFPR Components from Ultrasound Images Using Convolutional Neural Networks
Tilman Seesselberg (University of Applied Sciences Darmstadt, Germany); Axel Busboom (Munich University of Applied Sciences, Germany); Jonas Welsch, Edmond Cretu and Robert Rohling (University of British Columbia, Canada)

2: Adaptive Anomaly Detection in Industrial Systems: An EVT-DTS Approach with LSTM Autoencoders
Bing Yu and JiaKai Xu (Harbin Institute of Technology, China); Gang Xiang and RuiShi Lin (Beijing Aerospace Automatic Control Institute, China); Liguo Zhao and Yang Yu (Harbin Institute of Technology, China)

3: Two-Parameter Gauss-Newton based Real-Time Ranging Method for Full-waveform LiDAR
Tengfei Bi, Xiaolu Li, Wenbin Chen, Zichen Ma, Lijun Xu and Duan Li (Beihang University, China)

4: Multi-Class Gaze Detection in a Dynamic Environment
Aidan Lochbihler (Carleton University, Canada); Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada); Kathleen Van Benthem, Chris Herdman, Kirsten Brightman and Will Sloan (Carleton University, Canada); Frank Knoefel (Bruyere Continuing Care, Canada); Shawn Marshall (Ottawa Hospital, Canada); Rafik Goubran (Carleton University, Canada)

5: A Sparse Antenna Array Synthesis Method for Road Positioning
Tong Wan (Harbin Institute of Technology, China); Chongqin Wang (Harbin University of Science and Technology, China); Yiming Lu and Ninghe Yang (Harbin Institute of Technology, China); Bo Lu (Beijing Aerospace Automatic Control Institute, China); Feng Shen (Harbin Institute of Technology, China)

6: Partial Representation-Based Oil-gas-water Flow State Monitoring via Dual-modal Detection
Zhao Li, Chao Tan and Feng Dong (Tianjin University, China)

7: High Accuracy Target Tracking System Based on Muscle-skeleton Robotic Arm
Yan Wang, Qiang Wang and Jianyin Fan (Harbin Institute of Technology, China)

8: Enhancing Brain Age Prediction: A Generative AI Approach for EEG Machine Learning Models
Zara Cook (University of Waterloo & Simon Fraser University, Canada); Grant Sinha (University of Waterloo, Canada); Jack Wang (University of Waterloo and National Research Council of Canada, Canada); Chengzong Zhao (University of Waterloo, Canada); Nabil Belacel (NRC, Canada); Sam Doesburg (Simon Fraser University, Canada); George Medvedev (Fraser Health Authority, Canada); Urs Ribary and Vasily Vakorin (Simon Fraser University, Canada); Pengcheng Xi (National Research Council Canada, Canada)

9: Prototype Based Personalized Federated Learning for Planetary Gearbox Fault Diagnosis
Wenjun Sun (Southeast University, China); Ruqiang Yan (Xi'an Jiaotong University, China)

10: Non-Contact High-Frequency Vibration Measurement Using Blade Tip Vibration Acceleration
Yuda Zhu and Baijie Qiao (Xi'an Jiaotong University, China); Liu Meiru (Sichuan Gas Turbine Establishment Aero Engine Corporation of China, China); Wang Yanan (National Key Lab of Aerospace Power System and Plasma Technology, China); Dai Jiangbo (Sichuan Gas Turbine Establishment Aero Engine Corporation of China, China); Xuefeng Chen (Xi'an Jiaotong University, China)

11: Wi-Fi's Energy Detection: A Study of Regional Regulations on Clear Channel Assessment
Stone Liu and Ioannis Lambadaris (Carleton University, Canada); Sebastian Max (Ericsson Research, Germany); David Sugirtharaj (Ericsson, Sweden); Jeff Bailey (Ericsson, Canada)

12: A Portable Data Acquisition System for Online Wavelength Modulation Spectroscopy
Yikai Xia, Jiangnan Xia, Di Xiao and Yuan Chen (University of Edinburgh, United Kingdom (Great Britain)); Enemali Godwin (Glasgow Caledonian University, United Kingdom (Great Britain)); Chang Liu (University of Edinburgh, United Kingdom (Great Britain))

13: Performance Evaluation of a New Universal Time Domain Gating Algorithm
Alina Zohner (University of Erlangen-Nuremberg, Germany); Florian Irnstorfer (Friedrich-Alexander University Erlangen-Nuremberg, Germany); Robert Weigel (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany); Christof Pfannenmüller (Friedrich-Alexander University Erlangen-Nuremberg & Institute for Electronics Engineering, Germany)

14: Multi-class Similarity-based Approach for Remaining Useful Life Estimation
Silvia Onofri and Alex Marchioni (University of Bologna, Italy); Gianluca Setti (KAUST Jeddah, Saudi Arabia); Mauro Mangia and Riccardo Rovatti (University of Bologna, Italy)

15: A Kalman filter-based method for displacement calculation of blade tip timing
Jinghui Xu, Baijie Qiao and Zhibo Yang (Xi'an Jiaotong University, China); Liu Meiru and Dai Jiangbo (Sichuan Gas Turbine Establishment Aero Engine Corporation of China, China); Xuefeng Chen (Xian Jiaotong University, China)

16: Low-Resource Fully-Digital BPSK Demodulation Technique for Intra-Body Wireless Sensor Networks
Stephane Pitou (University of Montpellier France & LIRMM, CNRS, France)

17: Etching-based measurement error compensation for eddy current displacement measurement
Kalle Kinnunen and Raine Viitala (Aalto University, Finland)

18: Towards the Development of a Photonic Current Sensor for HVDC Networks
Alfred Amiolemen (Ambrose Alli University & University of Strathclyde, United Kingdom (Great Britain)); Grzegorz Fusiek (University of Strathclyde, United Kingdom (Great Britain)); Pawel Niewczas (University of Strathclyde & Synaptec Ltd, United Kingdom (Great Britain))

19: On the use of LPWAN for enabling connected power tools: the LoRaWAN case
Paolo Bellagente, Salvatore Dello Iacono, Alessandro Depari, Paolo Ferrari, Alessandra Flammini, Marco Pasetti, Stefano Rinaldi and Emiliano Sisinni (University of Brescia, Italy)

20: VNA-based Modulated Measurements for Polynomial Modeling and Linearization of RF Multipliers
Ali H Alsarraf (KU Leuven, Belgium); Gian Piero Gibiino (University of Bologna, Italy); Dominique Schreurs (KU Leuven, Belgium)

21: Enhanced Combined Weighted Method for TDOA-Based Localization
Gyula Simon (Óbuda University, Hungary)

22: Advanced Smart Sensing Node with Acoustic-Based Connectivity for Spot Welding in the Automotive Industry
Paolo Caruso and Vincenzo Paciello (University of Salerno, Italy); António Espírito Santo, Helbert da Rocha and Jose A. Salvado (University of Beira Interior, Portugal)

23: Performance Measurements of LoRaWAN Connectivity for Links Through Metallic Shields: Preliminary and Feasibility Tests
Matteo Bertocco, Alessandro Pozzebon and Giacomo Peruzzi (University of Padova, Italy)

24: Deep Canonical Variate Analysis with Interpretable Attribute Guidance for Three-Phase Flow Process Monitoring
Linghan Li, Shumei Zhang and Feng Dong (Tianjin University, China)

25: Water Content Measurement Method Based on RF Dual-Parallel-Antenna Sensor
Ying Xu (Tianjin University, China); Shuo Liu (TianJin University, China); Chao Yuan, Zheng Meng and Rongji Zuo (Tianjin University, China); Liang Chen (Daqing Oilfield Design Institute Company Limited, China)

26: Wear State Score Prediction of Friction Testing Machine Using Improved Ensemble Convolutional Neural Network
Guo Yang and Hui Tao (South China University of Technology, China); Ruxu Du (Guangdong Janus Biotechnology Co. Ltd, China); Yong Zhong (South China University of Technology, China)

27: Machine Learning-Based Multi-Frequency Water Content Prediction Using Microwave Resonant Cavity Sensor
Ying Xu, Xiaoqing Li, Chao Yuan and Rongji Zuo (Tianjin University, China); Xili Ba (Petrochina Planning&Engineering Institute, China)

28: Electrical Capacitance-Ultrasonic Dual-mode Tomography for Gas-liquid Two-phase Flow
Keyi Wang, Ying Wang, Jiangtao Sun, Yuedong Xie, Duan Li, Lijun Xu and Shijie Sun (Beihang University, China)

29: A novel conductivity probe for measurement of bubble in gas-liquid two phase flow
Ran Pang, Chao Wang and Dong Qian (Tianjin University, China); Hongbing Ding (Tianjin Uinversity, China); Hongjun Sun (Tianjin University, China)

30: Liquid Interface Detection Using Dual Polarized Microwave Sensor
Sagiru Mukhtar Gaya and Khaled Al-Wahedi (Khalifa University of Science and Technology, United Arab Emirates); Mohamed AlShehhi (Khalifa University, United Arab Emirates); Mohamed A Abou-Khousa (Khalifa University of Science and Technology, United Arab Emirates)

31: Revised IEEE-1459 Power Definitions: A Revenue Metering Viewpoint
Andrew Berrisford (Berrisford Power Measurement and Analysis, Canada)

32: Flight time measurement methodology for small-caliber clamp-on ultrasonic flowmeters
Zimeng Zheng, Dandan Zheng and Ying Xu (Tianjin University, China); Maosen Wang (School of Electrical and Information Engineering, Tianjin University, China)

33: Viterbi-Based Trajectory Estimation with Widely Spaced Receiving Radar Antennas
Martin Scherhaeufl (-); Markus Pichler-Scheder, Maria Klaffenböck and Florian Hammer (Linz Center of Mechatronics GmbH, Austria)

34: Hardware Design and Implementation of Digital Lock-in Amplifier for Multi-channel Parallel Impedance Measurement
Jianze Xu, Ziqiang Cui, Can Sun and Huaxiang Wang (Tianjin University, China)

35: Task coding self-adaption network for Fault diagnosis of all converters
Fan Wu (University of Electronic Science and Technology of China, China); Gen Qiu (No. 2006, Xiyuan Avenue, West High-Tech Zone & University of Electronic Science and Technology of China, China); Kai Chen and Yifan Wang (University of Electronic Science and Technology of China, China)

36: Fault Prior-guided White-box Model towards Interpretable Discriminant Feature Extraction
Yuan Zheng, Weihua Li, Zhuyun Chen, Huibin Lin and Guolin He (South China University of Technology, China)

37: Multi-scale Dilated Convolutional Auto-encoder Network for Weak Feature Extraction and Health Condition Detection
Jiaxian Chen, Dongpeng Li, Ruyi Huang, Zhuyun Chen and Weihua Li (South China University of Technology, China)

38: A Clustering-Guided Source-Free Domain Transfer Learning Diagnostic Method for Rotating Machinery
Zhenya Wang, Tao Liu, Sr. and Liu Chang (Kunming University of Science and Technology, China); Xing Wu (Yunnan Vocational College of Mechanical and Electrical Technology, China); Chen Qing (Kunming University of Science and Technology, China)

39: Indicator-assisted Sparse Morphological Decomposition for High-speed Bearing Diagnosis
Lei Jin (Xi'an Jiaotong University, China); Shibin Wang (The State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, China); Du Zhang and Baoqing Ding (Xi'an Jiaotong University, China); Ruqiang Yan (Xi'an Jiaotong University, China); Xuefeng Chen (Xian Jiaotong University, China)

40: LSTM-Autoencoder-based Interpretable Predictive Maintenance Framework for Industrial Systems
Anmol Agrawal (IIIT, Naya Raipur, India); Aparna Sinha (International Institute of Information Technology Naya Raipur, India); Debanjan Das (IIIT Naya Raipur, India)

Tuesday, May 21 14:30 - 15:30
TIM/OJIM Poster Session
Room: Foyer 2
Session Chair: Ruqiang Yan

41: Validation of the Reference Impedance in Multiline Calibration with Stepped Impedance Standards
Ziad Hatab and Michael Gadringer (Graz University of Technology, Austria); Ahmad Bader Alothman Alterkawi (AT&S AG, Austria); Wolfgang Bosch (Graz University of Technology & Institute of Microwave and Photonic Engineering, Austria)

42: Research on Running Status Monitoring and Rotating Blade Crack Detection of Large-Scale Centrifugal Compressor Based on Blade Tip Timing Technique
Hongkun Li (Dalian University of Technology, China)

43: A Portable 28-GHz Channel Sounder Platform and Measurement Results From Close-to-Ground Field Tests
Edward Ball (University of Sheffield, United Kingdom (Great Britain)); Sumin David Joseph (The University of Sheffield, United Kingdom (Great Britain))

44: Design of an FPGA-Based High-Speed Data Acquisition System for Frequency Scanning Interferometry Long-Range Measurement
Sivagunalan Sivanathan (Treforest Campus & University of South Wales, United Kingdom (Great Britain))

45: Anomaly Detection for Shielded Cable Including Cable Joint Using a Deep Learning Approach
Seung Jin Chang (Hanbat National University, Korea (South)); Gu-Young Kwon (Kongju National University, Korea (South))

46: Bayesian Image Reconstruction Using Weighted Laplace Prior for Lung Respiratory Monitoring With Electrical Impedance Tomography
Jiafeng Yao, Yang Wu, Bai Chen and Kai Liu (Nanjing University of Aeronautics and Astronautics, China); Jiabin Jia (University of Edinburgh, United Kingdom (Great Britain))

47: Polar Coordinate for Damage Imaging of Adhesively Bonded Plates Using Ultrasonic Guided Waves and Laser Doppler Vibrometer Measurements
Mohsen Barzegar (Instituto de Telecomunicações & Instituto Superior Técnico, Portugal); Dario J. Pasadas (Instituto Telecomunicações & Instituto Superior Técnico, Portugal); Artur L. Ribeiro (Instituto de Telecomunicações & Instituto Superior Técnico, University of Lisbon, Portugal); Helena G. Ramos (Instituto de Telecomunicacoes, Instituto Superior Tecnico, Portugal); Yevgeniya Lugovtsova (Bundesanstalt Fur Materialforschung Und Prufung, Portugal); Jannis Bulling (Bundesanstalt Fur Materialforschung Und Prufung, Germany)

48: Theoretical Predictions of Perturbed Magnetic Flux Density Components Due to Narrow Flaws in ECT
Prashanth Baskaran (Instituto de Telecomunicações, Portugal)

49: Data Modeling Techniques for Pipeline Integrity Assessment: A State-of-the-Art Survey
Chunsheng Yang (Guangzhou University, Canada & Carleton University, Canada); Zheng Liu (University of British Columbia Okanagan, Canada); Min Liao (National Research Council Canada, Canada); Jiatong Ling (University of British Columbia, Canada); Ke Feng (University of New South Wales, Australia)

50: AlignBodyNet: Deep Learning-Based Alignment of Non-Overlapping Partial Body Point Clouds From a Single Depth Camera
Pengpeng Hu (Coventry University, United Kingdom (Great Britain))

51: Point2PartVolume: Human Body Volume Estimation From a Single Depth Image
Pengpeng Hu (Coventry University, United Kingdom (Great Britain))

Tuesday, May 21 15:30 - 17:30
SPS: The forthcoming era of battery-free measurement systems: Progress in methodologies and devices for energy harvesting and wireless power transmission
Conference Room 2
Session Chairs: Carlo Trigona and Enza Panzardi

Comparative analysis of low-power PV cells of different technologies under different types of indoor artificial lighting
Eduard Ferré, Manel Gasulla and Ferran Reverter (Universitat Politècnica de Catalunya, Spain)

Unveiling Botanical Piezo-Tribo Energy Harvesting for Autonomous Measurement Systems
Carlo Trigona, Giuliano A. Salerno, Iman Arjmandmanesh, Saad Bin Meraj and Salvatore Baglio (University of Catania, Italy); Adi R. Bulsara (Naval Information Warfare Center, USA)

Dissolvable Piezo-Ionic Pullulan Sensor for Measurements of Applied Deformation
Carlo Trigona, Mairaj Wali and Carmelo Finocchiaro (University of Catania, Italy); Giovanna Di Pasquale (Università degli Studi di Catania, Italy); Salvatore Graziani (University of Catania, Italy); Antonino Pollicino (Univesrità di Catania, Italy)

RF Energy Harvesting for IoT Sensors: Effects of Inductor Quality Factor on Efficiency
Amir Fereshtian (Universitat Politecnica de Catalunya & Castelldefels School of Telecommunications and Aerospace Engineering, Spain); Jordi Berenguer (Universitat Politecnica de Catalunya, Spain); Manel Gasulla (Universitat Politècnica de Catalunya, Spain)

Experimental evaluation and comparison of FOCV-based PMU for indoor low-power PV cells
Marc Azlor, Manel Gasulla and Ferran Reverter (Universitat Politècnica de Catalunya, Spain)

Toward a compact low-cost electronic interface for photoacoustic based gas sensors
Ada Fort, Enza Panzardi, Valerio Vignoli and Marco Mugnaini (University of Siena, Italy)

Tuesday, May 21 15:30 – 17:30
Instrumentation and Measurement for Industry 4.0
Conference Room 3
Session Chairs: Marco Mugnaini and Tizian Schneider

Measuring Node for Modular Wireless Sensor-Networks in Harsh Industrial Environments
Alessio Carullo, Simone Corbellini, Luca Lombardo, Alberto Vallan and Marco Sento (Politecnico di Torino, Italy)

Variable time delay estimation for a debutanizer column using multiple correlation analysis
Salvatore Graziani (University of Catania, Italy); Maria Gabriella Xibilia (University of Messina, Italy)

A Deployable Edge Computing Solution For Machine Condition Monitoring
Xijia Zhao and Peng Wang (University of Kentucky, USA)

Using a mobile phone to measure an overhead crane hook condition
Joose Lankia and Riku Ala-Laurinaho (Aalto University, Finland)

Closing the Loop: Enhancing Industrial Productivity Through Soft Sensor
Paulo Pereira (Vale S.A., Brazil); Thomas Vargas Barsante Pinto (Universidade Federal de Minas Gerais, Brazil & Instituto Tecnológico Vale, Brazil); Saulo Neves Matos (University of São Paulo, Brazil); José Perez (Instituto Tecnológico Vale, Brazil); Higor Barbosa (Vale S.A., Brazil); Gustavo Pessin (Vale Institute of Technology, Brazil)

Asymmetric Self-Heating of Fully Printed Strain gauge in Wheatstone Bridge Configuration
Tiziano Fapanni, Emilio Sardini and Edoardo Cantù (University of Brescia, Italy)

Tuesday, May 21 15:30 – 17:30
Instrumentation and Measurement for Energy Systems
Conference Room 4/5
Session Chairs: Helko E. van den Brom and Philippe Hamelin

Characterization of Analog Front-End in PMU Design for Inertia Monitoring
Marco Agustoni and Guglielmo Frigo (Swiss Federal Institute of Metrology METAS, Switzerland)

Towards a non-Invasive Monitoring System for Wind Turbine Blades
Nicolas Schärer (ETH Zürich, Switzerland); Tommaso Polonelli (ETH Zurich, Switzerland); Julien Deparday (Ostschweizer Fachhochschule, Switzerland); Michele Magno (ETH Zurich, Switzerland)

Targeted Adaptive Non-Intrusive Load Monitoring
Song Chen, Maojiang Zhao, Yu Yang, Zuqiang Xiong and Zhemin Bai (Xiamen University, China)

Measurement and information uncertainty for highly variable power profiles
Anca Petruta Brincoveanu (University Politehnica of Bucharest, Romania); Radu Plamanescu (National University of Science and Technology Politehnica Bucharest, Romania); Ana Maria Dumitrescu and Mihaela Albu (Politehnica University of Bucharest, Romania)

Power Quality Measurements in a Low-Voltage DC Microgrid in an Open Parking Garage
Helko E. van den Brom (VSL B.V., The Netherlands); Ronald van Leeuwen (VSL, The Netherlands); Jos M. Warmerdam and Rob Schaacke (Amsterdam University of Applied Sciences, The Netherlands)

Assessing Impact of Uncertainty on a Decision Support System for Flexibility Exploitation in a Distribution Network
Federico Carere, Marco Laracca, Silvia Sangiovanni and Tommaso Bragatto (Sapienza University of Rome, Italy); Alberto Geri (University of Rome Sapienza, Italy); Parastou Poursoltan (Sapienza University of Rome, Italy)

Tuesday, May 21 15:30 – 17:30
Instrumentation and Measurement for Chemical and Biological Quantities
Level 1 Auditorium
Session Chairs: Carlos Juan and Luca Lombardo

QCM measurement systems: Problems and performance analysis
Elia Landi, Riccardo Moretti and Marco Mugnaini (University of Siena, Italy); Consolatina Liguori and Vincenzo Paciello (University of Salerno, Italy); Salvatore Dello Iacono (University of Brescia, Italy); Ada Fort (University of Siena, Italy)

Influence of Dry Layers in Solute Concentration Measurement with Planar Microwave Sensors
Carlos G. Juan (Miguel Hernández University of Elche & Technical University of Cartagena, Spain); Enrique Bronchalo (Universidad Miguel Hernandez de Elche (UMH), Spain); Jose Maria Sabater (Miguel Hernandez University, Spain)

Automated Optic Calibration to Optimize Pipetting Accuracy and Precision in a Liquid-Handling-System
Anna Bach, Sebastian Mikkat, Heidi Fleischer, Mohamed Ali Tlili and Thomas Roddelkopf (University of Rostock, Germany); Kerstin Thurow (Center for Life Science Automation - CELISCA, Germany)

Absorption Spectroscopy of H2S near 1578 nm using CRDS
WenChao Qian, Haonan Lv, Anhao Jiang, Min Zhu and Chaohai Zhang (Nanjing University of Aeronautics and Astronautics, China)

Sampling apparatus for the process monitoring of contaminants in polyolefin recycling
Wolfhard Reimringer (Saarland University, Germany); Helen Haug (Fraunhofer Institute for Process Engineering and Packaging, Germany); Lukas Seifert (RWTH Aachen University, Germany); Tilman Sauerwald (Saarland University, Germany)

Plastic Optical Fiber Immunosensor for Escherichia coli Detection
Marcelo Werneck (Federal University of Rio de Janeiro (UFRJ), Brazil); Rafaela Lopes (LIF/COPPE/UFRJ, Brazil); Juan D. L. Vargas (Federal University of Rio de Janeiro, Brazil); Paulo Henrique S Pinto (Universidade Federal do Rio de Janeiro, Brazil); Alex Dante (Federal University of Rio de Janeiro (UFRJ), Brazil & International Iberian Nanotechnology Laboratory (INL), Portugal); Regina Allil (Universidade Federal do Rio de Janeiro, Brazil)

Tuesday, May 21 15:30 – 17:30
Instrumentation and Measurement for Communications and IoT
Conference Room 6/7
Session Chairs: Alberto Morato and Salvatore Dello Iacono

A Simplified Setup for Passive Intermodulation Measurement
Martin Hudlička (Czech Metrology Institute, Czech Republic); Ahmed Sayegh (Physikalisch-Technische Bundesanstalt, Germany)

Measurable quantities in a synchronization system under attack: A first step to implement a detection system
Giada Giorgi (University of Padova, Italy)

Carrier Phase Based Relative Positioning Using MUSIC-based ToA Estimation with High Resolution
Payam Pourzadeh Hassan and Ian D. Marsland (Carleton University, Canada); Roland Smith (Ericsson, Canada); Ron Kerr (Carleton University, Canada); Syed Hassan Raza Naqvi (Ericsson Canada Inc., Canada & Politecnico di Milano, Italy); Ioannis Lambadaris (Carleton University, Canada)

Electromagnetic side channel for application profiling in IoT frameworks: a comparison between time and frequency measurement approaches
Andrea Amodei and Domenico Capriglione (University of Cassino and Southern Lazio, Italy); Gianni Cerro (University of Molise, Italy); Luigi Ferrigno (University of Cassino, Italy); Gianfranco Miele, Luca Tari and Antonio Nardone (University of Cassino and Southern Lazio, Italy)

A -79 dBm µ-Watt Wake-Up Receiver for Energy Efficient ISM and LoRa Communication
Tommaso Polonelli and Vlad Niculescu (ETH Zurich, Switzerland); Thomas Burger (Swiss Federal Institute of Technology (ETH) Zurich, Switzerland); Michele Magno (ETH Zurich, Switzerland)

Quasi-Real-Time Wireless Communication Based on Wake-Up Receivers with a Latency Below 5 ms
Robert Fromm (Leipzig University of Applied Sciences, Germany); Olfa Kanoun (Chemnitz University of Technology, Germany); Faouzi Derbel (Leipzig University of Applied Sciences, Germany)

Tuesday, May 21 15:30 – 17:30
Circuits and Embedded Systems for Instrumentation and Measurement 1
Conference Room 1
Session Chairs: Artur Ribeiro and Lars Bengtsson

A pseudo-random signal generator based on 2D memristor Logistic map
Bo Xu, Yifan Wang, Songting Zou, Libing Bai and Kai Chen (University of Electronic Science and Technology of China, China); Jia Zhao (Chengdu Medical College, China)

SOMeL: Multi-granular Optimized Framework for Digital Neuromorphic Meta-learning
Shuangming Yang (Tianjin University, China); Qing He (Tianjin Unviersity, China); Mostafa Rahimi Azghadi (James Cook University, Australia)

An Improved Measurement System for Detecting Electrical Bioimpedance Spectroscopy
Shuaifu Zhang, Yanbin Xu, Qingwei Hu, Fan Chen, Ziqiang Cui, Qi Lv, Haojun Fan and Feng Dong (Tianjin University, China)

Low-Power High Time Resolution Charge Detection ROIC in 40nm CMOS Technology
Alireza Mohammad Zaki and Yutong Du (Delft University of Technology, The Netherlands); Stoyan Nihtianov (Technical University - Delft, The Netherlands)

Dedicated SAW Oscillator for Sensing Applications
Henrik Wolframm and Felix Weisheit (Kiel University, Germany); Eckhard Quandt (Christian-Albrechts-Universität zu Kiel, Germany); Michael Höft (Kiel University, Germany)

Parameters Estimation of Cole-Cole Bio-Impedance Model with a Minimum Number of Frequencies
Nour Ammar (Control and Energy Management Laboratory & Measurement and Sensor Technology, Germany); Cherif Ouni (Technische Universität Chemnitz, Germany); Ahmed Yahia Kallel (TU Chemnitz, Germany); Nabil Derbel (Sfax University, Tunisia); Ahmed Fakhfakh (Laboratory of Technologies for Smart Systems, Digital Research Center of Sfax, Tunisia); Olfa Kanoun (Chemnitz University of Technology, Germany)

Tuesday, May 21 18:00 – 20:00
Welcome Reception
Room: City Chambers

I²MTC 2024 Technical Schedule – Wednesday, May 22nd

Wednesday, May 22 8:30 - 10:30
SPS: Waveform acquisition and analysis
Conference Room 2
Session Chairs: Pasquale Daponte and Nicholas Paulter

Calibrated Sinefit Based on Quantized Data
Paolo Carbone (University of Perugia, Italy); Balázs Renczes (Budapest University of Technology and Economics & Faculty of Electrical Engineering and Informatics, Hungary); Alessio De Angelis and Antonio Moschitta (University of Perugia, Italy)

An Improved Compressed Sensing–based Method for Anomaly Detection in Cables using Spread Spectrum Signals
Eulalia Balestrieri, Pasquale Daponte, Luca De Vito, Francesco Picariello, Sergio Rapuano and Ioan Tudosa (University of Sannio, Italy)

Two-wire Cable Anomaly Diagnosis with Machine Learning based on Passive Measurements
Eulalia Balestrieri, Pasquale Daponte, Luca De Vito, Francesco Picariello, Sergio Rapuano and Ioan Tudosa (University of Sannio, Italy)

Evaluation of Phase Measurement Error in Digital Oscilloscopes
Shuhei Fukunaga and Tsuyoshi Funaki (Osaka University, Japan)

Measuring wideband nonlinearity of analog to digital converters
Raymond Allan Belcher (Signal Conversion Ltd, United Kingdom (Great Britain)); Luis Palafox (Physikalisch-Technische Bundesanstalt, PTB, Germany)

Wednesday, May 22 8:30 - 10:30
Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 2
Level 1 Auditorium
Session Chairs: Gianfranco Miele and Alberto Vallan

Postural Sway Classification using Bispectrum
Ebrahim Nehary and Sreeraman Rajan (Carleton University, Canada); Bruno Ando (University of Catania, Italy)

A Cost-Effective Webcam Eye-Tracking Algorithm for Robust Classification of Fixations and Saccades
Emma J Boulay (Carleton University, Canada); Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada); Frank Knoefel (Bruyere Continuing Care, Canada); Kathleen C Fraser (National Research Council Canada, Canada); Rafik Goubran (Carleton University, Canada); Manuela Kunz (National Research Council Canada, Canada); Neil Thomas (Bruyère Research Institute, Canada)

Cough Sound Analysis using Vocal Tract Models
Brady Laska (Carleton University, Canada); Julio Valdes (Researcher at the National Research Council of Canada, Canada); Pengcheng Xi (National Research Council Canada, Canada); Rafik Goubran (Carleton University, Canada); Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada); Madison Cohen-McFarlane (Carleton University, Canada); Frank Knoefel (Bruyere Continuing Care, Canada)

A Low-Cost Edge Computing Device for Real-Time Detection of Motor Symptoms in Neurodegenerative Diseases Using Machine Learning
Elia Landi (University of Siena, Italy); Chiara Carissimo and Gianni Cerro (University of Molise, Italy); Luigi Ferrigno (University of Cassino, Italy); Gianfranco Miele (University of Cassino and Southern Lazio, Italy); Filippo Spinelli, Marco Mugnaini and Ada Fort (University of Siena, Italy); Klara Komici (University of Molise, Italy)

Design of an Energy Efficient Sensor Node for Wearable Applications
Achraf Djemal (National School of Electronics and Telecommunications of Sfax, Tunisia); Abdallah Adawy (Technische Universität Chemnitz, Germany & Jordan University of Science and Technology, Jordan); Ahmed Fakhfakh (LT2S, Tunisia); Olfa Kanoun (Chemnitz University of Technology, Germany); Ghada Bouattour (ENIS, Tunisia); Lidu Wang (Professorship Measurement and Sensor Technology, TU Chemnitz, Germany)

Toward a universal BCG validation using a mechanical emulator
Adrien Thirion (LAAS-CNRS Institut National Polytechnique de Toulouse & Nanomade Lab, France); Nora Hafiane (Nanomade Lab, France); Bruno Antunes Vieira (Nanomade Lab & INSA Lyon, Institut National Des Sciences Appliquées de Lyon, France); Blaise Mulliez (Université de Toulouse, France); Hélène Tap (LAAS-CNRS, Institut National Polytechnique de Toulouse, Université de Toulouse, France)

Wednesday, May 22 8:30 – 10:30
Instrumentation and Measurement for Non-Destructive Testing and Evaluation (IMNDE) 2
Conference Room 4/5
Session Chairs: James Smith, Carlos Juan and Reza Zoughi

Frequency Division Multiplexing and Random Phasing for Improved Uniformity in Microwave Heating Applications
Logan M Wilcox and Ali Mirala (Missouri University of Science and Technology, USA); Mohammad Tayeb Al Qaseer (Iowa State University, USA); Kristen M Donnell (Missouri University of Science and Technology, USA)

Steel Stress Measurement Using Orthogonal Chip-based Frequency and Impedance-digital Sensors
Changrong Yang (Newcastle University, United Kingdom (Great Britain)); Guiyun Tian (Newcastle University & University of Electronic Science and Technology of China, United Kingdom (Great Britain)); Mark Robinson and Emmanuel Tashiwa Ibrahim (Newcastle University, United Kingdom (Great Britain))

Estimation of power generation current distribution in Polymer electrolyte fuel cell using multiple magnetic field sensors
Kohei Kawada, Ryota Takasugi and Yuji Gotoh (Oita University, Japan); Masaaki Izumi (The University of Kitakyusyu, Japan); Takaaki Nara (The University of Tokyo, Japan)

An Antenna Loaded with Complementary Split Ring Resonator for Non-invasive Blood Glucose Measurement
Zexiang Lv (Chongqing University of Technology, China)

Underground Pipeline Depth Localization Based On Stepped Frequency Continuous Wave GPR
Minghao Zhang (Harbin Institute of Technology, China); Chongqin Wang (Harbin University of Science and Technology, China); Tong Wan, Wenqiang Li, Feng Shen and Xinda Li (Harbin Institute of Technology, China)

Grain-level visualization of stress-strain distribution on fatigue crack via self-magnetic flux density: a brief experimental investigation
I Dewa Made Oka Dharmawan and Jinyi Lee (Chosun University, Korea (South))

Wednesday, May 22 8:30 – 10:30
Signal Processing for Instrumentation and Measurement 1
Conference Room 6/7
Session Chairs: Grazia Iadarola and Alessandro Ferrero

Evaluating the accuracy of wearable devices for positioning classification
Grazia Iadarola (Polytechnic University of Marche, Italy); Linda Senigagliesi (Università Politecnica delle Marche, Italy); Gianluca Ciattaglia (Polytechnic University of Marche, Italy); Ennio Gambi (Universita' Politecnica Delle Marche, Italy); Susanna Spinsante (Università Politecnica Delle Marche, Italy)

Super-resolution Power Spectrum Estimation for Blade Tip Timing Measurement
Jiahui Cao (Xi'an Jiaotong University, China); Shuming Wu (Xi an Jiaotong University, China); Zhibo Yang (Xi'an Jiaotong University, China); Min Zhang (China Nuclear Power Engineering Co. Ltd., China); Xuefeng Chen (Xi'an Jiaotong University, China)

Accuracy of Three-point Interpolated DFT Frequency and Damping Factor Estimators
Daniel Belega (University of Timisoara, Romania); Dario Petri (University of Trento, Italy)

Ultraclean Pure Shift Spectroscopy with Fast Acquisition Based on Deep Neural Network
Jia Shen, Hong Li, Mingkai Huang, Yu Yang and Zhong Chen (Xiamen University, China)

Improved Frequency Estimation for Range-Finding Applications using Phase Unwrapping
Sivagunalan Sivanathan (Treforest Campus & University of South Wales, United Kingdom (Great Britain)); Mohammed Ali Roula (Co-Author, United Kingdom (Great Britain)); Kang Li (University of South Wales, United Kingdom (Great Britain))

Experimental Characterization of a Robust Localization Method Based on UWB Ranging
Valerio Brunacci and Alessio De Angelis (University of Perugia, Italy); Dave Zachariah (Uppsala University, Sweden)

Wednesday, May 22 8:30 – 10:30
Image Processing and Vision Based Measurement 2
Conference Room 3
Session Chairs: Chi Hung Hwang and Mirko Marracci

An Improved Image Stitching Method based on Vision-Inertial Fusion
Tao Liu, Bo Chen, BenKuan Wang and Datong Liu (Harbin Institute of Technology, China)

Tracking Fluorescent Artificial Features on Cardiac Surface for Evaluating Heart Function
Chi-Hung Hwang (Taiwan Instrument Research Institute, NARLabs, Taiwan); RongQing Qiu (National Applied Research Laboratories, Taiwan); Chun-Wei Lai (National Tsing Hua University, Taiwan); Yu-Jen Chen and Yu-Hsin Yang (National Taiwan University, Taiwan); Hsin-Ping Peng (National Tsing Hua University, Taiwan); Yen-Pei Lu (National Applied Research Laboratories, Taiwan); Rui-Cian Weng (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)

Interface Curvature Measurement of Liquid Film Based on SLIF
Jinshun Liu, Ting Xue and Songlin Li (Tianjin University, China)

Optimization of estimation and compensation algorithm for dynamic DIC measurements
Giovanni Sala, Simone Paganoni and Emanuale Zappa (Politecnico di Milano, Italy)

Classification of whole slide images for the presence of maternal vascular malperfusion lesions using attention-based, weakly supervised deep learning
Afsoon Khodaee and Adrian D.C. Chan (Carleton University, Canada); Eranga Ukwatta (University of Guelph, Canada); Shannon Bainbridge (University of Ottawa, Canada)

Car Paint Defect Detection with YOLOv5 Based on Phase Measuring Deflectometry
JiaXuan Liu and She Zhao (Harbin Institute of Technology, China); Jing Jin (Harbin institute of Technology, China); Qiang Wang (Harbin Institute of Technology, China)

Wednesday, May 22 8:30 – 10:30
Machine Learning and Big Data for Instrumentation and Measurement 1
Conference Room 1
Session Chairs: Maria Gabriella Xibilia and Lee Barford

Analyzing the Performance of AI-Based Battery SoC Estimation: A Metrological Point of View
Virginia Negri, Alessandro Mingotti, Roberto Tinarelli and Lorenzo Peretto (University of Bologna, Italy); Ludovica Apa (Sapienza, University of Rome, Italy); Livio D'Alvia (Sapienza University of Rome, Italy); Zaccaria Del Prete (SAPIENZA University of Rome, Italy); Emanuele Rizzuto (Sapienza University of Rome, Italy)

Machine Learning Techniques for Improving Multiclass Anomaly Detection on Conveyor Belts
Saulo Neves Matos, Otávio Coletti, Rafael Zimmer and Fernando Filho (University of São Paulo, Brazil); Ricardo Carvalho (University of Ouro Preto, Brazil); Victor Silva and Jorge Luiz (University of São Paulo, Brazil); Thomas Vargas Barsante Pinto (Universidade Federal de Minas Gerais, Brazil & Instituto Tecnológico Vale, Brazil); Luiz Barros (Instituto Tecnológico Vale, Brazil); Caetano Mazzoni Ranieri (University of São Paulo, Brazil); Bruno Eduardo (Vale S.A., Brazil); Diego F Silva (Universidade de São Paulo, Brazil); Jo Ueyama (University of São Paulo (USP) & Institute of Mathematics and Computer Science, Brazil); Gustavo Pessin (Vale Institute of Technology, Brazil)

Cross-Correlation Estimation in Artificial Neural Network for Uncertainty Assessment
Vincenzo Gallo and Valter Laino (University of Salerno, Italy); Antonio Pietrosanto (University of Salerno & CEO of Metering Research srl, Italy); Consolatina Liguori and Marco Carratù (University of Salerno, Italy); Jan Lundgren (Mid Sweden University, Sweden)

Including Measurement Uncertainty to Improve the Reliability of Classification ANN
Valter Laino, Vincenzo Gallo and Marco Carratù (University of Salerno, Italy); Antonio Pietrosanto (University of Salerno & CEO of Metering Research srl, Italy); Consolatina Liguori (University of Salerno, Italy)

Hierarchical Classifier for Improved Human Activity Recognition using Wearable Sensors
Heba Nematallah and Sreeraman Rajan (Carleton University, Canada)

Explaining Deep Learning Models for Covid-19 Detection with Grad-CAM and Novel Use of PCA
Richard Yang (Brunel University, United Kingdom (Great Britain)); Qingping Yang and Fang Wang (Brunel University London, United Kingdom (Great Britain)); Ding Chen (Wuhan Union Hospital, United Kingdom (Great Britain))

Wednesday, May 22 10:30 - 11:00
Wednesday AM Coffee Break
Room: Foyer

Wednesday, May 22 11:00 - 12:00
2024 Joseph F Keithley Award in Instrumentation and Measurement
Room: Main Auditorium

Wednesday, May 22 12:00 - 12:30
Award Ceremony
Room: Main Auditorium

Wednesday, May 22 12:30 - 13:30
Wednesday Lunch
Room: Foyer

Wednesday, May 22 13:30 – 14:00
Exhibitor Pitch
Room: Main Auditorium

Wednesday, May 22 14:00 - 15:00
How To Share Your Ideas with Courage, Confidence and Passion
With Clare Josa MEng, Best-selling author of Ditching Imposter Syndrome
Room: Main Auditorium

Wednesday, May 22 15:00 - 16:00
Wednesday Poster Session & Wednesday Coffee Break
Room: Foyer
Session Chairs: Shervin Shirmohammadi, Giada Giorgi and Elia Landi

1: ICARE-Chronos Technology: Drone-deployed Probes for Accurate and Simultaneous Temperature and Sag Measurement of Power Lines
Philippe Hamelin, Jean-François Gravel, Pierre-André Bergeron, Samuel Lavoie, Ghislain Lambert, Frédéric Nadeau, Alex Sartor, Pierre-Luc Richard, Matthieu Montfrond and Nicolas Pouliot (Hydro-Québec, Canada)

2: Laboratory replication of low power quality conditions observed on the field for testing active energy meters
Alessandro Cultrera (INRIM - Istituto Nazionale di Ricerca Metrologica, Italy); Danilo Serazio (INRiM - Istituto Nazionale di Ricerca Metrologica, Italy); Flavio Galliana (INRIM - Istituto Nazionale di Ricerca Metrologica, Italy); Bruno Trinchera, Sr. (INRiM - Istituto Nazionale di Ricerca Metrologica, Italy); Martino Chirulli (VERIFICA S.p.A., Italy); Giulia Aprile and Luca Callegaro (INRIM - Istituto Nazionale di Ricerca Metrologica, Italy)

3: Parameters Update Strategy for Model-Based MPPT for PV Systems
Loredana Cristaldi, Marco Faifer, Christian Laurano, Emil Petkovski, Sergio Toscani and Roberto Ottoboni (Politecnico di Milano, Italy)

4: A Simple Classification Method for Evaluating Influence Factors Affecting Instrument Transformer Accuracy
Alessandro Mingotti, Roberto Tinarelli and Lorenzo Peretto (University of Bologna, Italy)

5: Experimental Analysis of Equivalent Circuit's Parameters for Half-Cell Photovoltaic Modules under Natural Sunlight
Stefano Schubert and Gabriele Malgaroli (Politecnico di Torino, Italy); Filippo Spertino (Politecnico di Torino, Tonga)

6: Packet Losses Distributions in 5G Networks for PMU-Based Monitoring Systems
Alberto Morato (IEIIT-CNR, Italy); Guglielmo Frigo (Swiss Federal Institute of Metrology METAS, Switzerland); Federico Tramarin (University of Modena and Reggio Emilia, Italy)

7: Measurement of Symmetrical Component Powers with a Revenue Metering Chip
Andrew Berrisford (Berrisford Power Measurement and Analysis, Canada)

8: Development of a Fault Localization Algorithm Based on SFWR Considering Propagation Velocity Changes with Propagation Distance
Hyun-Mo Seong and Yeon-Sub Sim (Hanbat National University, Korea (South)); Chun-Kwon Lee (Pukyong National University, Korea (South)); Gu-Young Kwon (Kongju National University, Korea (South)); Seung Jin Chang (Hanbat National University, Korea (South))

9: Multi-step Prediction Method of Short-term Wind Power Based on CTAR Model
Tong Li and Jiang Wang (Tianjin University, China); Bo Gong (Tianjin University & School of Electrical and Information Engineering, China); Kuanchuan Wang, Weitong Liu and Siyuan Chang (Tianjin University, China)

10: Appliances Load Pattern Reconstruction from Adaptive Delta-Driven Sampled Smart Meter Data
Saeed M Qaisar (CESI LINEACT, France & Effat University, France); Omar Kittaneh (Effat University, Saudi Arabia); Alberto López Martínez and Francisco Ferrero Martín (University of Oviedo, Spain)

11: Accuracy evaluation of ECG waves detection and segmentation
Livio D'Alvia and Eduardo Palermo (Sapienza University of Rome, Italy); Zaccaria Del Prete (SAPIENZA University of Rome, Italy)

12: Machine Status Tracking Using Vibration via Sparse Sampling and Without Reconstruction
Boon Yaik Ooi (UTAR, Malaysia); Xin Yi Kh'ng and Woan Lin Beh (Universiti Tunku Abdul Rahman, Malaysia); Shervin Shirmohammadi (University of Ottawa, Canada)

13: The Effect of Sensor Placement in A Cooking Activity Recognition System
Majid G Moghaddam (University of Ottawa, Canada); Ali Asghar Nazari Shirehjini (Dfintech AG, Switzerland & Lakehead University, Canada); Shervin Shirmohammadi (University of Ottawa, Canada)

14: Signal Quality Assessment in Low-Density and Single Channel Surface Electromyography
Emma Farago and Adrian D.C. Chan (Carleton University, Canada)

15: Binaural Characterization of Active Noise Cancelling Headphones
Brady Laska and Rafik Goubran (Carleton University, Canada); Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)

16: A Deep Brain Stimulation Optimization Strategy Based on Actor-Critic Network
Kuanchuan Wang, Jiang Wang and Chen Liu (Tianjin University, China); Yulin Zhu (Beijing University of Civil Engineering and Architecture, China)

17: Deep Learning Prediction of Ejection Fraction from Echocardiograms: Vector Embeddings for a Best Practice R3D Transformer
Somin Lee (University of Toronto, Canada); Vasu Kaker, Daniel J Chung and Yongyi Zhao (Massachusetts Institute of Technology, USA); Sudheesha Perera (Brown University, USA); Prabhu Sasankan (Beth Israel Deaconess Medical Center, USA); Irbaz Riaz (Harvard Medical School, Canada); George Tang (University of California, Irvine, USA); Kpodonu Jacques (Harvard Medical School, USA); Po-Chih Kuo (National Tsing Hua University, Taiwan); Brigitte Kazzi (Brigham and Women's Hospital, USA); Leo Celi (Beth Israel Deaconess Medical Center, USA)

18: Evaluation of Two-Electrode System Configurations for Forearm Arteries Bioimpedance Measurement
Margus Metshein and Ksenija Pesti (Tallinn University of Technology, Estonia); Didzis Lapsa (Institute of Electronics and Computer Science, Latvia); Paul Annus (Tallinn University of Technology, Estonia); Rims Janeliukštis and Atis Elsts (Institute of Electronics and Computer Science, Latvia); Olev Martens (Tallinn University of Technology, Estonia)

19: Optical Coherent Tomography Driven Wall Shear Stress Prediction with Deep Neural Network in Projection Domain
Yan Li, Shangjie Ren and Feng Dong (Tianjin University, China)

20: Unsupervised Learning for Breast Abnormality Detection using Thermograms
Ankita Dey and Sreeraman Rajan (Carleton University, Canada)

21: Design of Droplet Manipulation Platform based on Digital Microfluidic Chip
Wenbin Zheng, Haodong Guo, Feng Lei, Hongtao Yin and Ping Fu (Harbin Institute of Technology, China)

22: Concealed simultaneous measurements of biopotential and bioimpedance on rodents
Sergio Mainar-Álvarez (Universitat Politècnica de Calunya & Instrumentation Sensors and Interfaces Group, Spain); Oscar Casas (Universitat Politècnica de Catalunya, Spain & Instrumentation, Sensors and Interfaces Group, Spain); Ernesto Serrano (Universitat Politècnica de Catalunya, Spain)

23: Deep Brain Stimulation Reshapes the Brain's Internal State Observed by Microstate-Improved Brain Network Analysis
Chen Liu, Zhiqi Jiang and Jiang Wang (Tianjin University, China); Xiaodong Zhu (Tianjin Medical University General Hospital, China)

24: Ultrasound image improvement based on parameter optimization of spatially variable point spread function
Jie Zheng, Yifei Chen, XiangYu Li, Xin Zhang and Shen Yi (Harbin Institute of Technology, China)

25: Design of a Teleoperated Robotic Bronchoscopy System for Peripheral Pulmonary Lesion Biopsy
Xingyu Chen and Xiaohui Xiong (Chinese Academy of Sciences, China)

26: Effect of Excitation-Measurement Pattern of Planar Electrode Array on Detecting Crush Injuries
Fan Chen, Duo Li, Yanbin Xu, Shuaifu Zhang, Qi Lv, Haojun Fan and Feng Dong (Tianjin University, China)

27: Towards a Textile-Based Thermostatic System for Skin Temperature Regulation
Valentina Di Pinto (University of Modena and Reggio Emilia, Italy); Fabrizio Picariello and Luca Torricelli (Tex Tech Technologies, Italy); Luigi Rovati (University of Modena and Reggio Emilia, Italy)

28: FEM-based Parametric Optimization of a Measurement Setup for Sensitivity Improvement in Insulin Absorption Assessment
Rosanna Manzo and Pasquale Arpaia (University of Naples Federico II, Italy); Marco Balato (University of Naples, Italy); Davide Cuneo (University of Naples Federico II, Italy); Francesca Mancino (University of Federico II, Naples, Italy); Simone Minucci (University of Tuscia Viterbo Italy, Italy); Nicola Moccaldi (University of Naples Federico II, Italy); Carlo Petrarca (Naples University, Italy)

29: A colorimetric RGB-based sensing approach for Phenylalanine detection
Bruno Ando, Danilo Greco and Mattia Manenti (University of Catania, Italy); Ludovica Maugeri (University-Polyclinic of Catania, Italy); Marianna Messina (AOU Policlinico Rodolico - San Marco, Italy); Salvatore Petralia and Giuseppe Todero (University of Catania, Italy)

30: Exploring the potential of radiomic features in predictive tumor growth modeling
Assia Hamitou and Amir Laraki Rifi (Vrije Universiteit Brussel, Belgium); Camille Raets (Vrije Universiteit Brussels, Belgium); Inès Dufait (Vrije Universiteit Brussel, Belgium); Mark De Ridder (UZ Brussel, Belgium); Kurt Barbé (Vrije Universiteit Brussel & Faculty of Sciences, Belgium)

31: Low-Cost Tissue Oximetry Using Discrete Light-Emitting Diodes
Tuukka Panula, Inka Mustajoki, Katri A Karhinoja, Maria Kjellman, Jukka-Pekka Sirkiä and Matti Kaisti (University of Turku, Finland)

32: Improving Cardiac Auscultation Signal Quality by using 4-Channel Stethoscope Array
Marianthi Adamopoulou and Meng Jiang (Mid Sweden University, Sweden); Chibuzo J Nnonyelu (Mid Sweden University, Sweden & Sensible Things That Communicate (STC) Research Center, Sweden); Marco Carratù and Consolatina Liguori (University of Salerno, Italy); Jan Lundgren (Mid Sweden University, Sweden)

33: Wearable Sensors and Machine Learning Fusion for Parkinson's Disease Assessment
Mohammed Hammoud, Aleksei Shcherbak and Melaku Getahun (Skolkovo Institute of Science and Technology, Russia); Olga Istrakova and Nataliya Shindyaeva (Moscow Clinic 2, Russia); Olga Zimniakova (SRC - Burnasyan Federal Medical Biophysical Center of FMBA, Russia); Ekaterina Bril (Burnazyan Federal Medical and Biophysical Center, Russia); Maxim Semenov (SRC - Burnasyan Federal Medical Biophysical Center of FMBA, Russia); Andrey Somov (Skolkovo Institute of Science and Technology, Russia); Anna Baldycheva (University of Exeter, United Kingdom (Great Britain))

34: A DSP-based Multichannel EBI Measurement Device with ECG and PPG Options
Anar Abdullayev, Marek Rist, Andrei Krivošei, Margus Metshein, Raul Land and Olev Martens (Tallinn University of Technology, Estonia)

35: A Multimodal Lab-On-CMOS based Biosensor System
Andalib Nizam (The University of Tennessee Knoxville, USA); Nicole McFarlane (University of Tennessee Knoxville, USA)

36: Model-Based Closed-Loop Seizure Suppression: Algorithm Development and Hardware Implementation
Weitong Liu, Bin Deng and Fangzhou Hu (Tianjin University, China); Bo Gong (Tianjin University & School of Electrical and Information Engineering, China); Siyuan Chang, Tong Li, Yuxin Wang, Jiang Wang and Chen Liu (Tianjin University, China)

37: Respiratory Monitoring Using Millimeter-Wave Base Stations Based on OFDM Signals
Jiangtao Luo, Kaikai Liu, Yiwen Wang, Linxia Li and Zengshan Tian (Chongqing University of Posts and Telecommunications, China)

38: Adaptive Grinding Planning for Robotic Arms based on Parameterized Cost Estimation and Dynamic Hierarchical Optimization
Ningyuan Wang, Yuemeng Ma and Qiang Wang (Harbin Institute of Technology, China)

39: Reconstruction of ERT Sensitivity Matrix Using Kernel Function
Fanpeng Dong and Yue (Tianjin University, China); Yuwei Zhao (Tianjin University Tianjin, China)

40: Study on Pressure Effect of V-shaped Tube Coriolis Flowmeters
Jingyu Gao, Lijun Sun and Chao Tan (Tianjin University, China)

41: Design and Testing of Flexible Pressure and Temperature Sensing Capacitive Sensors
Yifei An, Junfeng Zou, Yuefeng Bai, Caozhen Dong, Junkai Cheng and Nan Li (Northwestern Polytechnical University, China)

42: SOC detection of multi-regional lithium-ion battery based on ultrasonic flexible sensing technology
Jie Gao, Xuan Liu, Yan Lyu, Xinzhong Qiao and Cunfu He (Beijing University of Technology, China)

43: Early Diabetic Foot Ulcer Evaluation based on Lactate Distribution Detection by Electrical Impedance Tomography
Yunqian Wang and Bo Sun (Xi'an University of Technology, China); Yuru Bai (The Second Affiliated Hospital, China); Tong Zhao (Xi`an University of Technology, China); Songpei Hu and Jiafeng Yao (Nanjing University of Aeronautics and Astronautics, China)

44: Online Monitoring of Membrane Contamination based on EIT and Deep learning
Wen Sun (Tiangong University, China); Qi Wang (Tianjin Polytechnic University, China); Ronghua Zhang (Tianjin Polytechnic University School of Artifical Intelligence, China); Jianming Wang and Xiuyan Li (Tiangong University, China)

45: An Electrical Impedance Tomography Platform for Tissue Engineering
Marcella Lucciardi and Roberta Ramilli (University of Bologna, Italy); Joseph Lovecchio (Institute of Biomedical and Neural Engineering, Reykjavik University, Iceland); Marilisa Cortesi and Marco Crescentini (University of Bologna, Italy)

46: Accuracy Comparison of Frequency and ROCOF Dynamic Estimators under Contingencies
Guglielmo Frigo (Swiss Federal Institute of Metrology METAS, Switzerland); David Macii and Dario Petri (University of Trento, Italy)

47: Human Breathing Rate Monitoring Using Modulated Scatterer-based Radar Technology
Mithaa Alhanaee and Baker Mohammad (Khalifa University, United Arab Emirates); Mohamed A Abou-Khousa (Khalifa University of Science and Technology, United Arab Emirates)

48: Estimation of In-game Player Behavior by Measuring Key Gameplay Parameters
Julia Orlova, Anton Stepanov and Anton Vinogradov (Skolkovo Institute of Science and Technology, Russia); Lubov Orlova (MEPHI, Russia); Anna Baldycheva (University of Exeter, United Kingdom (Great Britain)); Andrey Somov (Skolkovo Institute of Science and Technology, Russia)

49: The PVZEN Laboratory for Energy Communities: Monitoring System for Model Identification
Alessio Carullo, Angela Amato, Alessandro Ciocia and Simone Corbellini (Politecnico di Torino, Italy); Filippo Spertino (Politecnico di Torino, Tonga); Alberto Vallan and Marco Augusto Alfredo Bertonasco (Politecnico di Torino, Italy)

Wednesday, May 22 15:00 – 16:00
Live Demonstrations
Room: Foyer 2

Measurement of Thickness Reduction and Corrosion Under Coating Using Pulsed Eddy Current Techniques
Lei Xiong, Xinnan Zheng, Zihan Xia and Tian Meng (University of Manchester, United Kingdom (Great Britain)); Wuliang Yin (The University of Manchester, United Kingdom (Great Britain))

Demonstration Multi-Channel Eddy Current Instrumentation for Non-destructive Testing
Yuchun Shao, Zihan Xia and Tian Meng (University of Manchester, United Kingdom (Great Britain)); Saibo She and Wuliang Yin (The University of Manchester, United Kingdom (Great Britain))

Live Demonstration: Fluorescence to Measure Light Intensity
Ian Coghill (École Normale Supérieure, France); Aliénor Lahlou (Sony Computer Science Laboratories, France); Yuriy Shpinov and Thomas Le Saux (École Normale Supérieure, France); Ludovic Jullien (PSL University, France)

Live Demonstration of "Process to Part Inspection"
Randika Vithanage and Gareth Pierce (University of Strathclyde, United Kingdom (Great Britain))

Live Demonstration: Optical 3D tactile sensor based e-skin for human-machine interaction
Lee Zhengwei and Zeyu Liu (Institute of Automation, Chinese Academy of Sciences, China); Long Cheng (Chinese Academy of Sciences, China); Jiachen Wei (Institute of Automation Chinese Academy of Sciences, China)

Live Demonstration: SMU Open-Source Platform for Synchronized Measurements operating as PMU and DMU
Cesar Andres Cazal (RWTH Aachen University & Institute for Automation of Complex Power Systems, Germany); Ferdinanda Ponci (RWTH Aachen University, Germany); Antonello Monti (RWTH Aachen University & Institute for Automation of Complex Power Systems, Germany)

Live Demonstration: Evanescent Field-Based Plastic Optical Fiber Sensor: Theory and Experimental Refractive Index Measurements
Marcelo Werneck (Federal University of Rio de Janeiro (UFRJ), Brazil); Arthur M S Werneck (Universidade Federal do Rio de Janeiro, Brazil); Stella R dos Santos (Universidade Federal Do Rio de Janeiro, Brazil); Regina Celia Allil (Universidade Federal do Rio de Janeiro, Brazil)

Wednesday, May 22 16:00 - 18:00
SPS: Instrumentation and measurement for reliable, safe and sustainable applications
Conference Room 2
Session Chairs: Lorenzo Ciani and Loredana Cristaldi

Impedance analysis of hybrid supercapacitor using EIS under temperature and SOC variable conditions
Gabriele Patrizi and Fabio Corti (University of Florence, Italy); Maurizio Laschi (Università di Firenze, Italy); Dario Vangi, Alberto Reatti, Marcantonio Catelani and Lorenzo Ciani (University of Florence, Italy)

Electromagnetic detection of foreign bodies flowing in a pipe with continuous longitudinal electric field excitation
Jarrod Zhu, Bill Heffernan, Michael Hayes and Stanley Perry (University of Canterbury, New Zealand)

Towards a quantitative evaluation of the relationship between performance and environmental sustainability of Artificial Intelligence algorithms
Luigi Duraccio, Leopoldo Angrisani, Mauro D'Arco, Egidio De Benedetto and Monica Imbò (University of Naples Federico II, Italy); Annarita Tedesco (University of Bordeaux, France)

The impact of energy measurement in Fault Detection: a preliminary analysis of Load Profiling capability
Luca Tari (University of Cassino and Southern Lazio, Italy); Giovanni Betta and Luigi Ferrigno (University of Cassino, Italy); Antonello Monti (RWTH Aachen University & Institute for Automation of Complex Power Systems, Germany); Ferdinanda Ponci (RWTH Aachen University, Germany)
Physical Prior knowledge as constraints to predict State of Health for lithium-ion batteries
Xintao Xu, Hanmin Sheng, Wenlong Zeng and Xi Wang (University of Electronic Science and Technology of China, China)

Collocated electric and magnetic field sensor and amplifier design for non-invasive food scanning system
Stanley Perry, Abdullah Naeem, Bill Heffernan and Michael Hayes (University of Canterbury, New Zealand)

Wednesday, May 22 16:00 - 18:00
SPS: Interpretable, efficient deep learning for intelligent monitoring of industrial equipment 1
Conference Room 3
Session Chairs: Xingwu Zhang and Shibin Wang

INVITED TALK: Signal Processing Informed Neural Network for Intelligent Fault Diagnosis
Ruqiang Yan, School of Mechanical Engineering, Xi'an Jiaotong University, P.R. China

Powder Bed Defect Extraction of Laser Powder Bed Fusion Additive Manufacturing with Tensor Robust Principal Component Analysis
Hao Jiang (Xi'an Jiaotong University, China); Xingwu Zhang (State Key Laboratory for Manufacturing System Engineering, China); Zhibin Zhao and Chenxi Wang (The State Key Laboratory for Manufacturing Systems Engineering, China); Huihui Miao and Xuefeng Chen (Xian Jiaotong University, China)

NorCLR: A Normality-Aggregated Contrastive Learning Framework for Mechanical Anomaly Detection
Chenye Hu and Jiaxin Ren (Xi'an Jiaotong University, China); Jingyao Wu and Hong Xu (Xi an Jiaotong University, China); Chuang Sun and Ruqiang Yan (Xi'an Jiaotong University, China)

WavFormer: An Interpretable Wavelet-Constrained Transformer for Industrial Acoustics Diagnosis
Jiaxin Ren, Chenye Hu, Zuogang Shang and Yasong Li (Xi'an Jiaotong University, China); Zhibin Zhao (The State Key Laboratory for Manufacturing Systems Engineering, China); Ruqiang Yan (Xi'an Jiaotong University, China)

Source-free Open-set Domain Adaptation Network for Emerging Fault Diagnosis of Planetary Gearbox
Ke Yue (South China University of Technology, China); Jipu Li (The Hong Kong Polytechnic University, China); Zhuyun Chen, Junbin Chen and Weihua Li (South China University of Technology, China)

Wednesday, May 22 16:00 - 18:00
Instrumentation and Measurement for the Oil and Gas Industry
Conference Room 4/5
Session Chairs: Chao Tan and Grzegorz Fusiek

A Non-intrusive Method for Liquid Level Measurement in Vertical Pipeline Using Ultrasonic Lamb Wave
Zixiang Shi, Yong Bao and Chao Tan (Tianjin University, China); Jinhai Liu (Energy Technology and Services-Oil Production Services Co, China); Feng Dong (Tianjin University, China)

Wear Prediction of Petrochemical Granulator Gearbox Using Multidimensional Transformer Network via Online Oil Monitoring
Guo Yang and Hui Tao (South China University of Technology, China); Ruxu Du (Guangdong Janus Biotechnology Co. Ltd, China); Yong Zhong (South China University of Technology, China)

Identification of gas-solid two-phase flow regimes based on electrostatic sensor and CB-ResNext network
Jiayu Lu, Hongli Hu, Herui Cai, Haichao Yang and Haodong Zhang (Xi'an Jiaotong University, China); Haijian Dong (China XD Group Co. Ltd., China)

Gas-Liquid Multiphase Flow Measurement in Venturi Tube Through Data-Driven Modelling
SeyedAhmad Hosseini (Glasgow Caledonian University, United Kingdom (Great Britain)); Gabriele Chinello (TUVSUD National Engineering Laboratory, United Kingdom (Great Britain)); Gordon Lindsay, Sheila Smith and Don McGlinchey (Glasgow Caledonian University, United Kingdom (Great Britain))

Velocity vector measurement of dispersed bubbles in horizontal gas-liquid slug flows by using ultrasonic Doppler method
Junxi Liu, Lusheng Zhai, Bo Xu, Yukun Huang and Wenhao Wang (Tianjin University, China)

Gas and liquid flow measurement of wet gas based on vortex meter-liquid film sensor and neural network
Jinxia Li (Civil Aviation University of China, China); Hongjun Sun, Yi Huang and Teng Li (Tianjin University, China)

Wednesday, May 22 16:00 - 18:00
Machine Learning and Big Data for Instrumentation and Measurement 2
Conference Room 6/7
Session Chairs: Alessio De Angelis, Antonio Pietrosanto and Domenico Capriglione

Extended Rayleigh-Ritz Autoencoder with Distribution-Free Statistics
Anika Terbuch, Dimitar Ninevski and Paul O'Leary (University of Leoben, Austria); Matthew Harker (Ecole de Technologie Supérieure, Canada); Manfred Mücke (Materials Center Leoben, Austria)

Building Digital Twins for Thermal Pseudo-Measurements Generation
Marcel Zimmer, Andrea Benigni, Thiemo Pesch and Maximilian Buechel (Forschungszentrum Jülich, Germany); Florian Redder and Maximilian Mork (Forschungszentrum Juelich, Germany); André Xhonneux (Forschungszentrum Jülich, Germany); Dirk Müller (EON Energy Research Center - RWTH Aachen University, Germany)

Improving Wind Turbine Foundation Damage Detection: A Domain Adaptation Approach with Kernel Mean Matching Method
Léa Maringer and Jersson X Leon Medina (Universitat Politècnica de Catalunya, Spain); Núria Parés (Universitat Politecnica de Catalunya, Spain); Francesc Pozo (Universitat Politecnica de Catalunya (UPC), Spain)

Accuracy Impact of Increased Measurement Quality when using Pretrained Networks for Classification
Jan Lundgren and Meng Jiang (Mid Sweden University, Sweden); Valter Laino, Vincenzo Gallo and Marco Carratù (University of Salerno, Italy); Chibuzo J Nnonyelu (Mid Sweden University, Sweden & Sensible Things That Communicate (STC) Research Center, Sweden)

Lithium-ion Batteries State of Charge Comparison between Extended Kalman Filter and Machine Learning
Walter Barbosa Guedes (Federal University of Campina Grande & Federal University of Santa Catarina, Brazil); Jaidilson Jo Silva and Angelo Perkusich (Federal University of Campina Grande, Brazil)

Multi-Path Interference Denoising of LiDAR data using a Deep Learning based on U-Net Model
Yali Nie, Mattias O'Nils and Ola Gatner (Mid Sweden University, Sweden); Muhammad Imran (IKEA of Sweden, Sweden); Irida Shallari (Mid Sweden University, Sweden)

Wednesday, May 22 16:00 - 18:00
Optical and Fiber Optic Instrumentation and Measurement
Conference Room 1
Session Chairs: Tuan Guo and George Xiao

Torsion and strain sensing through a helically twisted microstructured polymer optical fiber
João Preizal (Instituto de Telecomunicações & University of Aveiro, Portugal); Nuno Valente (Instituto de Telecomunicações University of Aveiro, Portugal); Lucia Bilro (Instituto de Telecomunicações, Portugal); Ricardo Oliveira (IT - Aveiro, Portugal); Rogério N Nogueira (Instituto de Telecomunicacoes, Portugal)

Improving Laser Feedback Interferometers Robustness Against Speckle Using Multiple Acquisition Schemes
Clement Tronche (Institut National Polytechnique de Toulouse, France); Adam Quotb (LAAS-CNRS, France); Francis Jayat (LAAS-CNRS, University of Toulouse, INP ENSEEIHT, France); Julien Perchoux (Institut National Polytechnique de Toulouse, France)

Towards High Resolution Absolute Angle Sensing Using Dual-Wavelength Laser Speckle
Sam J Gibson, Thomas O H Charrett and Ralph P Tatam (Cranfield University, United Kingdom (Great Britain))

Fiber Bragg Grating Sensors vs Strain Gauges for Static Bridge Monitoring System
Mohamad Farhat (Australian University - Kuwait, Kuwait); Mohamad Hany Yassin (Australian University, Kuwait); Michel Nahas (Australian University - Kuwait, Kuwait); Amin Bilal (Australian University, Kuwait)

Flow structure and velocity distribution in horizontal gas-liquid intermittent flow detected by S-PLIF&PIV
Xinyi Zhong, Lusheng Zhai, Wenhao Wang and Xinyu Meng (Tianjin University, China)

Translational Slug Velocity Measurement Based on Fiber Optical Reflectometer
Dandan Zheng (Tianjin University, China); Jilin Ye (School of Electrical and Information Engineering & Tianjin University, China); Maosen Wang (School of Electrical and Information Engineering, Tianjin University, China); Yongtao Chen (School of Electrical and Information Engineering & Tianjin University, China)

Wednesday, May 22 16:00 - 18:00
Instrumentation and Measurement in Medical, Biomedical and Healthcare Systems 3
Level 1 Auditorium
Session Chairs: Minh Long Hoang, Gianfranco Miele and Mahdi Saleh

Non-invasive Assessment for Dynamic Cerebral Autoregulation Based on Near-Field Coupling
Ansheng Shao (Chongqing University of Technology, China); Gen Li (Chongqing University of Technology, China)

Mental effort detection when using a motor imagery-based brain-computer interface
Rachele Robbio (University of Naples Federico II, Italy); Ludovica Gargiulo (University of Naples, Federico II, Italy); Nicola Moccaldi (University of Naples Federico II, Italy); Angela Natalizio (Politecnico di Torino, Italy); Antonio Esposito (Università degli Studi di Napoli Federico II, Italy & Augmented Reality for Health Monitoring Laboratory (ARHEMlab), Italy); Marco Parvis (Politecnico di Torino, Italy); Pasquale Arpaia (University of Naples Federico II, Italy)

Image Processing System Based on Mesh Technology for Cell Kinematic Measurement
Minh Long Hoang (University of Parma, Italy); Paul Depoorter (INSA, France); Flavia Bonalumi (University of Parma, Italy); Margherita Burattini (University of Verona, Italy); Mirko Hu, Alessia Caputo, Barbara Montanini and Michele Miragoli (University of Parma, Italy); Nicola Delmonte (Università di Parma, Italy)

Body Fat Proportion Estimation by the Segmental Bioelectrical Impedance Analysis of Forearm
Margus Metshein (Tallinn University of Technology, Estonia); Varje-Riin Tuulik (West Tallinn Central Hospital, Estonia); Viiu Tuulik (Technomedicum of Tallinn University of Technilogy, Estonia); Mart Min (Tallinn University of Technology, Estonia); Monika Kumm (University of Tartu, Estonia); Paul Annus and Olev Martens (Tallinn University of Technology, Estonia)

Preliminary Analysis of the Estimation of Tissue Thermal Parameters for Tumor Laser Ablation with Minimally Invasive Techniques
Aurora Bellone, Elisa Ullo, Massimo Olivero, Gianni Coppa, Alberto Vallan and Guido Perrone (Politecnico di Torino, Italy)

Entropy and Coherence Features in EEG-based Classification for Alzheimer's Disease Detection
Sabatina Criscuolo (University of Naples Federico II, Italy); Andrea Cataldo (University of Salento, Italy); Egidio De Benedetto (University of Naples Federico II, Italy); Antonio Masciullo (University of Salento, Italy); Marisa Pesola (University of Naples Federico II, Italy); Raissa Schiavoni (University of Salento, Italy)

Wednesday, May 22 18:30 - 22:30
Gala Dinner
Room: DoubleTree by Hilton Glasgow Central

Information about the coach departures from TIC to the DoubleTree:

- The first set of coaches will load passengers from 6:20 PM to 6:30 PM.
- The second set of coaches will board passengers from 6:55 PM to 7:05 PM

Thursday, May 23 8:30 - 10:30
Thursday AM Poster Session
Room: Foyer
Session Chairs: Gyula Simon and Sagiru Gaya

1: Fault Detection of Melt Pump Gearbox Using Learnable Multi-scale Convolutional Neural Network by Fusing Online and Offline Oil Monitoring Data
Guo Yang and Hui Tao (South China University of Technology, China); Ruxu Du (Guangdong Janus Biotechnology Co. Ltd, China); Yong Zhong (South China University of Technology, China)

2: Assessing Trust in Collaborative Robotics with Different Human-Robot Interfaces
Matteo Menolotto (Tyndall National Institute & University College Cork, Ireland); Dimitrios Sokratis Komaris (Aston University, United Kingdom (Great Britain)); Patricia OSullivan and Brendan OFlynn (University College Cork, Ireland)

3: Performance analysis of model-based functional identification on modified measuring instruments
Levin C. X. Ho (Physikalisch-Technische Bundesanstalt & Technical University Berlin, Germany); Marko Esche and Martin Nischwitz (Physikalisch-Technische Bundesanstalt, Germany); Sabine Glesner (TU-Berlin, Germany)

4: Experimental procedure for metrological characterization of AR-based eye-tracking interfaces
Fabrizio Lo Regio, Leopoldo Angrisani, Mauro D'Arco, Egidio De Benedetto and Luigi Duraccio (University of Naples Federico II, Italy); Annarita Tedesco (University of Bordeaux, France)

5: Earthquake Detection System using IEC 61499 & IEEE 1451 Standards
Daniele Buonocore and Vincenzo Paciello (University of Salerno, Italy); Reza Abrishambaf (Miami University, USA); Helbert da Rocha and António Espírito Santo (University of Beira Interior, Portugal)

6: An IoT Monitoring System for the Accurate Measurement of CO2 Concentration Due to Plants Photosynthesis
Irene Cappelli and Lorenzo Parri (University of Siena, Italy); Marco Tani (University of siena, Italy); Valerio Vignoli and Ada Fort (University of Siena, Italy)

7: Effect of physical properties of granular sustainable-porous materials on water content measurements by using a low-cost sensor
Nicola Papini, Manuela Cecconi, Pisana Placidi and Andrea Scorzoni (University of Perugia, Italy); Alessandro Tarantino (University of Strathclyde, United Kingdom (Great Britain))

8: Performance Evaluation of Particulate Matter Low-Cost Sensors under Power Supply Variations
Davide Sitzia, Paolo Castello, Carlo Muscas, Paolo Attilio Pegoraro, Sara Sulis and Serif Yildiz (University of Cagliari, Italy)

9: Design and evaluation of a Soft Sensor for Snow Weight measurement
Vincenzo Gallo (University of Salerno, Italy); Irida Shallari (Mid Sweden University, Sweden); Marco Carratù (University of Salerno, Italy); Jan Lundgren (Mid Sweden University, Sweden); Consolatina Liguori (University of Salerno, Italy); Mattias O'Nils (Mid Sweden University, Sweden)

10: UAV Cloud Particle Sensor
Ville Kaikkonen, Eero O. Molkoselkä, Harri Juttula and Anssi Mäkynen (University of Oulu, Finland)

11: Deformation Monitoring Based on Millimeter-Wave Beam Scanning Algorithm
Xiaolei Dang, Kaikai Liu, Yiwen Wang and Zengshan Tian (Chongqing University of Posts and Telecommunications, China)

12: Modeling Humidity and Temperature Effects on Electrochemical Gas Sensors at Low Concentrations
Francisco Souza (IMEC-NL, The Netherlands & OnePlanet Research Center, The Netherlands); Jasper Fabius, Shaojie Zhuang, Burcu Celikkol and Santiago Gaitan (IMEC-NL OnePlanet Research Center, The Netherlands); Jan Vonk (Wageningen University & Research & OnePlanet, The Netherlands)

13: Exploring the Dissipation Parameter of Quartz Crystal Resonator under 3-Overtone Mode
Jianguo Hu (Tsinghua University & School of Microelectronics Tianjin University, China); Tian-Ling Ren (Tsinghua University, China)

14: Bearing Fault Monitoring based on Flexible Piezoelectric Accelerometer
Liuyang Zhang (Xi'an Jiaotong University, China); Wenkang Li and Hailin Cao (XJTU, China)

15: Investigation of the strain-dependent electrical impedance of fiber-reinforced electrodes in dielectric elastomer transducers
Johannes Mersch (Johannes Kepler University Linz, Austria); Markus Koenigsdorff (Technische Universität Dresden, Germany); Laura Wittich (TUD Dresden University of Technology, Germany); Marco Jose Da Silva (Johannes Kepler University Linz, Austria)

16: The Residence Times Difference (RTD) ring fluxgate magnetometer
Claudia Ferro, Mario Urso, Salvatore Mirabella and Carlo Trigona (University of Catania, Italy); Adi R. Bulsara (Space and Naval Warfare Center (San Diego), USA); Salvatore Baglio (University of Catania, Italy)

17: A Multi-Sensor Approach for Multi-Joint Tracking
Bruno Ando, Salvatore Graziani, Mattia Manenti and Danilo Greco (University of Catania, Italy)

18: A Computation Method for Separate Flow Velocity Based on ERT in Dredging Engineering
Yuwei Zhao (Tianjin University Tianjin, China); Yue, Fanpeng Dong and Kun Li (Tianjin University, China)

19: Assessing Mechanical Stress Effects on CoFeSiB Microwires: Modeling and Preliminary Characterization
Alessandro Spalletta, Gianluca Caposciutti, Mirko Marracci and Bernardo Tellini (University of Pisa, Italy); Carlo Trigona and Salvatore Baglio (University of Catania, Italy)

20: Fabrication and Testing of a Stainless Steel Quartz Coaxial Cable Structure for High Temperature Measurement
Xinyu Jiao, Yongji Wu, Huijuan Zhao, Dock Houston and Dustin Gravley (Clemson University, USA); Susan Maley (Electric Power Research Institute, USA); Chethan Acharya (Souther Company Gas, USA); Hai Xiao (Clemson University, USA)

21: Energy Management Architectures for Dual Coil Electromagnetic Vibration Energy Harvesting Converter
Kholoud Hamza (National School of Electronics and Telecommunications of Sfax., Tunisia); Olfa Kanoun (Chemnitz University of Technology, Germany); Ahmed Fakhfakh (LT2S, Tunisia); Ghada Bouattour (ENIS, Tunisia)

22: Classifying Occupancy Levels in Smart Building by Experimental Evaluation of KNN and its Variants
Ghulam Fizza (Universiti Kuala Lumpur, British Malaysian Institute, Malaysia); Kushsairy Kadir (Universiti Kuala Lumpur British Malaysian Institute, Malaysia); Haidawati Nasir (Universiti Kuala Lumpur, Malaysia)

23: CycloWatt: An Affordable, TinyML-enhanced IoT Device Revolutionizing Cycling Power Metrics
Victor Luder (ETH Zurich, Switzerland); Sizhen Bian (ETH Zürich, Switzerland); Michele Magno (ETH Zurich, Switzerland)

24: Leveraging Machine Learning Insights on Coiling Temperature Cooling Profiles at the Instrumented Hot Strip Rolling Mill, Tata Steel, Port Talbot, UK
Robert Gibbs and Cinzia Giannetti (Swansea University, United Kingdom (Great Britain)); Thomas Baynes (Tata Steel UK Ltd, United Kingdom (Great Britain)); Cameron Pleydell-Pierce (Swansea University, United Kingdom (Great Britain))

25: Deep Neural Network Representation for Explainable Machine Learning Algorithms: A Method for Hardware Acceleration
Julian Schauer, Payman Goodarzi and Andreas Schütze (Saarland University, Germany); Tizian Schneider (Saarland University & Center for Mechatronics and Automation Technology (ZeMA), Germany)

26: Gaussian Mixture Model-Based Temperature Modelling for Data-Driven Laser Absorption Spectroscopy Tomography
Ran Yi, Yalei Fu and Chang Liu (University of Edinburgh, United Kingdom (Great Britain))

27: Data Augmentation and Class Imbalance Compensation Using CTGAN to Improve Gas Detection Systems
Shima Mahinnezhad and Shirin Mahinnezhad (École de Technologie Supérieure, Canada); Kuljeet Kaur (Ecole Technologie Superieure, Canada); Andy Shih (Ecole de Technologie Supérieure, Canada)

28: Elasticity Measurements of Expanded Foams using a Collaborative Robotic Arm
Luca Beber and Edoardo Lamon (University of Trento, Italy); Luigi Palopoli (Universita` di Trento, Italy); Luca Fambri, Matteo Saveriano and Daniele Fontanelli (University of Trento, Italy)

29: Cycloid gear tooth fault detection of industrial robot joints based on IAS signal
Yu Guo and Xingchao Yin (Kunming University of Science and Technology, China)

30: Simulation of UAV-based indoor mapping for multi-story building using a RGB-D SLAM solution
Wenxiang Wu (Harbin Institute of Technology & HIT, China); Bo Chen and Datong Liu (Harbin Institute of Technology, China)

31: Unsupervised Model Learning of Pneumatic Musculoskeletal Robots with Inadequate Sensors
Haoran Xu, Jianyin Fan, Ma Hongxu and Qiang Wang (Harbin Institute of Technology, China)

32: LiDAR attitude estimation based on LiDAR point-cloud data processing
Mauro D'Arco and Martina Guerritore (University of Naples Federico II, Italy)

33: Qualification of an IR test bench for Hydrogen quality at high pressure
Sebastian Pültz (Saarland University, Germany); Tizian Schneider (Saarland University & Center for Mechatronics and Automation Technology (ZeMA), Germany); Andreas Schütze (Saarland University, Germany)

34: Cyclist Safety Device based on Spectral Audio Processing for Approaching Vehicles Detection
Alessandra Flammini, Emiliano Sisinni and Salvatore Dello Iacono (University of Brescia, Italy); Daniele Buonocore, Consolatina Liguori and Vincenzo Paciello (University of Salerno, Italy)

35: Non-Cooperative Full-Envelope Calibration of a Supersonic Air Data System
Juan Jurado (US Air Force Academy, USA); Clark McGehee (US Air Force, USA)

36: Improving time transfer performance for low earth orbit satellites
Triyan Pal Arora and Ivan Petrunin (Cranfield University, United Kingdom (Great Britain)); Jaz Hill-Valler (Satellite Applications Catapult, United Kingdom (Great Britain)); Esther Anyaegbu (Spirent Communication Plc, United Kingdom (Great Britain))

37: Machine Learning Enhanced Signal Quality Assessment Leveraged with GDOP for GNSS/INS Fusion
Thomas Brun, Zhengjia Xu and Ivan Petrunin (Cranfield University, United Kingdom (Great Britain)); Ronald Wong and Raphael Grech (Spirent Communications Plc, United Kingdom (Great Britain))

38: Prediction of Li-Ion battery State-Of-Health based on data-driven approach
Daniel Lotano (Polytechnic University of Bari, Italy); Lorenzo Ciani (University of Florence, Italy); Nicola Giaquinto (Politecnico di Bari, Italy); Gabriele Patrizi (University of Florence, Italy); Marco Scarpetta and Maurizio Spadavecchia (Polytechnic University of Bari, Italy)

39: Improved Test Equipment for Low Cost Automated Battery Ageing and Characterization
Simone Barcellona (Politecnico di Milano, Italy); Silvia Colnago (Ricerca sul Sistema Energetico RSE SpA, Italy); Marco Faifer, Christian Laurano and Sergio Toscani (Politecnico di Milano, Italy)

40: Impact of Interfering Factors on a Glucose Sensor Model
Costanza Cenerini (Università Campus Bio-Medico di Roma, Italy); Danilo Pietro Pau (STMicroelectronics, Italy); Anna Sabatini (Campus Bio-Medico University of Rome, Italy); Luca Vollero (Università Campus Bio-Medico di Roma, Italy)

41: Microcontroller-based multichannel data acquisition system for an electromagnetic sensor array to detect heterogeneity in flowing conductive media
Jarrod Zhu, Michael Hayes, Bill Heffernan and Stanley Perry (University of Canterbury, New Zealand)

42: Remaining Useful Life estimation for MEMS-based transducers
Marco Carratù, Vincenzo Gallo and Paolo Sommella (University of Salerno, Italy); Antonio Pietrosanto (University of Salerno & CEO of Metering Research srl, Italy); Marcantonio Catelani, Lorenzo Ciani and Gabriele Patrizi (University of Florence, Italy)

43: Improving the winding angle measurement for an effective process control
Giulio D'Emilia, Luciano Chiominto, Emanuela Natale and Antonios Stamopoulos (University of L'Aquila, Italy)

44: Fault Diagnosis of Blast Furnace Throat Temperature Monitoring Device Based on Residual Analysis
Jinkun Li (Zhejiang University, China); Xiao-Yu Tang (Zhejiang University & Yuquan Compus, China); Songchen Li, Xin Wang, Chunjie Yang and Wenhai Wang (Zhejiang University, China)

45: Development of a Multiple HFCT-based Reflectometry for Live Cable Diagnosis
Chang Hyeon Hong, Yeon-Sub Sim and Hyun-Mo Seong (Hanbat National University, Korea (South)); Gu-Young Kwon (Kongju National University, Korea (South)); Chun-Kwon Lee (Pukyong National University, Korea (South)); Seung Jin Chang (Hanbat National University, Korea (South))

46: Towards Real-Time Fast Unmanned Aerial Vehicle Detection Using Dynamic Vision Sensors
Jakub Mandula (ETH Zürich, Switzerland); Jonas Kühne, Luca Pascarella and Michele Magno (ETH Zurich, Switzerland)

47: SoC Architecture for High-Frequency Acquisition of Household Electric Signals
Victor Manuel Navarro Perez (Alcala University, Spain); Rubén Nieto (Rey Juan Carlos University, Spain); Álvaro Hernández Alonso, Jesús Ureña Ureña and Laura de Diego-Otón (University of Alcala, Spain); Miguel Tapiador Luque (Alcala University, Spain)

48: Improvements of the conditioning stage of a QADA receiver for an IR positioning system
Jesús Ureña Ureña, José M. Villadangos and Álvaro Hernández Alonso (University of Alcala, Spain); David Moltó and Elena Aparicio-Esteve (University of Alcalá, Spain); Juan Carlos García (University of Alcala, Spain)

Thursday, May 23 8:30 - 10:30
SPS: Recent Advances in Process Tomography
Conference Room 2
Session Chairs: Yunjie Yang & Kamel Haddadi

INVITED TALK: Wire-mesh sensors for multiphase flow tomographic imaging
Prof. Dr.-Ing. Marco Da Silva, Head of the Institute of Measurement Technology, Johannes Kepler University Linz, Linz, Austria

Gesture Recognition: A Comprehensive Approach Using Electrical Impedance Tomography for Whole-Arm Monitoring
Sen Wang and Borun Li (Xi'an Jiaotong University, China); Tingting Zhang and Jian Wang (Xi'an Jiaotong University, China); Zhibin Zhao (The State Key Laboratory for Manufacturing Systems Engineering, China); De-Wen Zhang (Xi'an Jiaotong University, China)

Image Reconstruction in Ultrasonic Transmission Tomography Using L1/L2 Regularization
Aoyu Li, Guanghui Liang and Feng Dong (Tianjin University, China)

A High-Efficiency Excitation and Measurement Scheme for Electromagnetic Tomography
Yongkang Yu, Ziqiang Cui and Huaxiang Wang (Tianjin University, China)

Pulp-froth Interface Detection by Using ERT Linear Sensor
Xinyan Liu, Ziqiang Cui, Hantao Qu and Huaxiang Wang (Tianjin University, China)

Thursday, May 23 8:30 – 10:30
SPS: Optical Imaging for Flow-Field Diagnosis
Conference Room 3
Session Chairs: Michael Lengden and Chun-Jen Weng

INVITED TALK: Neural measurement operators for reconstructing complex flows
Dr. Samuel J. Grauer, Department of Mechanical Engineering, Pennsylvania State University

A TDLAS Tomographic Forecasting-and-Reconstructing Network for Predictive Temperature Imaging
Jingjing Si and Zhi Wang (Yanshan University, China); Yinbo Cheng (Hebei Agricultural University, China)

A Phase Noise Immune TDLAS Flow Velocimetry via using Modulated Waveform Synchronizing
Guangyu Hou, Lijun Xu, Yiding Wang and Zhang Cao (Beihang University, China)

Gaussian Fitting Localization-Based SART Algorithm for 3D Particle Field Reconstruction with single light field camera
Manfu Chen, Jian Li, Biao Zhang and Chuanlong Xu (Southeast University, China)

Schlieren and X-ray imaging of laser-particle interactions in metal additive manufacturing
Ioannis Bitharas (Heriot-Watt University, United Kingdom (Great Britain))

Laser Beam Optimization for LAS Tomography by Ergodic Evaluation
Jinting Wen, Zhang Cao and Lijun Xu (Beihang University, China)

Thursday, May 23 8:30 – 10:30
SPS: Low noise instrumentation, noise measurements and applications
Conference Room 4/5
Session Chairs: Graziella Scandurra and Carmine Ciofi

INVITED TALK: Fluctuation-enhanced gas sensing by two-dimensional materials
Janusz Smulko, Gdansk University of Technology

Fluctuation-enhanced gas sensing by two-dimensional materials
Janusz Smulko (Gdańsk University of Technology, Poland)

Fluctuation-enhanced Sensing of Organic Vapors by Ink-printed MoS2 Devices under UV Irradiation
Katarzyna Drozdowska and Janusz Smulko (Gdańsk University of Technology, Poland); Sergey Rumyantsev (Institute of High Pressure Physics PAS Warsaw, Poland); Andrzej Kwiatkowski (Gdansk University of Technology, Poland)

A Simple, Portable, Two Channels Correlation Spectrum Analyzer for Low Frequency Noise Measurements
Carmine Ciofi, Graziella Scandurra, Gino Giusi and Luigi Ferro (University of Messina, Italy); Emanuele Cardillo (Università di Messina, Italy)

A Simplified Topology for the Design of Low Noise Voltage Amplifiers for Low Frequency Noise Measurements
Carmine Ciofi and Graziella Scandurra (University of Messina, Italy); Krzysztof Achtenberg (Military University of Technology, Poland)

Noise characterization and optimization in a system for the measurement of the coherence time of superconducting qubits
Agata Barsotti, Stefano Di Pascoli and Massimo Macucci (University of Pisa, Italy)

Thursday, May 23 8:30 – 10:30
Signal Processing for Instrumentation and Measurement 2
Conference Room 6/7
Session Chairs: Grazia Iadarola and Shibin Wang

Electromagnetic Torque Calculation Method based on Motor Current Ridge and Its Application for System Identification
Kai Xu (Kunming University of Science and Technology, China); Xing Wu (Yunnan Vocational College of Mechanical and Electrical Technology, China); Dongxiao Wang and Xiaoqin Liu (Kunming University of Science and Technology, China)

Acoustic Tool Condition Monitoring with Angular Resolution on the Cutting Edges
Dimitar Ninevski, Paul O'Leary and Thomas Pisowicz (University of Leoben, Austria); Julia Thaler and Elias Jan Hagendorfer (Materials Center Leoben Forschung GmbH, Austria)

A Wiener Filter Based Band-Pass FIR Differentiator with Zero Delay
Markus Neumayer, Hannes Wegleiter and Thomas Bretterklieber (Graz University of Technology, Austria)

Accurate fitting techniques for QCM-D response analysis
Antonio Moschitta and Paolo Carbone (University of Perugia, Italy); Elia Landi, Riccardo Moretti and Ada Fort (University of Siena, Italy)

Dual-user Virtual Mouse System Using Acoustic-based Hand Tracking
Wei Han (The University of Edinburgh, United Kingdom (Great Britain)); Yinghao Li, Hao Yu and Jiabin Jia (University of Edinburgh, United Kingdom (Great Britain))

Principal Component Analysis Based Vibration Sensor selection for fault diagnosis of an Industrial Gearbox
Priyom Goswami and Rajiv Nandan Rai (Indian Institute of Technology Kharagpur, India)

Thursday, May 23 8:30 – 10:30
Circuits and Embedded Systems for Instrumentation and Measurement 2
Conference Room 8
Session Chairs: Lars Bengtsson and Shigeru Oho

Fault Detection in DC-DC converter: A solution based on Kalman filtering
Francesco Cecchetto, Luca Lentola and Enrico Orietti (Infineon Technologies Italia, Italy); Giada Giorgi (University of Padova, Italy)

Research and Implementation of Automatic Gain Control Method for Time-Difference Ultrasonic Gas Meter
Lishui Liang and Dandan Zheng (Tianjin University, China); Maosen Wang (School of Electrical and Information Engineering, Tianjin University, China); Haichen Liu and Jianqiang Mei (Tianjin University of Technology and Education, China)

A Silicon Photomultiplier Based Detection System with Integrated Feature Extraction
Atik Yasir Rahman (The University of Tennessee, Knoxville, USA); Nicole McFarlane (University of Tennessee Knoxville, USA)

Synergy Exploration in Deploying Convolutional Neural Networks Across Distributed Neuromorphic System
Bo Gong (Tianjin University & School of Electrical and Information Engineering, China); Jiang Wang, Siyuan Chang, Weitong Liu and Tong Li (Tianjin University, China)

Lightweight UAV Propeller Fault Detection Through Audio Signals Measurements
Valeria Bruschi (Marche Polytechnic University, Italy); Stefania Cecchi (UNIVPM, Italy); Gianluca Ciattaglia and Grazia Iadarola (Polytechnic University of Marche, Italy); Giacomo Peruzzi and Alessandro Pozzebon (University of Padova, Italy); Susanna Spinsante (Università Politecnica Delle Marche, Italy)

A Simplified Tilt-Resilient Probe Design for Noninvasive Current Measurement using Magnetic Sensors
Kartheek A Sai Bandi (Indian Institute of Technology and Engineering, Tirupati, India); Prashanth Vooka (Indian Institute of Technology Tirupati, India)

Thursday, May 23 10:30 - 11:00
Thursday AM Coffee Break
Room: Foyer

Thursday, May 23 11:00 - 12:00
Mass Spectrometry Imaging – Powerful Methods for Biomedical Research
Plenary Speaker: Professor Josephine Bunch
Room: Main Auditorium

Thursday, May 23 12:00 - 13:00
Thursday Lunch
Room: Foyer

Thursday, May 23 13:00 - 14:00
Advances in Measurement Theory and Metrology
Conference Room 2
Session Chairs: Roberto Ferrero and Leopoldo Angrisani

Multi-Level Method for Sound Source Location Measurement
Mahya Shahmohammadimehrjardi (Carleton University, Canada); Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada); Adrian D.C. Chan and Rafik Goubran (Carleton University, Canada); Pengcheng Xi (National Research Council Canada, Canada); Julio Valdes (Researcher at the National Research Council of Canada, Canada)

Four terminal-pair measurements of ceramic capacitors
Stephan Schlamminger, Jordan Love, Andrew Koffman and Yicheng Wang (National Institute of Standards and Technology, USA)

Sampling errors with a small number of samples in the measurement interval
Dušan Agrež (University of Ljubljana, Slovenia)

Thursday, May 23 13:00 - 14:00
Instrumentation and Measurement for Advanced Manufacturing
Conference Room 3
Session Chairs: Carlo Trigona and Lara Harris

Suppression of Aliasing Errors Introduced by Non-Ideal Mixers and Spectrum Partitioning Methods in the FI-DAC System
Yixiao Wang, Shengjian Liu, Shengwei Meng and Liansheng Liu (Harbin Institute of Technology, China)

Proposal of a Cyber Physical Finite Element Sensor Network for Surface Measurements
Lars-Michel Bretthauer, Ralf Heynicke and Gerd J. Scholl (Helmut-Schmidt-University, Germany)

Instrumentation and Signal Processing for the Verification of Directional Drilling
Paul O'Leary, Anika Terbuch and Dimitar Ninevski (University of Leoben, Austria); Daniel Mevec and Robert Fruhmann (eSENSEial Data Science GmbH, Austria); Negin Khalili-motlagh-kasmaei (Montan University of Leoben, Austria); Michael Habacher (University of Leoben & eSENSEial Data Science GmbH, Austria)

Thursday, May 23 13:00 - 14:00
SPS: Interpretable, efficient deep learning for intelligent monitoring of industrial equipment 2
Conference Room 4/5
Session Chairs: Zhibin Zhao & Mohammad Tayeb Al Qaseer

Deep Transfer Learning method for Automatic Modulation Recognition
Wenlong Zeng, Hanmin Sheng, Xintao Xu and Xi Wang (University of Electronic Science and Technology of China, China)

An Interpretable Fault Diagnosis Framework Based on Capsule Network with Statistical Features
Hao Lan, Shuhan Deng, Ruyi Huang, Zhuyun Chen and Weihua Li (South China University of Technology, China)

Sparse Optimization Driven Deep Unfolding Network for DOA Estimation
Han Zhang (Chang'an University, China)

Thursday, May 23 13:00 - 14:00
Instrumentation and Measurement Systems for Robotics
Conference Room 6/7
Session Chairs: Yong Yan

Accurate Ultrasonic Ranging Using a Beat Signal
Shigeru Oho (Nippon Institute of Technology, Japan)

Roaming the Red Planet: Revolutionising Mars Exploration with Dynamic Mobile Infrastructure
Luca Santoro, Davide Brunelli and Daniele Fontanelli (University of Trento, Italy)

Thursday, May 23 13:00 - 14:00
Automotive
Conference Room 8
Session Chairs: Markus Pichler-Scheder and Pier Andrea Traverso

Measurement Frauds in Fuel Dispensers: how Urban Mobility Simulators can help to combat them
Gabriel Trajano Almeida (National Institute of Metrology, Quality and Technology, Brazil); Carlos Augusto Ruviaro de Oliveira (Instituto Nacional de Metrologia, Qualidade e Tecnologia & Universidade Federal do Rio de Janeiro, Brazil); Wilson Melo, Jr. (National Institute of Metrology Quality and Technology, Brazil)

Uncertainty Evaluation in Inductance Measurement of Synchronous Reluctance Motors
Simone Mari and Andrea Credo (University of L'Aquila, Italy); Giovanni Bucci (Universita' Dell' Aquila, Italy); Fabrizio Ciancetta, Edoardo Fiorucci and Andrea Fioravanti (University of L'Aquila, Italy); Ilya Petrov (Lappeenranta University of Technology, Finland); Juha Pyrhonen (Co-authour, Finland)

Ultra-Wideband Localization Strategies for Autonomous Transport Vehicle Docking Operations
Markus Pichler-Scheder, Richard Schmidt and Florian Hammer (Linz Center of Mechatronics GmbH, Austria)

Thursday, May 23 14:00 - 15:00
Thursday PM Poster Session
Room: Foyer
Session Chairs: Trent Moritz and Sagiru Gaya

1: Real-Time Facial Attribute Recognition Using Multi-Task Learning
Huaqing Yuan (Tianjin University, China); Yi He (School of Electrical and Information Engineering & Tianjin University, China); Peng Du, Lu Song and Yanbin Xu (Tianjin University, China)

2: Non-contact Full-Field Bearing Condition Monitoring and Fault Diagnosis Using Millimeter-Wave Radar
Liuyang Zhang, Zhongxing Wang and Tian Fengshuo (Xi'an Jiaotong University, China); Rong Wang and Haoyuan Lu (Xi'an Jiaotong University, China)

3: A TSN-based Technique for Real-Time Latency Evaluation in Communication Networks
Alberto Morato (IEIIT-CNR, Italy); Claudio Zunino (CNR IEIIT, Italy); Manuel Cheminod (National Research Council of Italy, CNR - IEIIT, Italy); Stefano Vitturi (CNR, Italy); Federico Tramarin (University of Modena and Reggio Emilia, Italy)

4: A New Fixed-Point Non-Integer Downsampling Method For High-precision Harmonic analysis
Songting Zou, Kai Chen, Yifan Wang, Bo Xu, Lei Qian and Yu Zhang (University of Electronic Science and Technology of China, China)

5: Effect of insulation layer length in ERT sensor to measurment in dredging pipe
Kun Li, Yue and Fanpeng Dong (Tianjin University, China)

6: Continuous scanning Hyperspectral confocal microscope with broadband light source
Guo-Hao Lu (Taiwan Instrument Research Institute, Taiwan & National Applied Research Laboratories, Taiwan); Chao-Feng Liu (Taiwan Instrument Research Institute, Taiwan); Chun-Jen Weng (Taiwan Instrument Research Institute & National Applied Research Laboratories, Taiwan)

7: Photothermal Spectrum Phase Modulation for Acetylene Detection with HC-PCF
Houxian Du, Xunbo Gao, Yangyang Xie, Ruize Tong, Daiyuan Yang, Yukun Wang, Biqian Xu and Guo-ming Ma (North China Electric Power University, China)

8: Instability analysis of Taylor bubble in horizontal gas-liquid intermittent flows by S-PLIF method
Guojian Pu, Lusheng Zhai, Xinyu Meng, Xinyi Zhong and Wenhao Wang (Tianjin University, China)

9: Optical Coherence Tomography Based Measurements to Support Cleaning Treatments of Painted Ancient Artifacts
Chiara Bellezza Prinsi, Paola Buscaglia, Massimo Olivero, Sabrina Grassini, Alberto Vallan and Guido Perrone (Politecnico di Torino, Italy)

10: Toward a FBG Interrogation Scheme for Temperature Measurement based on Gaussian optical source
Chourouk Jouni and Hani Al Hajjar (Université de Technologie de Compiègne, France); Jad Abou Chaaya (ENIB, France); Youssef Zaatar (Lebanese University, Lebanon); Alejandro Ospina and Frédéric Lamarque (Université de Technologie de Compiègne, France)

11: Photon-statistics-based IMM Kalman filtering method for moving targets detection using single-photon LiDAR
Linjie Lyu (University of Beihang & Instrumentation Science and Optoelectronic Engineering, China); Duan Li (Beihang University, China); Pengmou Ma (Changcheng Institute of Metrology & Measurement & Aviation Industry Corporation of China, China); YanHong Jiang (Beijing University of Aeronautics and Astronautics, China); Lisha Jiang (BeiHang University, China); Lijun Xu (Beihang University, China)

12: Estimation of the Fatigue Life of a Fiber Bragg Grating Overhead Line Sag Sensor
Himanshi Singh and Grzegorz Fusiek (University of Strathclyde, United Kingdom (Great Britain)); Pawel Niewczas (University of Strathclyde & Synaptec Ltd, United Kingdom (Great Britain)); Valerie Livina (Principal Scientist, United Kingdom (Great Britain))

13: Self-Organized Synchronization of Mutually Coupled Spatially Distributed 60-GHz PLLs
Christian Hoyer, Franz Alwin Dürrwald and Florian Protze (Technische Universität Dresden, Germany); Jens Wagner (Technische Universität Dresden & Chair for Circuit Design and Network Theory, Germany); Tilo Meister and Frank Ellinger (Technische Universität Dresden, Germany)

14: Design of a Data Recorder Based on a RISC-V MCU
Shengchang Wang, Jialin Zhou, Qiao Jiaqing, Bing Liu and Li Wang (Harbin Institute of Technology, China)

15: Simplified Phase-sensitive Rectifier-based Resistance Measurement Circuit for Cost-effective Structural Damage Detection using Electro-Mechanical Impedance Method
Vineeta Gupta (Indian Institute of Technology, Tirupati, India); Prashanth Vooka (Indian Institute of Technology Tirupati, India)

16: Design of a Transimpedance Amplifier with T-Network and DC Signal Rejection Structure for Photoelectric Sensors
Te Liang, Jiangtao Sun and Mengxian Shen (Beihang University, China); Wenbin Tian (China Agricultural University, China); Zhiying Wang (Institute of Mechanics, China); Lijun Xu (Beihang University, China)

17: Magnetostrictive ultrasonic torsional wave detection method for high-density polyethylene pipe weld status
Kai Wang, Rui Zhang, Bo Feng, Yizhou Guo, Yihua Kang, Yini Song and Hongbao Ma (Huazhong University of Science and Technology, China)

18: A 3D reconstruction method for complex defects based on MFD and multidirectional MFL
Shengping Li, Jie Zhang, Xu Zhang, Chunrui Feng and Libing Bai (University of Electronic Science and Technology of China, China)

19: A metal rod measurement method in liquid by using an EMAT array
Fulu Liu, Keyu Du, Linhui Ma, Jiyao Li, Lijun Xu and Yuedong Xie (Beihang University, China)

20: Numerical Solutions to Eddy-current Reflection Coefficient
Zihan Xia (University of Manchester, United Kingdom (Great Britain)); Ruochen Huang (Fuzhou University, China); Xue Bai and Tian Meng (University of Manchester, United Kingdom (Great Britain)); Xiaofei Liu (The University of Manchester, United Kingdom (Great Britain)); Zhijie Zhang (North University of China, China); Wuliang Yin and Wuqiang Yang (The University of Manchester, United Kingdom (Great Britain)); Qian Zhao (Qufu Normal University, China)

21: Simultaneous measurements of metal thickness and defect depth using low frequency sweeping eddy current testing
Saibo She (The University of Manchester, United Kingdom (Great Britain)); Zihan Xia and Xinnan Zheng (University of Manchester, United Kingdom (Great Britain)); Wuliang Yin (The University of Manchester, United Kingdom (Great Britain))

22: Material Characterization Using the Clamped Circular Waveguide Method
Trent D Moritz, Matthew Dvorsky, Joseph Spewock and Mohammad Tayeb Al Qaseer (Iowa State University, USA)

23: A Novel Sensing System Used for Detecting Magnetic Shots Inside Conductive Tubes Based on Low Frequency Eddy Current Testing
Cao Bangda and Zhijie Zhang (North University of China, China); Wuliang Yin (The University of Manchester, United Kingdom (Great Britain))

24: A Dual-sided PLIF40 Method to Mitigate the Impact of Total Reflection in Liquid Film Imaging
Ting Xue, Wenkang Zhang and Jinshun Liu (Tianjin University, China)

25: AuraPose: Accurate Human Pose Detection and Behavior Recognition via Enhanced OpenPose with Angular Measurement
Haichen Liu and Jianqiang Mei (Tianjin University of Technology and Education, China); Fan Jia (Raysov Instrument Co. Ltd., Dandong, China); Dandan Zheng (Tianjin University, China); Jiamin Yuan (University of Sheffield, United Kingdom (Great Britain)); Zheling Wang (The University of New South Wales, Australia); Yiran Zhao (University of Birmingham, United Kingdom (Great Britain))

26: Method for Capturing Measured LiDAR Data with Ground Truth for Generation of Big Real LiDAR Data Sets
Ola Gatner, Irida Shallari and Mattias O'Nils (Mid Sweden University, Sweden); Muhammad Imran (IKEA of Sweden, Sweden); Yali Nie (Mid Sweden University, Sweden)

27: Structural Analysis of Temperature-flow Field Interaction Based on Wavelet Frequency Reconstruction and Devernay Algorithm
Yukang Zheng, Ting Xue and Haixia Wang (Tianjin University, China)

28: Full-Scale Aerial Target Recognition Method Based on Fully Convolutional One-Stage Object Detection
Yuehuan Wu (Harbin Engineering University, China); Bo Chen (Harbin Institute of Technology, China); Pan Dawei (Harbin Engineering University, China)

29: Fuzzy Optimization in Electrical Tomography Imaging Based on Expectation-Maximization Algorithm
Honghao Qu, Yue and Fanpeng Dong (Tianjin University, China)

30: Disturbance Wave Velocity Model based on Physics-Guided Backpropagation Neural Network
Hongjun Sun and Yi Huang (Tianjin University, China); Jinxia Li (Civil Aviation University of China, China); Teng Li (Tianjin University, China)

31: A method to obtain a probability distribution from a unimodal possibility distribution
Sina Ronaghi, Simona Salicone and Alessandro M Ferrero (Politecnico di Milano, Italy); Harsha Vardhana Jetti (Politecnico Di Milano, Italy)

32: Research on the relationship between sound velocity and void fraction in bubbly flow
Dandan Zheng and Fengxian Li (Tianjin University, China); Maosen Wang (School of Electrical and Information Engineering, Tianjin University, China)

Thursday, May 23 14:00 – 15:00
Late Result Poster Session & Thursday PM Coffee Break
Room: Foyer 2
Session Chairs: Trent Moritz and Sagiru Gaya

33: Cylinder Wake Turbulence Measurements using a Self Power-generating Piezoelectric Strip
Li P Sung, Mitchell Henshaw and Vidya Vishwanathan (United States Naval Academy, USA)

34: Drone detection using micro-Doppler signatures from V-band radar
Shashank Pant (National Research Council Canada, Canada); Ankita Dey (Carleton University, Canada); Max Manning (AiRadar Inc., Canada); Pascale Sévigny (DRDC - Ottawa Research Centre, Canada); Sreeraman Rajan (Carleton University, Canada); Bhashyam Balaji (Defence R&D Canada, Ottawa Research Center, Canada); Prakash Patnaik (NRC Canada, Canada)

35: Quantifying Information Loss in Lossy Compression of Measurement Data
Steven W Thompson and Maciej Zawodniok (Missouri University of Science and Technology, USA)

36: A Framework of Adaptive UAV Flight Effectiveness Evaluation Based on The Phase Identification
Yuan Wang, BenKuan Wang and Datong Liu (Harbin Institute of Technology, China)

37: Signal Separation in Ultrasonic NDE based on Fractional Fourier Transform
Chengxiang Peng, Madis Ratassepp and Paul Annus (Tallinn University of Technology, Estonia)

38: Synthesizing Small-Scale Defect Features in High-Resolution Metal Images Using Generative Adversarial Networks
ChenLiang Fan and Hsiu-Lung Chang (Foxconn, Taiwan); Yan-Zhong Liu (Foxconn, China); Chih-Chien Hung (Foxconn, Taiwan); Guo-Hao Lu (Taiwan Instrument Research Institute, Taiwan & National Applied Research Laboratories, Taiwan); Chun-Jen Weng (Taiwan Instrument Research Institute & National Applied Research Laboratories, Taiwan); Chi-Hung Hwang (Taiwan Instrument Research Institute, NARLabs, Taiwan)

39: Application of electrical capacitance tomography to monitor exhaust residue deposition in semiconductor processes
Anil Kumar Khambampati, Minho Jeon and Kyung Youn Kim (Jeju National University, Korea (South))

40: Measurement of mass fraction of mixed biomass particles in a fluidized bed using electrostatic sensing and data-driven modeling
Bojian Qi (Beijing Technology and Business University, China); Yong Yan (University of Kent, United Kingdom (Great Britain)); Wenbiao Zhang (Tianjin University, China)

41: Non-Contact Vital Measurements Using the Spatial Ultrasound Doppler Sensor
Hisashi Togo, Kousei Kawai, Toru Ishii, Hiroshi Kawaguchi and Shintaro Izumi (Kobe University, Japan)

42: Improving instrument design for reliable compressor control
Sangjip Bae, Dong-Keun Choi and Jae-Eon You (SKenergy, Korea (South))

43: Time-domain and spectral comparative analysis of digital and digitized ECG signals of patients with Brugada syndrome
Silvia Caligari and Vincenzo Randazzo (Politecnico di Torino, Italy); Fiorenzo Gaita and Carla Giustetto (University of Turin, Italy); Eros GA Pasero (Politecnico of Turin, Italy & Neuronica Lab, Italy)

44: Towards determining cognitive impairment in preterm infants using a random forest
Thibo Van Doninck (Vrije Universiteit Brussel, Belgium)

45: Optimizing Machine Learning for Rectal Cancer: A Multi-Faceted Approach
Camille Raets (Vrije Universiteit Brussels, Belgium); Chaïmae El Aisati (UZ Brussel, Belgium); Amir Laraki Rifi and Koen Putman (Vrije Universiteit Brussel, Belgium); Johan de Mey, Mark De Ridder and Alexandra Sermeus (UZ Brussel, Belgium); Kurt Barbé (Vrije Universiteit Brussel & Faculty of Sciences, Belgium)

46: Identification of baled materials through capacitive sensing
Dayang Wang, Yong Yan and Lijuan Wang (University of Kent, United Kingdom (Great Britain))

47: On the Development of a Wearable EEG Monitoring Device for Brain-related Disorders
Mahdi Saleh (University of Manchester, United Kingdom (Great Britain)); Raghu Soman and Mehrdad Seirafi (Alpha Brain Technologies, The Netherlands); Alexander J Casson (The University of Manchester, United Kingdom (Great Britain))

48: Measurement Systems for Value-Driven Digital Twins - A Case Study in Sustainable Transport-as-a-Service for the Global South
Lara Harris, Marcos Kauffman and Tengfei Long (Institute for Advanced Manufacturing and Engineering, Coventry University, United Kingdom (Great Britain))

49: Multiparameter Microwave Sensor for Rapid and Nondestructive Grading of In-Shell Nuts
Samir Trabelsi (US National Poultry Research Center, USDA-ARS, USA & USDA-ARS, USA); Micah Lewis (ARS, USA)

50: Modeling the Maternal and Fetal Cardiovascular Coupling via Uterus and Placenta
Alessandra Galli and Elisabetta Peri (Eindhoven University of Technology, The Netherlands); Paul Hamelmann (Philips Hospital Patient Monitoring, The Netherlands); M. Beatrijs Van Der Hout, Judith van Laar and Massimo Mischi (Eindhoven University of Technology, The Netherlands)

Thursday, May 23 15:00 - 17:00
Signal Processing and Data Acquisition Systems
Conference Room 2
Session Chairs: Bruce Wallace and Markus Neumayer

A multi-frequency phase difference estimation algorithm with time-frequency analysis
Yuwei Qiao, Peng Yu, Liansheng Liu and Datong Liu (Harbin Institute of Technology, China)

DOA Estimation by jointly exploiting L1-SVD and spatial smoothing in coherent environment
Jingchao Zhang, MuHeng Li, Longxin Bai and Liyan Qiao (Harbin Institute of Technology, China)

The Role of Surrogate Data in Supraharmonic Assessment Uncertainty Evaluation
Manouane Caza-Szoka (Universite du Quebec a Trois-Rivieres, Canada); Philippe Blanchard (Université du Québec à Trois-Rivières, Canada); Roger Bergeron (Les Services Électrigenies, Canada); Daniel Massicotte (Universite du Quebec a Trois-Rivieres, Canada)

Structural Analysis and Optimization of Monocular Stereo PIV System for Gas-Liquid Two-Phase Flow
Haixia Wang and Ting Xue (Tianjin University, China)

Design of A High Performance Time-to-Digital Converter with Zero Dead Time on Xilinx FPGA
Xinren Qi and Yonggang Wang (University of Science and Technology of China, China)

TIADC digital calibration based on apFFT phase measurement
Runze Yu, Xiyuan Peng and Datong Liu (Harbin Institute of Technology, China)

Thursday, May 23 15:00 – 17:00
Instrumentation and Measurement in Agriculture, Food Production and Food Safety
Conference Room 3
Session Chairs: Luca Lombardo and Valentina Bello

A Low-Cost Portable RGB Sensor Based on Nano Metal-Organic Frameworks for Food Safety
Francisco Ferrero Martín, Marta Valledor, Candela Melendras García, Ana Soldado Cabezuelo, Inmaculada Ortíz Gomez and Jose Manuel Costa Fernandez (University of Oviedo, Spain)

Y-Net: Insect Counting and Segmentation using Deep Learning on Embedded Devices
Amin Kargar (Tyndall National Institute & University College Cork, Ireland); Salvatore Tedesco (Tyndall National Institute, Ireland); Dimitrios Zorbas (Nazarbayev University, Kazakhstan); Michael Gaffney (Teagasc Ashtown Food Research Centre, Ireland); Brendan O'Flynn (Tyndall National Institude, Ireland)

A Smart Electrode for heating and/or determining timber properties of logs
Bill Heffernan, Michael Hayes and Michael Franks (University of Canterbury, New Zealand)

Speckle Pattern Imaging for Recognition of Milk Dilutions
Valentina Bello, Matteo Fiocchi, Irene Bassi, Elena Figus and Sabina Merlo (University of Pavia, Italy)
Alignment of multi-camera spectral images using wavelet transform
Martin Richter (Ilmenau University of Technology, Germany); Raik Illmann (Technische Universitaet Ilmenau, Germany); Maik Rosenberger and Gunther Notni (Ilmenau University of Technology, Germany)

Development of a quality control method for raw cow milk using GC-IMS and gas sensor measurements
Maximilian Koehne (Fraunhofer-Institute for Process Engineering and Packaging, Germany & Saarland University, Germany); Ervienatasia Djaw and Martin Schoellner (Fraunhofer-Institute for Process Engineering and Packaging, Germany); Tilman Sauerwald (Saarland University, Germany); Gina Zeh (Fraunhofer-Institute for Process Engineering and Packaging, Germany)

Thursday, May 23 15:00 – 17:00
SPS: Ophthalmic instrumentation and measurement methods
Conference Room 4/5
Session Chairs: Mario Ettore Giardini and Luigi Rovati

INVITED TALK: The uncertainties of fundus imaging and analysis in clinical research
Tom MacGillivray, Centre for Clinical Brain Sciences, University of Edinburgh, UK

INVITED TALK: Objective measurements of human accommodation
Marco Ruggeri, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, USA

Electrooculogram Compression Based on Wavelet Packet Decomposition
Alberto López Martínez (University of Oviedo, Spain); Saeed M Qaisar (CESI LINEACT, France & Effat University, France); Francisco Ferrero Martín (University of Oviedo, Spain); Reda Yahiaoui (Franche Comte University, SINERGIES Laboratory & SINERGIES Laboratory, France)

Development of Multi-Mode Retinal Phototherapy Device
Sébastien Buchwalder (Oculox Technologies SA, Switzerland); Pascal Faure (Oculox Technologies, Switzerland); Luca Negrini and Anton Hromov (Oculox Technologies SA, Switzerland); Martial H Geiser (OculoWise Sàrl, Switzerland); Filippo Piffaretti (Oculox Technologies, Switzerland)

Preliminary assessment of three protocols for the screening of amblyopia through Monte Carlo simulation
Keely Shand (University of Strathclyde, United Kingdom (Great Britain)); Atirut Boribalburephan (Looloo Technology, United Kingdom (Great Britain)); Mario Ettore Giardini (University of Strathclyde, United Kingdom (Great Britain))

Investigation on 3D-lens correction for multispectral camera systems with actuated image sensor
Maik Rosenberger (Ilmenau University of Technology, Germany); Mirco Andy Eilhauer and Carl Bernhard Nopper (Technische Universität Ilmenau, Germany)

Thursday, May 23 15:00 – 17:00
Instrumentation and Measurement for Physical and Electromagnetic Quantities
Conference Room 6/7
Session Chairs: Cleonilson Protasio de Souza and Maurizio Spadavecchia

A new chip-scale magnetic field sensor based on oscillation mode optomechanical detection
Zhe Li, Pengju Kuang, Chengwei Xian, Yifan Wang, Kai Chen and Yongjun Huang (University of Electronic Science and Technology of China, China)

The Feasibility Study on Pulverized Coal Volume Concentration Measurement in Primary Air of Plant Using Fin Resonant Cavity Sensor
Hao Xu, Yiguang Yang, Lijun Chen, Junwei Cao and Hongbin Yu (Northeast Electric Power University, China)

Operational Amplifier Characterization at Cryogenic Temperatures
Danilo Santoro, Giovanni Chiorboli and Marco Bassani (University of Parma, Italy); Alessandro Andreani (Università degli Studi di Milano, Italy); Paolo Cova (University of Parma, Italy); Nicola Delmonte (Università di Parma, Italy); Massimo Lazzaroni (Università degli Studi di Milano, Italy); Andrea Riminucci and Valeria Trabattoni (University of Milan, Italy); Andrea Zani (INFN Milano, Italy)

An Experimental Procedure for Measuring Thermal Parameters of Heat-Reservoir-based Energy Harvesters
Maria Paula Medeiros Gomes Miguel and Mariana Marques Ferreira (Federal University of Paraíba, Brazil); Cleonilson Protasio de Souza (Federal University of Paraiba, Brazil); Bruno Alessandro Silva Guedes de Lima (UFPB, Brazil); Orlando Baiocchi (University of Washington Tacoma, USA)

A Novel Inductive Sensor For Simultaneous Linear and Angular Displacement Measurement
Srikar Emany (Indian Institute of Technology Palakkad, India); Anil Kumar Appukuttan Nair Syamala Amma (University of Edinburgh, United Kingdom (Great Britain)); Sreenath Vijayakumar and Satyajit Das (Indian Institute of Technology Palakkad, India)

Reducing Phase Decoupling Errors of Coriolis Flowmeters for Slurry Flow measurement through Analytical Modelling
Wasif Shafaet Chowdhury and Yong Yan (University of Kent, United Kingdom (Great Britain)); Jinyu Liu and Marc-Antony Coster-Chevalier (KROHNE Ltd, United Kingdom (Great Britain))

Thursday, May 23 15:00 – 17:00
SPS: Flexible sensing and imaging for embodied intelligence
Conference Room 8
Session Chairs: Yunjie Yang and Nan Li

INVITED TALK: Complex fluids imaging with ultrasound
Prof. Chao Tan, School of Electrical and Information Engineering, Tianjin University, China

INVITED TALK: Stretchable electronics and its application in restoring human sensorimotor system
Dr Haotian Chen, Lecturer, University of Glasgow

Tactile sensing on deformed surfaces with electrical impedance tomography
Huazhi Dong and Zhe Liu (The University of Edinburgh, United Kingdom (Great Britain)); Delin Hu (University of Edinburgh, United Kingdom (Great Britain)); Xiaopeng Wu and Francesco Giorgio-Serchi (The University of Edinburgh, United Kingdom (Great Britain)); Yunjie Yang (University of Edinburgh, United Kingdom (Great Britain))

Image quality evaluation of ECT sensors on dynamic multiphase flows with coupling field simulation
Abdul Hafeez Abdul Bari (The University of Edinburgh, United Kingdom (Great Britain)); Shengnan Wang (China Jiliang University, China); Yunjie Yang (University of Edinburgh, United Kingdom (Great Britain))

Blood Flow Velocity Measurement with Ultrasonic Radio Frequency Signal De-correlation
Jiachen Shi, Shangjie Ren, Chao Tan and Feng Dong (Tianjin University, China)

Multi-modal EIT Image Reconstruction Using Deep Similarity Prior
Jingyu Sun (The University of Edinburgh, United Kingdom (Great Britain)); Hao Fang (University of Edinburgh, United Kingdom (Great Britain)); Wei Zhou (Northwestern Polytechnical University, China); Zhe Liu (The University of Edinburgh, United Kingdom (Great Britain)); Yunjie Yang (University of Edinburgh, United Kingdom (Great Britain))

Thursday, May 23 17:00 - 17:30
Junior I&M Event Update & Closing Ceremony & 2025 Announcement
Room: Main Auditorium