I²MTC 2021

To measure is to know

IEEE International Instrumentation and Measurement Technology Conference

May 17-20, 2021 | Virtual Conference

2021 CONFERENCE PROGRAM

Please visit our website for more information!
i2mtc2021.ieee-ims.org

SPONSORS AND ORGANIZERS

IEEE

IEEE INSTRUMENTATION & MEASUREMENT SOCIETY®

Table of Contents

Welcome Message from the General Co-Chairs

On behalf of the IEEE International Instrumentation and Measurement Technology Conference (I2MTC) Organizing Committee, the I2MTC Board of Directors and the IEEE Instrumentation and Measurement Society (IMS), we warmly welcome you to I2MTC 2021 which is taking place as a virtual event. I2MTC is the flagship conference of the IMS, and one of the top international conferences in the areas of instrumentation and measurement.

I2MTC 2021 was scheduled to be held at the Technology and Innovation Centre (TIC) in the heart of Glasgow, Scotland. Glasgow is Scotland's largest city, and historically is one of the main centers of the industrial revolution in the UK. Glasgow's scientific heritage is very strong. Lord Kelvin lived and worked in Glasgow for over 50 years. James Watt was born around 25 miles from Glasgow, and his early career was achieved in Glasgow. John Logie Baird was born around 30 miles from Glasgow, and invented an early version of television while working in Glasgow. Today, Glasgow is home to four Universities and a multitude of science, engineering and technology-based businesses of varying size. Measurement science and instrumentation are at the core of many of these businesses. It is therefore appropriate that Glasgow was selected as host city for I2MTC 2021.

The past 15 months have been unprecedented. With global lockdown commencing in early 2020 and movement restrictions continuing through the summer, autumn and early winter of 2020, it became very clear that I2MTC 2021 could not be delivered as an on-site conference, and an early decision was taken to make it a virtual event. The Organizing Committee decided that even in a virtual format, the conference would uphold all the traditions and implement the well-loved events for which I2MTC is known. The goal was for the virtual conference to mirror the features of the on-site I2MTC. The focus of the Organizing Committee on achieving this goal was sharp. It was therefore decided that all on-line presentations at the virtual event would be delivered 'live', taking advantage of the different digital conference platforms available. Accordingly, attendees at I2MTC 2021 will experience the following live talks and sessions: Tutorials; Plenary, Invited and Regular Presentations; Poster Presentations; Demos; TIM@I2MTC; Conference Paper Awards; Topical Discussion Panels; Industry Sessions and a virtual tour of Glasgow. Live presentations will be followed by live Q&A, just like at an on-site event. Live content will be supplemented by 'on-demand' viewing, so delegates have the opportunity to view a presentation they may have missed, or view a presentation again. As is the norm, all accepted papers will be published in the conference proceedings, while presented papers adhering to the presentation requirements will be uploaded to IEEE Xplore. Authors of the proceedings papers are also eligible to submit an extended version of their work to the IEEE Transactions on Instrumentation and Measurement (TIM) Special Issue dedicated to I2MTC 2021.

Our gratitude and praise go to all of the researchers who submitted papers to the virtual conference despite facing the hardship of having little or no laboratory access for over half a year, and the additional difficulties encountered due to contact limitations and travelling only for essential purposes. Yet, the I2MTC community defied these problems by finding ways of undertaking new research then submitting research papers to the conference. Through this extraordinary effort on the part of the researchers during a global lockdown, the conference received 383 original papers, of which 313 were accepted after a thorough review. Moreover, the conference received 6 Demo proposals, 6 Open Posters and 38 contributions to the TIM@I2MTC track, the latter being a record number of submissions to this track. Many authors will deliver their live presentations at unsocial hours. The strong loyalty and support that I2MTC 2021 has received from its research community during this period is both amazing and highly appreciated.

I2MTC 2021 has a group of Plenary Speakers of extraordinary caliber. Helen Margolis from the UK National Physical Laboratory will talk about recent innovations in timing infrastructure and technology. Sheila Rowan from Glasgow University will talk about gravitational-wave detectors and the related ultra-

precision measurement challenges. Erling Riis from Strathclyde University will talk about atomic-based quantum sensors, tracing their journey out of the lab towards field applications. Judy Amanor-Boadu, from Intel in the USA and recipient of the J Barry Oakes Advancement Award, will talk about high-performance VLSI processors.

We would like to extend our thanks to the following for all of their continuous hard work and efforts: Sabrina Grassini and Kurt Barbé for organizing the Tutorials; Sergio Rapuno, Ruqiang Yan and Gordon Flockhart for the high-level oversight in coordinating and organizing the Special Sessions; Sebastian Yuri Catunda and Ralf Bauer for organizing the Demo Sessions; Michael Lengden and James Bain for organizing the Industry Sessions; Alison Cleary for her work on Panels; Jacqueline Malloy for hosting the virtual tour of Glasgow; and Shervin Shirmohammadi for supporting TIM@I2MTC. Our thanks also go to all of the Special Session Topic organizers, to all of the Associate Technical Program Chairs and to all of the Reviewers for their hard work and keeping to schedule on the various conference tracks.

Thanks go to Wendy Russell and colleagues at the Glasgow City Convention Bureau for their support leading to I2MTC 2021 being awarded to Glasgow, and for their continuous support since then.

Thanks are also extended to Laura LeBlanc of Conference Catalysts for her immense efforts as Conference Manager and for attending to all conference details and taking care of all of the issues that came her way. Thanks also to the Technical Team at Conference Catalysts for handling everything linked to the IT, website and conference digital platform.

Last, and by no means the least, we have to give recognition and special thanks to the Technical Program Committee Co-Chairs namely Melanie Ooi, Pawel Niewczas and Kristen Donnell. The geographical bases of the TPC Co-Chairs span from Missouri, through the UK all the way to New Zealand. This covers 17 hours time difference from west to east. Meeting times were never optimal, some meetings starting early in the day, others late in the night. Despite the inconvenience of inhospitable meeting times, the TPC Co-Chairs have worked together closely, tirelessly and uncomplainingly to ensure that all preparations and deliverables were completed on schedule. It has been an immense pleasure and honor to work with all three of them.

We hope that all attendees will adapt to the live virtual format of I2MTC 2021, learn new things, meet up on-line with established friends and make new contacts from across the world. We wish you all an enjoyable conference.

Deepak Uttamchandani and Matthew Maynard

General Co-Chairs

I2MTC 2021 Organizing Committee

General Chairs:
Deepak Uttamchandani, *University of Strathclyde, Glasgow, Scotland*
Matthew Maynard, *University of Strathclyde, Glasgow, Scotland*

Technical Program Co-Chairs:
Pawel Niewczas, *University of Strathclyde, Glasgow, Scotland*
Melanie Ooi, *University of Waikato, Hamilton, New Zealand*
Kristen M. Donnell, *Missouri University of Science and Technology, Missouri, United States*

Tutorial Co-Chairs:
Sabrina Grassini, *Politecnico di Torino, Italy*
Kurt Barbé, *Vrije Universiteit Brussel, Belgium*

Special Session Co-Chairs:
Sergio Rapuano, *University of Sannio, Italy*
Ruqiang Yan, *Xi'an Jiaotong University, China*
Gordon Flockhart, *University of Strathclyde, Glasgow, Scotland*

Demo Session Co-Chairs:
Sebastian Yuri Catunda, *Federal University of Rio Grande do Norte, Natal, Brazil*
Ralf Bauer, *University of Strathclyde, Glasgow, Scotland*

Industry Session Co-Chairs:
Michael Lengden, *University of Strathclyde, Glasgow, Scotland*
James Bain, *M Squared Lasers, Glasgow, Scotland*

Junior Women in Instrumentation and Measurement Chair:
Alison Cleary, *University of Strathclyde, Glasgow, Scotland*

Local Arrangement Chair:
Jacqueline Malloy, *University of Strathclyde, Glasgow, Scotland*

Conference Management:
Conference Catalysts, LLC, *USA*

I2MTC Board of Directors

<u>Chair:</u>

Lee Barford, *Keysight Technologies, USA*

<u>Members:</u>

Juan Manuel Ramirez Cortes, *National Institute of Astrophysics, Optics, & Electronics, Mexico*
Melanie Ooi, *University of Waikato, Hamilton, New Zealand*
Mark Yeary, *Univeristy of Oklahoma, USA*
Marco Parvis, Politecnico *di Torino, Italy*
Vedran Bilas, *University of Zagreb, Croatia*
Deepak Uttamchandani, *University of Strathclyde, Glasgow, Scotland*
Branislav Djokic, *National Research Council, Canada*

I2MTC 2021 Associate Technical Program Chairs

Advances in Measurement Theory and Metrology
- Marco Parvis

Big Data and Metrology
- Dario Petri
- Dr Valerie Livina

Circuits and Embedded Systems for Measurement
- Teddy Gunawan
- Zheng Liu

Data Acquisition Systems
- Amitava Chatterjee
- Pasquale Daponte

Image Processing for Measurement
- Chi Hung Hwang
- Jacob Scharcanski

Measurement for Advanced Manufacturing
- Serge Demidenko

Measurement for Chemical and Biological Quantities
- Gang Lu
- James Windmill
- Mick Lengden

Measurement for Communications and IoT
- Domenico Capriglione
- Chao Wang

Measurement for Industry 4.0
- David Macii
- Marco Mugnaini

Measurement for Non-Destructive Testing and Evaluation
- Prof. M. Tayeb Al Qaseer
- Prof. Zheng Liu
- Theodosia Stratoudaki

Measurement for Physical and Electromagnetic Quantities
- Grzegorz Fusiek
- Wuliang Yin

Measurement for Renewable Energy Systems
- David Garcia Cava

Measurement in Aerospace and Space Systems
- Catherine Jones
- Patrick Norman

Measurement in Agriculture, Food Production and Food Safety
- Gourab Sen Gupta
- Sabrina Grassini

Measurement in Environmental Monitoring
- Fakhrul Alam
- Yong Yan

Measurement in Medical, Biomedical and Healthcare Systems
- Octavian Postolache

Measurement Systems for Robotics
- Ruqiang Yan
- Valner Brusamarello

Micro and Nanotechnology in Instrumentation and Measurement
- Aimé Lay-Ekuakille
- Salvatore Graziani

Optical and Fiber Optic Measurement Systems
- Tuan Guo
- Marcelo Werneck

Real-Time Measurement Systems
- Intan Zaurah Mat Darus

Sensors and Transducers
- Bruno Andò
- Dr Theodosia Stratoudaki

Sensors and Transducers
- Intan Zaurah Mat Darus

Signal Processing for Measurement
- Antonio Moschitta
- Luca De Vito

The Automotive and Transportation Industry
- Daniel Watzenig

The Energy and Power Industry
- Eduardo Fiorucci
- Mihaela Albu

The Oil and Gas Industry
- Marcelo Werneck
- Gordon Dobie

Special Session Organizers

SPS-1: Electrical & Magnetic Sensing and Imaging for NDT&E
- Nan Li
- Xiucheng Liu

SPS-2: Instrumentation and Measurement for Improving Quality, Reliability and Safety: New Perspectives for Research and Industry (TC-32)
- Lorenzo Ciani
- Marcantonio Catelani
- Loredana Cristaldi
- Giulio D'Emilia

SPS-3: Multifunctional Sensors and Smart Materials
- Marcus Perry

SPS-4: Advanced Measurement and Data Analytics for Industrial Equipment Health (TC-3 & TC-7)
- Shibin Wang
- Weihua Li
- Gaigai Cai

SPS-5: Beyond Smart Sensors Networks: Characterization and Applications of Emerging Wireless Communications for IoT/CPS System (TC-37)
- Emiliano Sisinni
- Gianfranco Miele

SPS-6:In-situ Fiber-Optic Biomedical & Chemical Measurements and Applications
- Tuan Guo
- Yong Zhao

SPS-7: AI- Enabled Technologies for Smart Health Monitoring
- M. Shamim Hossain
- Abdulmotaleb El Saddik

SPS-8: Ophthalmic Instrumentation and Measurement Methods
- Luigi Rovati
- Mario Ettore Giardini

SPS-9: Sensors, Instrumentation, and Artificial Intelligence Technologies for Environmental Measurement and Modeling (TC-18 & TC-42)
- Der-Chen Huang
- Tuan Guo
- Huan Liu
- Chi-Hung Hwang

SPS-10: Transducers for a Greener Society: From Materials to Sensing Systems
- Salvatore Graziani
- Carlo Trigona

SPS-11: Embedded Artificial Intelligence for Smart Sensing and IoT applications
- Sebastian Bader
- Michele Magno

SPS-12: Non-visible Imaging Techniques for Measurement and Testing in Industrial and Scientific Applications
- Emanuele Zappa
- Paola Saccomandi

SPS-13: Smart Measuring Systems and Measures for the Management of Emergencies. The case of COVID19 pandemic, and beyond
- Federico Tramarin
- Stefano Cattini
- Alberto Ferrari

I2MTC 2021 Reviewers

Kushsairy Abdul Kadir
Trio Adiono
Dušan Agrež
Rafeeq Ahmed
Mohammad Tayeb Al Qaseer
Mihaela Albu
Regina Allil
Ana Almeida
Judy Amanor-Boadu
Syed Umar Amin
Bruno Ando
Chandra Sekhar Angani
Emma Angelini
Leopoldo Angrisani
John Araujo
Sara Attarchi
Filippo Attivissimo
Patrick Nyaaba Ayambire
Sebastian Bader
Zhila Bahrami
Llibing Bai
Donald Bailey
Gabriel Barrientos
Julio Barros
Ralf Bauer
Daniel Belega
Matteo Bertocco
Giovanni Betta
Vedran Bilas
Niclas Bjorsell
Roberto Bodo
Francesco Bonavolontà
Salah Bourennane
Nicola Bowler
Sonia Bradai
Kyle W. Brady
Thomas Bretterklieber
Katelyn Brinker
Elisabetta Brunazzi
Valner Brusamarello
Giovanni Bucci
Pedro Cabral
Gaigai Cai
Hüseyin Canbolat

Domenico Capriglione
Domenico Luca Carnì
Marco Carratù
Elyson Carvalho
Andrea Cataldo
Stefano Cattini
Nunzio Cennamo
Francisco Cercas
Gianni Cerro
Ediz Cetin
Yuejian Chen
Rujun Chen
Xun Chen
Rym Cheour
Moi-Tin Chew
Donyau Chiang
Francesco Chiavaioli
Theofilos Chrysikos
Cheng-Hsin Chuang
Fabrizio Ciancetta
Lorenzo Ciani
Mario Cifrek
Radu Ciorap
Adam J. Collin
Luis Miguel Contreras-Medina
Valentina Cosentino
Eduardo Costa Da Silva
Marco Crescentini
Loredana Cristaldi
Ziqiang Cui
Ivana Culjak
Brian Culshaw
Cesar Da Costa
Hilmi Dajani
Ali Daliri
Dominique Dallet
Alex Dante
Gabriele D'Antona
Pasquale Daponte
Geo Davis
Alessio De Angelis
Luca De Vito
Robert Dean
Serge Demidenko
Giulio D'Emilia
Alessandro Depari
José Dias Pereira
Xiaoxi Ding

Tadeusz Dobrowiecki
Jennifer Dodoo
Ruggero Donida Labati
Kristen Donnell
Zachary D. Drummond
Ana-Maria Dumitrescu
Matthew Dvorsky
Robin Dykstra
Yavuz Ege
Bernd Eichberger
Youssef Errami
Leila Es Sebar
Marco Faifer
Lisa-Marie Faller
Mengbao Fan
Xinyu Fan
Paolo Ferrari
Francisco Javier Ferrero
Roberto Ferrero
Alessandro Ferrero
Luigi Ferrigno
Andrea Fioravanti
Edoardo Fiorucci
Alessandra Flammini
Gordon Flockhart
Daniele Fontanelli
Glauco Fontgalland
Cristian Fosalau
Ali Foudazi
Grzegorz Fusiek
Adriana M Gama
Abdullah Gani
Bin Gao
Robert Gao
J. Jesus Garcia
Antonella Gaspari
Marko Gazivoda
Joerg Gebhardt
Martial Geiser
Oana Geman
Boby George
Noby George
Nicola Giaquinto
Giada Giorgi
Pedro Girao
Branko Glisic
Adam Glowacz

Chinthaka Gooneratne
Sabrina Grassini
Marco Grossi
Voicu Groza
Xiang Gui
Giulia Guidi
Teddy Gunawan
Liang Guo
Tuan Guo
Rajarshi Gupta
Kamel Haddadi
Mohd. Haleem
Uwe Hampel
Qingbo He
Guolin He
Yunze He
Yunze He
Marjo Heikkilä
Norbert Herencsar
Álvaro Hernández
M. Shamim Hossain
Brian S Hoyle
Jingyu Hua
Der-Chen Huang
Haiying Huang
Chi-Hung Hwang
Grazia Iadarola
Leonardo Iannucci
Prof Tarikul Islam
Mariana Jacob Rodigues
Jiabin Jia
Hongkai Jiang
Catherine Jones
Yang Ju
Marko Jurcevic
M. Kamruzzaman
Olfa Kanoun
Baki Karaböce
Ali Karime
Kyung Youn Kim
João Klein
Daniel Konings
Ye Chow Kuang
Arun Kumar
Jagadeesh Kumar
Yuriy Kurylyak
Roberto la Rosa
Francesco Lamonaca
Anna Maria Lanzolla

Tuami Lasri
Gennaro Laudato
Massimo Lazzaroni
Bernhard Lechner
Huang Chen Lee
Hyosang Lee
Warren Huang-Chen
Lee
Mathew Legg
Jing Lei
John Leis
Weihua Li
Hongkun Li
Jinyi Li
Jinxia Li
Peng Li
Xihui Liang
Tai-Shan Liao
Annalisa Liccardo
Consolatina Liguori
Huan Liu
Datong Liu
Lishuai Liu
Shengheng Liu
Chang Liu
Dong Liu
Fangrui Liu
Zheng Liu
Ken Loh
Luca Lombardo
Alberto Lopes
Martines
Gang Lu
Mario Luiso
Eduard Lunca
David Macii
Rui Madeira
Michele Magno
Aamir Mahmood
Soumyajyoti Maji
Piero Malcovati
Francisco Maldonado
Alex Mamishev
Simone Mari
Branzila Marius
Vincenzo Marletta
Antonio J. Marques
Cardoso
Mirko Marracci
Eric Matson

Uwe Meier
Joaquim Mendes
Matteo Menolotto
Mahmoud Meribout
Ahsan Mian
Gianfranco Miele
Marco Donald
Migliore
Madhu Mohan
Joao Monge
Rosario Morello
Riccardo Moretti
Antonio Moschitta
Nezih Mrad
Ghulam Muhammad
Khan Muhammad
Anirban Mukherjee
Ivan Muller
Lucas Murliky
Carlo Muscas
Slim Naifar
Emanuela Natale
Markus Neumayer
Pawel Niewczas
Anis Nurashikin
Nordin
Daniel Novák
Alfredo Núñez
Vicencio
Melanie Ooi
Claudio Oton
Mang Ou-Yang
Vincenzo Paciello
Enza Panzardi
Marco Parvis
Dario Pasadas
Daniel Pasquet
Nicola Pasquino
Igor Pasti
Gabriele Patrizi
Panos Patros
Xiang Peng
Lihui Peng
Maicon Pereira
Lorenzo Peretto
Alessandro Pesatori
Dario Petri
Anthony J Peyton
Francesco Picariello
Rik Pintelon

Vincenzo Piuri
Emanuele Piuzzi
Ian Platt
Nick Polydorides
Ferdinanda Ponci
Rodrigo Porto
Octavian Postolache
Radu-Emil Precup
D M G
Preethichandra
Peter Priller
Zhen Qiu
António Raimundo
Aarvind Rajan
Sreeraman Rajan
Pedro Ramos
Jose Rangel-
Magdaleno
Sergio Rapuano
Michael Rathmair
Majdi Rawashdeh
Rakiba Rayhana
C. Chakradhar Reddy
Artur Ribeiro
Stefano Rinaldi
Luis Rosado
Luigi Rovati
Marco Ruggeri
Riccardo Sabbadini
Ján Šaliga
Dominik Sankowski
Edward Sazonov
Stefano Scanzio
Jacob Scharcanski
Christian Schuss
Gourab Sen Gupta
Mauro Serpelloni
Alexandre Serres
Jyh Sheen
Changqing Shen
Moahmad
Shorfuzzaman
Jingjing Si
Mel Siegel
Paulo Silva
Emiliano Sisinni
Daniel Slomovitz
Manuc Soleimani
Guorong Song
Matheus Souza

Ciro Spataro
Dorijan Spikic
Theodosia
Stratoudaki
Chuang Sun
Morteza
Tabatabaeipour
Maashiro Takei
Chao Tan
Chakib Taybi
Roberto Tinarelli
Sergio Toscani
Federico Tramarin
Pier Andrea Traverso
Carlo Trigona
Ioan Tudosa
Jesús Ureña
Deepak
Uttamchandani
Roberto Valenti
David Valeriu
Ana Maria Várkonyi-
Kóczy
Vitor Viegas
Sasa Vlahinic
Alexandra von Meier
Lijuan Wang
Qi Wang
Benkuan Wang
Chao Wang
Ruohui Wang
Shibin Wang
Yujue Wang
Daniel Watzenig
Roland Weiss
Grzegorz Wiczynski
Paul S. Wright
Min Xia
Ruqiang Yan
Yunjie Yang
Wuqiang Yang
Xuefeng Yao
Mark Yeary
Xipeng Yin
Noritaka Yusa
Cristian Zet
Binpeng Zhang
Cao Zhang
Zhibin Zhao
Xiaoli Zhao

A big thank you to the I2MTC 2021 Reviewers!

I2MTC 2021 Conference Sponsors

I2MTC 2021 Plenary Speakers

Innovations in Timing Infrastructure and Technology: Improving Resilience, Access and Performance

Helen Margolis

Helen Margolis is the Head of Science for the Time & Frequency department at the UK National Physical Laboratory (NPL) and an NPL Fellow in Optical Frequency Standards and Metrology. She joined NPL in 1998 following a temporary lectureship at the University of Oxford, where she worked on a range of experiments designed to test the theory of quantum electrodynamics by spectroscopy of highly charged ions. She previously undertook her undergraduate and postgraduate studies in Oxford, being awarded the DPhil degree in 1994.

NPL operates the national time scale UTC(NPL) and the UK primary frequency standards, and uses these to contribute to international timekeeping, as well as to disseminate accurate time and frequency to users across the UK. NPL also carries out a broad programme of research and development in time and frequency metrology. Within this, Helen's specialist area of research expertise is optical frequency metrology using femtosecond combs, part of the effort to develop a new generation of high accuracy optical atomic clocks based on laser-cooled trapped ions and atoms. This work is expected to lead to a redefinition of the SI unit of time, the second. Helen is the coordinator of a European project Robust optical clocks for international timescales (ROCIT), and the Technical Authority for the National Timing Centre programme.

Helen represents NPL and the UK on various international committees, including the Consultative Committee for Time and Frequency (CCTF) and several of its working groups. She is the current chair of the Executive Committee of the European Frequency and Time Forum and a member of the CODATA Task Group on Fundamental Constants. She has been a Visiting Professor at the University of Oxford since 2017 and was awarded an MBE in 2019 for her services to metrology.

Gravitational-wave Detectors: Challenges in Precision Measurement Technology for Fundamental Physics

Sheila Rowan

Professor Sheila Rowan holds the Chair of Natural Philosophy at the University of Glasgow, UK and since 2009, is Director of its Institute for Gravitational Research. She has held research positions split between Stanford University and Glasgow before returning full time to a Faculty position in Glasgow in 2003.

She was elected to Fellowship of the Royal Society of London in 2018 and the Royal Society of Edinburgh in 2008, and awarded Fellowship of the American Physical Society in 2012. She received the Hoyle Medal and Prize of the Institute of Physics in 2016 in recognition of her pioneering research on aspects of the opto-mechanical technology of gravitational wave observatories, which utilise ultra-low noise precision interferometric sensing. In 2016 she was seconded (part-time) to be Chief Scientific Advisor to the Scottish Government, is the UK CSA Champion for Quantum Technologies and the President Elect of the UK Institute of Physics.

I2MTC 2021 Plenary Speakers (continued)

Atomic-Based Quantum Sensors – the Journey Out of The Lab

Erling Riis

Erling Riis is a Professor of Physics at the University of Strathclyde. He joined the University in 1991 and founded the cold atom activities there after having worked as a post-doc with Nobel Laureate Steven Chu at Stanford. The main drivers for the Strathclyde research have been high-resolution atomic spectroscopy, precision measurements and the development of the highly specialised laser sources and optical technology required for these experiments. More recently this has led to a concerted effort to realise compact and portable atomic-based sensors and measurements systems operating outside a laboratory environment.

The integration of a fundamental research programme in quantum and atom optics with technology development has been a defining feature of the cold atom group's research activities. This is particularly exemplified by the development of techniques for miniaturising cold atom systems to be used in e.g. portable atomic clocks and the integration of atomic, optical and digital signal processing solutions for magnetometry. These are novel measurement systems, that form the basis for the group's involvement in the UK Quantum Technology Hub for Sensors and Timing. With additional support from industrial collaborators and Innovate UK this work has demonstrated compact and portable quantum sensors and instrumentation suitable for scalable manufacture.

Erling is the Fellow of the Institute of Physics and the Optical Society of America and serves on the programme and organising committees for several of the key international conferences covering the field of Quantum Technology.

2020 IEEE I&M Society J. Barry Oakes Advancement Award

J. Barry Oakes Presentation

Judy Amanor-Boadu (Intel Corporation, USA)

"For contributions to the development of measurement-correlation methodologies that combine simulation methods with laboratory measurement, with application to increasing the efficiency and integrity of power-delivery systems for high-performance VLSI processors; and for dedicated and demonstrated service as a servant leader and a mentor."

I2MTC 2021 Tutorial Speakers

Material State Determination for Process State Awareness
James A. Smith, *Idaho National Laboratory*

Medicine 4.0: When New Technologies Work with A.I.
Eros Pasero, *Politecnico di Torino*

Optical and Fibre Optic Measurement Systems
Marcelo Werneck, *Universidade Federal do Rio de Janeiro*

Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption: Spectroscopy: Part 1 Theory
George Stewart, *University of Strathclyde*

Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption: Spectroscopy: Part 2 - Experimental Systems and their Deployment
Walter Johnstone, *University of Strathclyde*

Non-invasive Monitoring of Drugs Bioavailability by Tissue Impedance Measurement
Pasquale Arpaia, *DIETI, University of Naples Federico II*
Nicola Moccaldi, *Università di Napoli Federico II*

Industrial Measurements, Communications and Protocols
José Miguel Costa Dias Pereira, *Instituto Politécnico de Setúbal*

Fundamentals and Applications of Distributed Electromechanical Sensing for Power Networks
Steven Blair, *Synaptec*
Lloyd Clayburn, *Synaptec*

Impedance Spectroscopy for Measurement and Sensor Solutions
Olfa Kanoun, *TU Chemnitz*

Harmonic Synchrophasor Estimation for Smart Grid Applications: From New Estimators to New Applications
Lei Chen, *Tsinghua University*

COVID 101 – Best Practices from Pandemic Life Panel
Presented by the Women in Instrumentation and Measurement Committee

Sonia M. Garcia Blanco
University of Twente, The Netherlands

Sonia García Blanco (female) obtained her PhD in Electrical and Computer Engineering from the University of Glasgow (2003) in integrated optics for optical biosensors. After a post-doctoral fellowship at the University of Toronto, she spent almost 6 years working in an industrial research laboratory (INO in Québec City, Canada) where she led the photonic integration and wafer-level micropackaging internal research activities. She was project manager and technical coordinator in several external projects for the Canadian Space Agency, European Space Agency and other private clients. She joined the faculty of the MESA+ Institute for Nanotechnology of the University of Twente in August 2010 as assistant professor, to work towards the establishment of a research program in active integrated nanophotonic devices and plasmonics with applications in optical sensing and telecommunications within the Integrated Optical Micro-Systems Group (IOMS). Since January 2014, she leads the Integrated Optical Systems group within the Optical Sciences chair of MESA+. She is co-chair of the Integrated Optics conference at Photonics West since 2014 and symposium chair of the OPTO Symposium at Photonics West starting in 2021. She participates in technical committees of reputed international conferences such as CLEO-Europe, ECIO, IEEE GFP and ECOC. In 2014, she was awarded an ERC Consolidator grant (RENOS- 648978). She is currently the coordinator of the H2020 project Ophellia and partner of the H2020 projects SERSing and Femtochip. Prof. Dr. García-Blanco has authored and co-authored more than 50 refereed journal papers and over 150 conference contributions in the field of integrated photonics, optical biosensors, plasmonics, photonics integration and packaging.

Tamador Salih Saeed
Metrology for All Platform

Education:
2017-2021: Ph.D. Department of Physics, University of Khartoum. Sudan.
M.Sc. In Physics, Physics Department, University of Khartoum. Sudan.
B.Sc. (Honors), Physics Department, Faculty of Science, University of Khartoum, Sudan.

Experience:
One of the Experts metrology on list: Arab Experts at Industrial Development and Mining Organization (AIDMO).
Physicist, Measurement and Calibration laboratories, SSMO.
Lecturer: Center for Standardization Science, SSMO, 2012-2014.
Lecturer: Khartoum College for Medical Sciences. 2007-2010.
Teaching Assistant: Bayan College for Science and Technology, 2003-2008

Award:
Innovative Research Award, The 25th anniversary of OWSD, SWSO, 2018.

Workshops & Conferences:
Online presentation "Metrology and the Update SI" Organized by AIDMO, 26 October 2020.

Conference paper, Conference on Precision Electromagnetic Measurements, CPEM 2018, July 2018 Paris, France.

Presentation "Redefining the SI units" Workshop, main speaker and organizer, December 2018. Sudanese Standards & Metrology Organization, SSMO, Sudan.

Speaker "Metrology: The mainstay of standardization and its role in consumer protection " in The Arab Standardization and Consumers Protection Forum, 16-17 October 2017, Khartoum, Sudan.

Speaker "The Importance of Standardization Activities and their role in community development", workshop entitled "Supporting Community Partnership and Sustainable Development of Standardization Activities", Saudi Standards, Metrology and Quality Org, February 14-15. 2017, Riyadh, KSA.

Publications:

Mrs. Tamador has many publications in her field.

She is Owner of "Metrology for All" platform.

Erik Timpson, P.E. Ph.D.
Principal Electrical Engineer

Dr. Erik Timpson is a Principal Electrical Engineer in Quality Assurance Engineering at Honeywell Federal Manufacturing & Technologies (FM&T), which manages and operates the Department of Energy's Kansas City National Security Campus (KCNSC). With 5,000 employees in Kansas City and Albuquerque, the Kansas City National Security Campus provides diverse engineering, manufacturing and secure sourcing services for national security.

Prior to this role, Dr. Timpson served as a Product Development Engineer in the telecommunications industry.

Dr. Timpson has authored/coauthored more than 20 peer reviewed journal articles, conference proceedings, or technical magazine column articles. He has 5 patents granted.

He is a member of Institute of Electrical and Electronic Engineers (IEEE), Eta Kappa Nu, Kappa Nu Epsilon, and NCSL International. He has always had a love for education marked by his extensive tutoring, peer instructing, and undergraduate research at Missouri University of Science and Technology. He was the Young Professional Representative for IEEE Instrument and Measurement Society ADCOM.

Dr. Timpson earned a Bachelor degree in Electrical Engineering with honors and minors in Math, Physics, and Biology from the University of Missouri, Rolla. He earned a Master degree in Electrical and Computer Engineering from the University of Missouri, Kansas City and a Ph.D. in Electrical and Computer Engineering from University of Missouri, Columbia. Dr. Timpson is Six Sigma Black Belt trained.

2021 I2MTC Student/YP Panel: The Digital Job Search

IMS invites students and young professionals to join us for our annual Student/YP Panel at I2MTC! This year's panel will focus on finding your career path and will include discussions on digitally marketing yourself, how the pandemic has changed how we find jobs, discovering the right job fit for you, how IMS can support your professional journey, and more!

Moderators:

Katelyn Brinker is currently pursuing a Ph.D. in electrical engineering at Iowa State University with the support of a NASA Space Technology Research Fellowship (NSTRF/NSTGRO). She graduated from Missouri S&T with bachelor's degrees in electrical engineering and computer engineering in 2017 and with a master's in electrical engineering in 2019. She has served as an IEEE-HKN chapter president, IEEE student branch president, IEEE-HKN Student Governor, and Undergraduate and Graduate Representative to the IEEE Instrumentation and Measurement Society AdCom. She is also the 2017 recipient of the IEEE-HKN Outstanding Student Award.

Lijuan Wang (M'14-SM'20) is a Lecturer in Electronic Engineering at the School of Engineering and Digital Arts, University of Kent, Canterbury, UK. She is a Senior Member of IEEE and the current Young Professionals Rep for the IEEE Instrumentation and Measurement Society.
She received her B.Eng. degree in Computer Science and Technology from Qiqihar University, Heilongjiang Province, China in 2010 and her Ph.D. degree in Measurement and Automation from North China Electric Power University, Beijing, China in 2014. She subsequently obtained a second Ph.D. degree in Electronic Engineering from the University of Kent, Canterbury, UK in 2017.

Panelists:

Dr. Erik Timpson

Dr. Erik Timpson is a Principal Electrical Engineer in Quality Assurance Engineering at Honeywell Federal Manufacturing & Technologies (FM&T), which manages and operates the Department of Energy's Kansas City National Security Campus (KCNSC). With 5,000 employees in Kansas City and Albuquerque, the Kansas City National Security Campus provides diverse engineering, manufacturing and secure sourcing services for national security.

Prior to this role, Dr. Timpson served as a Product Development Engineer in the telecommunications industry.

Dr. Timpson has authored/coauthored more than 20 peer reviewed journal articles, conference proceedings, or technical magazine column articles. He has 5 patents granted.

He is a member of Institute of Electrical and Electronic Engineers (IEEE), Eta Kappa Nu, Kappa Nu Epsilon, and NCSL International. He has always had a love for education marked by his extensive tutoring, peer instructing, and undergraduate research at Missouri University of Science and Technology. He was the Young Professional Representative for IEEE Instrument and Measurement Society ADCOM.

Dr. Timpson earned a Bachelor degree in Electrical Engineering with honors and minors in Math, Physics, and Biology from the University of Missouri, Rolla. He earned a Master degree in Electrical

and Computer Engineering from the University of Missouri, Kansas City and a Ph.D. in Electrical and Computer Engineering from University of Missouri, Columbia. Dr. Timpson is Six Sigma Black Belt trained.

Dr Lee Barford
As the Fellow for Software and Analytics at Keysight Technologies, Dr Lee Barford is the top technical lead from among the over 2500 people who create software at Keysight, one of the world's leading instrumentation and measurement companies. He leads work in ensuring the safety and correctness of automated driving software and sensors and in validating quantum computers. He is a member of the IMS AdCom and Chair of the Board of I2MTC. Previously, he held technical leadership and management roles at Hewlett-Packard Laboratories and Agilent Laboratories. He received the PhD in Computer Science from Cornell University. He also serves as an Adjunct Professor of Computer Science and Engineering at the University of Nevada, Reno.

Andrea Angion
Andrea Angioni is a smart grid specialist at the Unareti SPA distribution operator, part of the multiutility A2A, in Milan, Italy. He works in the field of monitoring and automation of distribution systems. In the past he was research assistant at E.ON Energy research center of RWTH University in Aachen, Germany - where he worked on numerous european and german research projects.

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

Awards and Distinctions

Each year the IEEE Instrumentation and Measurement Society accepts nominations for its awards. The AdCom Awards Committee manages the nominations process, reviews the candidates, and recommends a slate. The slate of candidates is then submitted to the Society AdCom for approval and the awards are presented at our annual Awards Ceremony held as part of the I2MTC conference. The Awards Committee is pleased to announce the 2019-2021 winners.

2020 Transaction Outstanding Associate Editors

Mohammed Abou Khousa, *Khalifa University of Science & Technology, United Arab Emirates*
Fabricio Guimaraes Baptista, *Universidade Estadual Paulista Júlio, Brazil*
Eduardo Cabal-Yepez, *University of Guanajuato, Mexico*
Amitava Chatterjee, *Jadavpur University, India*
Lorenzo Ciani, *University of Florence, Italy*
Alessio De Angelis, *University of Perugia, Italy*
Daniele Fontanelli, *University of Trento, Italy*
Dimitrios Georgakopoulos, *National Measurement Institute, Australia*
Tarikul Islam, *Jamia Millia Islamia (University), India*
Huang-Chen Lee, *National Chung-Cheng University, Taiwan*
Jing Lei, *North China Electric Power University, China*
Datong Liu, *Harbin Institute of Technology, China*
Zhigang Liu, *Southwest Jiaotong University, China*
Subhas Mukhopadhyay, *Macquarie University, Australia*
Lihui Peng, *Tsinghua University, China*
Seyed Hossein Hesamedin Sadeghi, *Amirkabir University of Technology, Iran*
Jesús Ureña, *University of Alcalá, Spain*
Hongrui Wang, *Delft University of Technology, Netherlands*
Emanuele Zappa, *Politecnico di Milano, Italy*

IEEE Instrumentation and Measurement Society Andy Chi Best Paper Award

Ming Yin, *Hefei University of Technology, China*
Xiaoning Liu, *Hefei University of Technology, China*
Xun Chen, *University of Science and Technology of China*
Yu Liu, *Hefei University of Technology, China*

IEEE Instrumentation and Measurement Society Best Application Award

Wuliang Yin, *The University of Manchester, United Kingdom*

"for the application focusing on online monitoring of the evolution of steel microstructure in a hot rolling process."

IEEE Instrumentation and Measurement Society Outstanding Young Engineer Award
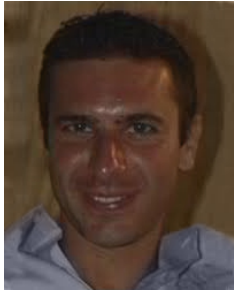
Carlo Trigona, *University of Catania, DIEEI, Italy*

"For his outstanding contribution to the advancement of I&M concept in sensors and transducers for energy harvesting."

IEEE Instrumentation and Measurement Society Distinguished Service Award

Georg Brasseur, *Graz University of Technology, Austria*

"For Distinguished Service to the IEEE I&M Society for over 25 years, contributions to the society's leading position in worldwide measurements and sensing systems engineering."

IEEE Instrumentation and Measurement Society Technical Award

Samuel P. Benz, *NIST, USA*

"For outstanding contributions to the use of Josephson Arbitrary Waveform Synthesizer (JAWS) as a reference standard for the measurement of harmonics in distorted waveforms."

Ilya Budovsky, *National Measurement Institute, Australia*

"For outstanding contributions to the use of Josephson Arbitrary Waveform Synthesizer (JAWS) as a reference standard for the measurement of harmonics in distorted waveforms."

Dimitrios Georgakopoulos,
National Measurement Institute, Australia

"For outstanding contributions to the use of Josephson Arbitrary Waveform Synthesizer (JAWS) as a reference standard for the measurement of harmonics in distorted waveforms."

IEEE Instrumentation and Measurement Society J. Barry Oakes Advancement Award

Judy Amanor-Boadu, *Intel Corporation, USA*

"For contributions to the development of measurement-correlation methodologies that combine simulation methods with laboratory measurement, with application to increasing the efficiency and integrity of power-delivery systems for high-performance VLSI processors; and for dedicated and demonstrated service as a servant leader and a mentor."

IEEE Instrumentation and Measurement Society Career Excellence Award

Reza Zoughi, Iowa State University

"For lifelong activity and outstanding achievement in pioneering microwave nondestructive testing and evaluation; and for serving the I&M Society in many roles in the past as, among others, President of the Society and EIC of the IEEE Transactions on Instrumentation and Measurement."

2021 Instrumentation and Measurement Society Senior Member Elevations

Ali Albishi
Mohammed Alenazi
Salman Alharthi
Paul Annus
Esteban Anoardo
M Balaji
Sekhar Babu Bandaru
Andrea Benigni
John Braun
Domenico Capriglione
Sacit Cetiner
Chihyun Cho
Razvan Ciocan
Luigi Ferrigno
Jose A. Garcia-Naya
Jayanand Gawande
Rosario Gerhardt
Yongxing Guo
David Heise
Jon Helgeland
Jie Huang
Kuo-Cheng Huang
Joseph John
M.M. Kamruzzaman
Chul Kim
Chengyu Liu
Dong Liu

Siliang Lu
Donald Madill
John Mccorkle
Ziyang Meng
Gianfranco Miele
George Orji
Pragnesh Patel
Hayde Peregrina Barreto
Alessandro Pesatori
Mohan Phadnis
Uday Ramteerthkar
Alon Regev
Paola Saccomandi
Charles Sammut
Lorenzo Scalise
Jacob Scherb
Heribert Schorn
Mauro Serpelloni
Abtin Spantman
Lijuan Wang
Soichi Watanabe
He Wen
Chun Hau Wong
Zaipuna Yonah
Xingwu Zhang
Wei Zhao

IEEE Instrumentation and Measurement Society: Officers

President, **Salvatore Baglio**, *University of Catania, Italy*
Executive Vice-President, **Juan Manuel Ramirez Cortes**, *National Institute of Astrophysics, Optics, & Electronics, Mexico*
Vice-President Finance, **Kristen Donnell**, *Missouri University of Science & Technology, USA*
Vice-President Conferences, **Sebastian Yuri C. Catunda**, *Federal University of Rio Grande do Norte (UFRN), at Natal, Brazil*
Vice-President Publications, **Gaozhi (George) Xiao**, *National Research Council, Canada*
Vice-President Membership, **Ruqiang Yan**, *Xi'an Jiaotong University, China*
Vice-President Technical & Standards, **Marco Parvis**, *Politecnico di Torino, Italy*
Vice-President Education, **Sergio Rapuano**, *University of Sannio, Italy*
Treasurer, **Helena Geirinhas Ramos**, *Instituto Superior Técnico Lisboa, Portugal*
Senior Past-President   , **Ruth A. Dyer**, *Kansas State University, USA*
Junior Past-President, **Max Cortner**, *Boston Scientific Corp., USA*
EiC Transactions, **Shervin Shirmohammadi**, *University of Ottawa, Canada*
EiC IM Magazine, **Bruno Andò**, *University of Catania, Italy*

IEEE Instrumentation and Measurement Society: Administrative Committee

2018-2021
Sebastian Yuri C. Catunda, *Federal University of Rio Grande do Norte (UFRN), at Natal, Brazil*
Marco Parvis, *Politecnico di Torino, Italy*
Gourab Sen Gupta, *Massey University, New Zealand*
Gaozhi (George) Xiao, *National Research Council, Canada*

2019-2022
Lee Barford, *Keysight Technologies, USA*
Melanie Ooi, *The University of Waikato, New Zealand*
Ferdinanda Ponci, *RWTH Aachen University, Germany*
Wendy Van Moer, *M&W Technics BVBA, Belgium*

2020-2023
Sabrina Grassini, *Politecnico di Torino, Italy*
Chi-Hung Hwang, *Taiwan Instrument Research Institute, NARLabs, Taiwan*
Juan Manuel Ramirez-Cortes, *National Institute of Astrophysics, Optics, & Electronics, Mexico*
Reza Zoughi, *Iowa State University, USA*

2021-2024
Kurt Barbé, *Vrije Universiteit Brussel, Belgium*
Branislav Djokic, *National Research Council, Canada*
Sergio Rapuano, *University of Sannio, Italy*
Ruqiang Yan, *Xi'an Jiaotong University, China*

Other Members
Graduate Rep, Matthew Dvorsky, *Iowa State University, USA*
Young Professional Rep, Lijuan Wang, *University of Kent, United Kingdom*

Program Grid: May 17

9:00 - 10:30	Material State Determination For Process State Awareness	Medicine 4.0: when new technologies work with A.I.	Optical and Fibre Optic Measurement Systems	
10:30 - 11:00	Break			
11:00 - 12:30	Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption: Spectroscopy: Part 1 Theory	Non-invasive monitoring of drugs bioavailability by tissue impedance measurement	Industrial Measurements, Communications, and Protocols	Fundamentals and Applications of Distributed Electromechanical Sensing for Power Networks
12:30 - 14:30	YP Meeting/Student Panel	Break		
14:30 - 16:00	Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption: Spectroscopy: Part 2 - Experimental Systems and their Deployment	Impedance Spectroscopy for Measurement and Sensor Solutions	Harmonic synchrophasor estimation for smart grid applications: from new estimators to new applications	
16:00 - 16:30	Break			
16:30 - 17:00	Lord Kelvin – His Life and Achievements			
17:00 - 17:30	A Comprehensive Insight into Effective and Informed Archival Journal Publication Process – "Dos and Don'ts"			

All times are in British Summer Time (BST or GMT+1).

Program Grid: May 18

9:00 - 10:30	Electrical & Magnetic Sensing & Imaging for NDT&E	Sensors, Instrumentation & AI for Environmental Measurement (TC-18 & TC-42)	Energy & Power Industry	Signal Processing 1	Sensors & Transducers 1
10:30 - 12:00	Opening Ceremony & Plenary (Helen Margolis)				
12:00 - 13:00	Poster Session #1: Measurement for Society - Reliability, Safety, Quality, Environment, Medical, Agriculture and Food				
13:00 - 14:30	Virtual Demonstrations: Instrumentation & Measurement				
14:30 - 15:00	Robots on Mars: the Early Explorations of the Perseverance Rover				
15:00 - 16:30	Measurement for Non-Destructive Testing & Evaluation	Transducers for Greener Society	Renewable Energy Systems, Oil & Gas Industry	Signal Processing 2	Multifunctional Sensors & Smart Materials 1
16:30 - 17:30	Poster Session #2: Advanced Measurement Systems: Data Analysis, Real-time, Micro and Nano, Optical and Fibre Optics, Data Acquisition, Circuits and Non-Destructive Testing			TIM @ I2MTC Poster Session	

All times are in British Summer Time (BST or GMT+1).

Program Grid: May 19

9:00 - 10:30	Medical & AI-Enabled Technologies for Smart Health Monitoring	Quality, Reliability & Safety 1 (TC-32)	Measurement for Industry 4.0 & Advanced Manufacturing	Embedded Artificial Intelligence for Smart Sensing & Communications & IoT	Image Processing 1
10:30 - 12:00	Award Ceremony & Plenary (Professor Sheila Rowan)				
12:00 - 12:30	Virtual Tour of Glasgow				
12:30 - 13:30	COVID 101 – Best Practices from Pandemic Life				
13:30 - 14:30	Poster Session #3: Measurement for Human-Computer Interactions: Advanced Sensors, Imaging, Image Processing, Signal Processing, Robotics and Data Analytics				
14:30 - 16:00	Industry Session #1: Instrumentation and Measurement in Advanced Manufacturing : An Industry Perspective				
16:00 - 17:30	Data Acquisition Systems 1	Quality, Reliability & Safety 2 (TC-32)	Smart Measurement Systems for Emergencies & Robotics	Emerging Wireless Communications for IoT/CPS Systems (TC-37)	Image Processing 2

All times are in British Summer Time (BST or GMT+1).

Program Grid: May 20

Time					
9:00 - 10:00	J. Barry Oakes Presentation (Judy Amanor-Boadu)				
10:00 - 11:30	Advanced Measurement & Data Analytics for Industrial Equipment Health Monitoring (TC-3 & TC-7)	Automotive, Transportation Industry, Aerospace & Space Systems	Measurement in Medical, Biomedical & Healthcare Systems 1	Physical, Electromagnetic, Biomedical & Chemical Measurements 1	Advanced Measurement Systems - Real-Time, Micro, Nano, Optical or Fiber-Optics 1
11:30 - 12:30	Plenary (Erling Riis)				
12:30 - 14:00	Industry Session #2: Quantum Enabled Instrumentation and Measurement: An Industry Perspective				
14:00 - 15:30	Ophthalmic Instrumentation & Measurement	Environmental Monitoring & Agriculture, Food Production & Food Safety	Measurement in Medical, Biomedical & Healthcare Systems 2	Measurement Theory & Metrology 1	Circuits & Embedded Systems 1
15:30 - 16:30	Poster Session #3: Measurements for Infrastructure: Transportation, Space & Aerospace; Energy & Power; Communications & IOT; Physical & Chemical Measurements and OPEN POSTERS				
16:30 - 17:00	Closing Ceremony				

All times are in British Summer Time (BST or GMT+1).

IEEE TRANSACTIONS ON
INSTRUMENTATION AND MEASUREMENT

A PUBLICATION OF THE IEEE INSTRUMENTATION AND MEASUREMENT SOCIETY

IEEE Transactions on Instrumentation and Measurement (TIM) is the number 1 journal in the area of general Instrumentation and Measurement (I&M) in terms of Impact Factor without Self Cites, according to the 2018 Journal Citation Report, and in Quarter 1 (Q1) of the Instruments and Instrumentation category. In addition, according to the 2018 Scopus report, TIM is the number 1 journal in the area of general I&M with a CiteScore of 3.84 and SJR of 0.878. In terms of timeliness, TIM's average duration of submission-to-first-decision and submission-to-online-publication of 59 days and 26 weeks, respectively, are among the very best in all of IEEE journals.

In addition to regular papers, TIM also publishes short papers and survey/review papers. **Short papers** are 2 or 3-page papers that are both reviewed faster and published faster than regular papers. When a short paper gets accepted, it is assigned to the very next issue that hasn't gone to print yet, providing authors with a means for rapid publication of novel, significant and time-sensitive articles. **Survey/review papers** review the existing literature on a specific topic, and present further contributions such as a novel taxonomy that will guide other researchers, deep analysis with new findings that were previously unknown, or identifying gaps and providing new insights. TIM is a hybrid journal, so papers can be published in either conventional or Open Access modes, depending on the author's preference.

IEEE TIM is the flagship publication of the IEEE Instrumentation and Measurement Society (IMS) and publishes papers that report on innovative solutions to the development and use of electrical, electronic, or software instruments and equipment to measure, monitor and/or record physical phenomena for the purpose of advancing measurement science, methods, functionality and applications.

Submit:
- Regular paper
- Short paper
- Survey/review paper

Publish:
- Conventional
- Open Access

For more info, please visit **http://tim.ieee-ims.org**

IEEE
Advancing Technology for Humanity

IEEE INSTRUMENTATION & MEASUREMENT SOCIETY

Technical Program: May 17th (Tutorials)

Material State Determination For Process State Awareness
5/17/2021 9:00:00 AM - 10:30:00 AM GMT+1
Speaker: James A. Smith, Idaho National Laboratory
Session Chair: Kurt Barbe, Vrije Universiteit Brussel, Belgium

Medicine 4.0: when new technologies work with A.I.
5/17/2021 9:00:00 AM - 10:30:00 AM GMT+1
Speaker: Eros Pasero, Politecnico di Torino
Session Chair: Deepak Uttamchandani, University of Strathclyde, Glasgow, Scotland

Optical and Fibre Optic Measurement Systems
5/17/2021 9:00:00 AM - 10:30:00 AM GMT+1
Speaker: Marcelo Werneck, Universidade Federal do Rio de Janeiro
Session Chair: Pawel Niewczas, University of Strathclyde, Glasgow, Scotland

Fundamentals and Applications of Distributed Electromechanical Sensing for Power Networks
5/17/2021 11:00:00 AM - 12:30:00 PM GMT+1
Speaker: Steven Blair, Synaptec
Lloyd Clayburn, Synaptec
Session Chair: Pawel Niewczas, University of Strathclyde, Glasgow, Scotland

Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption: Spectroscopy: Part 1 Theory
5/17/2021 11:00:00 AM - 12:30:00 PM GMT+1
Speaker: George Stewart, University of Strathclyde
Session Chair: Sabrina Grassini, Politecnico di Torino, Italy

Industrial Measurements, Communications and Protocols
5/17/2021 11:00:00 AM - 12:30:00 PM GMT+1
Speaker: José Miguel Costa Dias Pereira, Instituto Politécnico de Setúbal
Session Chair: Deepak Uttamchandani, University of Strathclyde, Glasgow, Scotland

Non-invasive monitoring of drugs bioavailability by tissue impedance measurement
5/17/2021 11:00:00 AM - 12:30:00 PM GMT+1
Speakers: Pasquale Arpaia, DIETI, University of Naples Federico II
Nicola Moccaldi, Università di Napoli Federico II
Session Chair: Kurt Barbe, Vrije Universiteit Brussel, Belgium

2021 I2MTC Student/YP Panel: The Digital Job Search
5/17/2021 12:30:00 PM - 2:30:00 PM GMT+1

**Gas Measurements for Emissions and Environmental Monitoring Using Laser Absorption:
Spectroscopy: Part 2 - Experimental Systems and their Deployment**
5/17/2021 2:30:00 PM - 4:00:00 PM GMT+1
Speaker: Walter Johnstone, University of Strathclyde
Session Chair: Sabrina Grassini, Politecnico di Torino, Italy

**Harmonic synchrophasor estimation for smart grid applications: from new estimators to new
applications**
5/17/2021 2:30:00 PM - 4:00:00 PM GMT+1
Speaker: Lei Chen, Tsinghua University
Session Chair: Deepak Uttamchandani, University of Strathclyde, Glasgow, Scotland

Impedance Spectroscopy for Measurement and Sensor Solutions
5/17/2021 2:30:00 PM - 4:00:00 PM GMT+1
Speaker: Olfa Kanoun, TU Chemnitz
Session Chair: Kurt Barbe, Vrije Universiteit Brussel, Belgium

Lord Kelvin – His Life and Achievements
5/17/2021 4:30:00 PM - 5:00:00 PM GMT+1

Miles Padgett

Miles Padgett is a Royal Society Research Professor and also holds the Kelvin
Chair of Natural Philosophy in the School of Physics and Astronomy at the
University of Glasgow.
His research team, covers all things optical from the basic ways in which light
behaves as it pushes and twists the world around us, to the application of new
optical techniques in imaging and sensing. They are currently using the
classical and quantum properties of light to explore: the laws of quantum physics in accelerating
frames, microscopes that see through noise, shaped light that overcomes diffraction-limited resolution
and endoscopes the width of a human hair.
He is a Fellow both of the Royal Society of Edinburgh and the Royal Society. He has won a number
of national and international prizes including, in 2019, the Rumford Medal of the Royal Society. In
both 2019 and 2020 he was named by Web of Science as a globally highly-cited researcher.
Miles celebrates the academic and post-academic careers of his present and former group members
who make all of this possible.

**A Comprehensive Insight into Effective and Informed Archival Journal Publication Process –
"Dos and Don'ts"**
5/17/2021 5:00:00 PM - 5:30:00 PM GMT+1

Reza Zoughi, *Iowa State University*

BIO: R. Zoughi received his B.S.E.E, M.S.E.E, and Ph.D. degrees in electrical engineering (radar
remote sensing, radar systems, and microwaves) from the University of Kansas where from 1981
until 1987 he was at the Radar Systems and Remote Sensing Laboratory (RSL). He is the Kirby
Gray (Battelle) Chair in Engineering and a Professor Electrical and Computer Engineering (ECpE)
at Iowa State University (ISU). He is also the Director of Center for Nondestructive Evaluation
(CNDE) at ISU. He served as the Schlumberger Endowed Professor of Electrical and Computer
Engineering at Missouri University of Science and Technology (Missouri S&T) from January 2001 to

August 2019. Prior to joining Missouri S&T and since 1987 he was with the Electrical and Computer Engineering Department at Colorado State University (CSU), where he was a professor and established the Applied Microwave Nondestructive Testing Laboratory (amntl) (http://amntl.mst.edu/). Dr. Zoughi held the position of Business Challenge Endowed Professor of Electrical and Computer Engineering from 1995 to 1997 while at CSU.

While at CSU he received nine teaching awards, including the State Board of Agriculture, Excellence in Undergraduate Teaching Award and the Abell Faculty Teaching Award. Since at Missouri S&T he has received seventeen Outstanding Teaching Awards & Commendations. He is the recipient of the 2007 IEEE Instrumentation and Measurement Society Distinguished Service Award, the 2009 American Society for Nondestructive Testing (ASNT) Research Award for Sustained Excellence, the 2011 IEEE Joseph F. Keithley Award in Instrumentation and Measurement and the 2020 IEEE Instrumentation and Measurement Society Career Excellence Award. In 2013 and 2020 he and his co-authors received the H. A. Wheeler Applications Prize Paper Award from the IEEE Antennas and Propagation Society (APS).
He is the author of a textbook entitled "Microwave Nondestructive Testing and Evaluation Principles" KLUWER Academic Publishers, 2000, and the co-author of a chapter on Microwave Techniques in the book entitled "Nondestructive Evaluation: Theory, Techniques, and Applications" Marcel and Dekker, Inc., 2002. He is the co-author of 179+ refereed journal papers, 362+conference proceedings and presentations and 120 technical reports.

He served as the Editor-in-Chief of the IEEE Transactions on Instrumentation and Measurement (2007-2011), three terms as an at-large AdCom member of the IEEE Instrumentation and Measurement (I&M) Society, I&M Society President (2014-2015) and serves as an I&M Society Distinguished Lecturer. He served as the General Co-Chair of the 2013 IEEE Instrumentation and Measurement Technology Conference (I2MTC). He has been elected as an at-large member of IEEE Publications Services & Products Board (PSPB) for two terms (2016-2018 & 2019), and served on the IEEE TAB/PSPB (2015 & 2017-2019).

He has twenty issued US patents to his credit (in addition to several issued abroad) in the field of microwave nondestructive testing and evaluation. He has delivered numerous Invited and Keynote presentations on the subject of microwave and millimeter wave nondestructive testing and imaging. He is also a Fellow of the American Society for Nondestructive Testing (ASNT).

ABSTRACT: The impact that high-quality journal publication has on advancing science, technology and authors' careers is well documented. Journal publishing has evolved significantly in the past two decades, as various benchmarks have been designed to designate "quality" or degree of "impact" to a given journal. Other metrics have been developed to better indicate the impact of an author's publications. All of these have resulted in an amazing increase in the number of submitted papers and the sprouting of many journals in a given field. Many articles have been written on these issues and more will be surely written as a result of other requirements such as open-access.

Successful publication of a journal paper, in particular in a "reputable" and "high-quality" journal, starts from before an author decides to compile thoughts, ideas and results into the form of a paper. This involves deciding on the proper, most effective and relevant publications venue; having the knowledge of (and experience) how to compile the content that goes into the paper; having a clear knowledge of the publications guidelines and rules for the chosen venue; etc. Writing a journal paper requires much more than a step-by-step write-up of what was done technically. First, the choice of the journal in which to publish is critically important since the technical focus of the paper must be within the technical focus of the journal. In addition, effective journal paper writing requires many implicit and explicit issues to consider. Established publications rules related to highlighting the novelty of the work, proper citation of already-published works related to the subject matter and published in journals in the same field, properly giving credit to previously-published materials, and many more such rules must be meticulously and methodically followed. In some cases, such as preparing a technically-extended journal paper, based on a conference proceedings paper (for example the IEEE Transactions on Instrumentation and Measurement Special Issue of the I2MTC 2016), unique and specific rules must be adhered to as well.

This tutorial aims to discuss and highlight all of these issues and provide a road-map for those who may be relatively new to the journal publication realm, or could use this information in future journal paper preparation.

Technical Program: May 18th

[INVITED] Applications of Process Tomography for Packed Reaction Column Monitoring
Jiabin Jia, University of Edinburgh, United Kingdom

3D Reconstruction in Planar Array Electrical Capacitance Tomography Based on Depth Estimation and Sparse Representation
Peng Suo, Beihang University, China
Lijun Xu, Beihang University, China
Jiangtao Sun, Beihang University, China
Wenbin Tian, Beihang University, China
Shijie Sun, Beihang University, China
Yuedong Xie, Beihang University, China

A Fractional-Order PID Controlled Iterative Calderon's Method for Electrical Capacitance Tomography
Yu Tian, Beihang University, China
Zhang Cao, Beihang University, China
Die Hu, Beihang University, China
Xin Gao, Beihang University, China
Lijun Xu, Beihang University, China

Research on Lung Electrical Impedance Imaging Method Based on Three-Dimensional Interpolation
Xiuyan Li, Tianjin Polytechnic University, China
Yu Wei, Tianjin Polytechnic University, China
Qi Wang, Tianjin Polytechnic University, China
Ronghua Zhang, Tianjin Polytechnic University, China
Jianming Wang, Tianjin Polytechnic University, China;

Influence of Parameters in Kalman-Filter-Based Method on Image Quality for Electrical Capacitance Tomography
Ying Wang, Beihang University, China
Lijun Xu, Beihang University, China
Shijie Sun, Beihang University, China
Xupeng Lu, Beihang University, China
Jiangtao Sun, Beihang University, China

Analysis and Visualization of Time-Varying Harmonics in Transformer Inrush Currents
Julio Barros, University of Cantabria, Spain
Matilde de Apráiz, University of Cantabria, Spain
Ramón Diego, University of Cantabria, Spain

Design of a High-Accuracy and Traceable Reference Instrument for Flickermeter Certification
Guglielmo Frigo, Swiss Federal Institute of Metrology, Switzerland

Improving Harmonic Measurements with Instrument Transformers: A Comparison Among Two Techniques
Giovanni D'Avanzo, University of Campania Luigi Vanvitelli, Italy
Marco Faifer, Politecnico di Milano, Italy
Carmine Landi, University of Campania Luigi Vanvitelli, Italy
Christian Laurano, Ricerca sul Sistema Energetico S.p.A., Italy
Palma Sara Letizia, Istituto Nazionale di Ricerca Metrologica, Italy
Mario Luiso, University of Campania Luigi Vanvitelli, Italy
Roberto Ottoboni, Politecnico di Milano, Italy
Sergio Toscani, Politecnico di Milano, Italy

Measurement of Synchrophasors with Stand Alone Merging Units: A Preliminary Study
Paolo Castello, University of Cagliari, Italy
Antonio Delle Femine, University of Campania Luigi Vanvitelli, Italy
Daniele Gallo, University of Campania Luigi Vanvitelli, Italy
Mario Luiso, University of Campania Luigi Vanvitelli, Italy
Carlo Muscas, University of Cagliari, Italy
Paolo Attilio Pegoraro, University of Cagliari, Italy

Compensation of Systematic Measurement Errors in PMU-Based Monitoring Systems for Trasmission Grids
Carlo Muscas, University of Cagliari, Italy
Paolo Attilio Pegoraro, University of Cagliari, Italy
Carlo Sitzia, University of Cagliari, Italy
Antonio Vincenzo Solinas, University of Cagliari, Italy
Sara Sulis, University of Cagliari, Italy

PVDF Piezoelectric Sensors on 3D Low-Melting Point Substrates: A Preliminary Study on Paper
Michela Borghetti, University of Brescia, Italy
Edoardo Cantù, University of Brescia, Italy
Emilio Sardini, University of Brescia, Italy
Mauro Serpelloni, University of Brescia, Italy

A Zero Offset Reduction Method for RTD-Based Thermal Flow Sensors
Jun Long, Beijing Institute of Control and Engineering, China
Yong Li, Beijing Institute of Control and Engineering, China
Xuhui Liu, Beijing Institute of Control and Engineering, China

The Estimation of Absolute Permeability Distribution of Magnetic Catalyst Based on TMR-EMT System
Chao Wang, Tianjin University, China
Zhengnan Li, Tianjin University, China
Qi Guo, Tianjin University, China
Jiamin Ye, Tianjin University, China
Ping Zou, Tianjin University, China

Optimization of the Structure of Electrode Array of Voltage-Driven Electrical Resistance Tomography
Chao Wang, Tianjin University, China
Ran Pang, Tianjin University, China
Qingqing Cao, Tianjin University, China
Jiamin Ye, Tianjin University, China

Resistance Measurements of Polydimethylsiloxane (PDMS) Stretch-Sensors Embedded with a Conductive Gel
Gerald Olson, Massey University, New Zealand
Clive Davies, Massey University, New Zealand
Gourab Sen Gupta, Massey University, New Zealand
Rose Davies, Massey University, New Zealand
Luke Fullard, Massey University, New Zealand

Sensors, Instrumentation & AI for Environmental Measurement (TC-18 & TC-42)
5/18/2021 9:00:00 AM - 10:30:00 AM GMT+1
Session Chair(s): Marcus Perry, University of Strathclyde, UK
Leopoldo Angrisani, Università degli Studi di Napoli Federico II

Machine Learning Based Calibration Time Reduction for Gas Sensors in Temperature Cycled Operation
Yannick Robin, Saarland University, Germany
Payman Goodarzi, Saarland University, Germany
Tobias Baur, Saarland University, Germany
Caroline Schultealbert, Saarland University, Germany
Andreas Schütze, Saarland University, Germany
Tizian Schneider, Saarland University, Germany

Model-Based vs. Data-Driven Approaches for Anomaly Detection in Structural Health Monitoring: A Case Study
Amirhossein Moallemi, Università di Bologna, Italy
Alessio Burrello, Università di Bologna, Italy
Davide Brunelli, University of Trento, Italy
Luca Benini, University of Bologna, ETH Zürich, Italy

Feedback Control System in Dredging Engineering Based on Convolutional Neural Network Prediction
Changhao Xin, Tianjin University, China
Shihong Yue, Tianjin University, China
Liu Yang, Tianjin University, China

Real-Time Wave Monitoring on Coastal Areas Using LPWAN-Based Embedded Systems
Matias Carandell, Universitat Politècnica de Catalunya, Spain
Daniel Mihai Toma, Universitat Politècnica de Catalunya, Spain
Carola Artero, Universitat Politècnica de Catalunya, Spain
Manel Gasulla, Universitat Politècnica de Catalunya, Spain
Joaquín Del Rio, Universitat Politècnica de Catalunya, Spain

12.5-m Distance Measurement in High-Interference Environment Using Ultrasonic Array Sensors
Yukiko Yoshikawa, Kobe University, Japan
Yuto Yasuda, Kobe University, Japan
Ishii Toru, Kobe University, Japan
Shintaro Izumi, Kobe University, Japan
Hiroshi Kawaguchi, Kobe University, Japan

Slow and Steady Feature Analysis Based Status Monitoring for Gas-Liquid Two-Phase Flow in Horizontal Pipe
Linghan Li, Tianjin University, China
Shumei Zhang, Tianjin University, China
Feng Dong, Tianjin University, China

Multi-Sensor Signal Statistical Feature Processing Method for Status Monitoring of Gas-Water Two-Phase Flow in Horizontal Pipe
Wentao Wu, Tianjin University, China
Shumei Zhang, Tianjin University, China
Shangjie Ren, Tianjin University, China
Feng Dong, Tianjin University, China

Machine Leaning Based Wavelength Modulation Spectroscopy for Rapid Gas Sensing
Wanlu Zhang, University of Edinburgh, United Kingdom
Rui Zhang, University of Edinburgh, United Kingdom
Yalei Fu, University of Edinburgh, United Kingdom
Godwin Enemali, University of Edinburgh, United Kingdom
Jingjing Si, Yanshan University, China

S- and Z-Parameters in Frequency and Time Domain: in Accordance with Expectations?
Michael Gadringer, Graz University of Technology, Austria

Neural Networks for the Estimation of Low-Order Statistical Moments of a Stochastic Dielectric
Simon Stenmark, Chalmers University of Technology, Sweden
Thomas Rylander, Chalmers University of Technology, Sweden
Tomas McKelvey, Chalmers University of Technology, Sweden

Opening Ceremony & Plenary Presentation (Helen Margolis)
5/18/2021 10:30:00 AM - 12:00:00 PM GMT+1
Session Chair(s): Deepak Uttamchandani, University of Strathclyde, Glasgow, Scotland
Melanie Ooi, University of Waikato, Hamilton, New Zealand

Innovations in Timing Infrastructure and Technology: Improving Resilience, Access and Performance
Helen Margolis, NPL

1: Deep Learning Approach for High Energy Efficient Real-Time Detection of Weeds in Organic Farming

Vitali Czymmek, West Coast University of Applied Sciences, Germany
Clarissa Möller, West Coast University of Applied Sciences, Germany
Leif Ole Harders, West Coast University of Applied Sciences, Germany
Stephan Hußmann, West Coast University of Applied Sciences, Germany

2: Implementation and Calibration of a Low-Cost Sensor Node for High-Resolution, Continuous and No-Manning Recording of Fruit Growth

Lorenzo Peppi, Università di Bologna, Italy
Matteo Zauli, Università di Bologna, Italy
Luigi Manfrini, Università di Bologna, Italy
Luca Corelli Grappadelli, Università di Bologna, Italy
Luca De Marchi, Università di Bologna, Italy
Pier Andrea Traverso, Università di Bologna, Italy

3: A New Processing Method to Segment Olive Trees and Detect Xylella Fastidiosa in UAVs Multispectral Images

Francesco Adamo, Polytechnic University of Bari, Italy
Filippo Attivissimo, Polytechnic University of Bari, Italy
Attilio Di Nisio, Politecnico di Bari, Italy
Mattia Alessandro Ragolia, Politecnico di Bari, Italy
Marco Scarpetta, Politecnico di Bari, Italy

4: Deep Learning Techniques for Enhancement of Weeds Growth Classification

Dmitrii Vypirailenko, Skolkovo Institute of Science and Technology, Russia
Elizaveta Kiseleva, Skolkovo Institute of Science and Technology, Russia
Dmitrii Shadrin, Skolkovo Institute of Science and Technology, Russia
Mariia Pukalchik, Skolkovo Institute of Science and Technology, Russia

5: Sparse Point Cloud Generation Based on Turntable 2D Lidar and Point Cloud Assembly in Augmented Reality Environment

Jiaqiang Zhou, Harbin Engineering University, China
He Xu, Harbin Engineering University, China
Zhen Ma, Harbin Engineering University, China
Yihan Meng, Harbin Engineering University, China
Daquan Hui, Harbin Engineering University, China

6: Design of Strain Signal Data Acquisition System for Wind Tunnel Balance Based on Zynq

Wang Liu, Harbin Institute of Technology, China
Jianxin Liu, Harbin Institute of Technology, China
Debao Wei, Harbin Institute of Technology, China
Liyan Qiao, Harbin Institute of Technology, China

7: A Method for Implementing Fractional Order Differentiator and Integrator Based on Digital Oscilloscope

Bo Xu, University of Electronic Science and Technology of China, China
Kai Chen, University of Electronic Science and Technology of China, China
Yifan Wang, University of Electronic Science and Technology of China, China
Hang Geng, University of Electronic Science and Technology of China, China

8: The AC Amplitude Measurement Characteristics of High-Resolution Digitizers Based on Calibration with Thermal Voltage Converter and Swerlein Algorithm

Jure Konjevod, University of Zagreb, Croatia
Roman Malarić, University of Zagreb, Croatia
Petar Mostarac, University of Zagreb, Croatia
Marko Jurčević, University of Zagreb, Croatia

9: Band Measurement Matrix Based Analog to Information Conversion

Jingchao Zhang, Harbin Institute of Technology, China
Liyan Qiao, Harbin Institute of Technology, China
Yuting Wang, Harbin Institute of Technology, China

10: Dual-Arm Robotic Compound-Oriented Measurement System: Integration of a Positive Pressure Solid Phase Extraction Unit

Heidi Fleischer, University of Rostock, Germany
Lea Ariana Kroos, University of Rostock, Germany
Shalaka Joshi, University of Rostock, Germany
Thomas Roddelkopf, University of Rostock, Germany
Regina Stoll, University of Rostock, Germany
Kerstin Thurow, University of Rotock, Central Scientific Research Center, Germany

11: Classroom Quality: on the Amount of Ambient Light in Today's Classroom - a Field Study

Christian Schuss, University of Oulu, Finland
Tapio Fabritius, University of Oulu, Finland

12: A Self-Powered Ambient Light Power Measurement Platform with Time-Domain Readout

Roberto La Rosa, École Polytechnique Fédérale de Lausanne, Switzerland
Mario Costanza, Femto-st, France
Patrizia Livreri, University of Palermo, Italy
Carlo Trigona, Università di Catania, Italy
Catherine Dehollain, École Polytechnique Fédérale de Lausanne, Switzerland

13: A Plant-Based Sensor for UV-A Radiation Measurements

Carlo Trigona, Università di Catania, Italy
Giuseppe Napoli, University of Catania, Italy
Stefania Pasquale, University of Catania, Italy
Ivana Puglisi, Università di Catania, Italy
Andrea Baglieri, Università di Catania, Italy
Anna Maria Gueli, Università di Catania, Italy

14: Modelling for an Electromagnetic Groundwater Flowmeter
Ben Mitchell, University of Canterbury, New Zealand
Michael Hayes, University of Canterbury, New Zealand
Bill Heffernan, University of Canterbury, New Zealand

15: A Machine-Learning Approach for the Prediction of Internal Corrosion in Pipeline Infrastructures
Giuseppe Canonaco, Politecnico di Milano, Italy
Manuel Roveri, Politecnico di Milano, Italy
Cesare Alippi, Politecnico di Milano, Italy
Fabrizio Podenzani, Eni, Italy
Antonio Bennardo, Eni, Italy
Marco Conti, Eni, Italy
Nicola Mancini, Eni, Italy

16: Robotic Installation of Wireless Strain Gauges Into Precast Concrete Elements
Tresor Tshimbombo, University of Strathclyde, United Kingdom
Marcus Perry, University of Strathclyde, United Kingdom
Chris Hoy, COWI UK Limited, United Kingdom
Efi Tzoura, Highways England, United Kingdom
Christos Vlachakis, University of Strathclyde, United Kingdom
Jack McAlorum, University of Strathclyde, United Kingdom

17: A Correction Method for Sight Axis of Non-Orthogonal Shafting Total Station After Calibration
Congcong Peng, Tianjin University, China
Bin Wu, Tianjin University, China
Gaoju Ma, Tianjin University, China
Jiehu Kang, Tianjin University, China

18: A Dual-Input Fault Diagnosis Model Based on Convolutional Neural Networks and Gated Recurrent Unit Networks for Analog Circuits
Tianyu Gao, Harbin Institute of Technology, China
Jingli Yang, Harbin Institute of Technology, China
Shouda Jiang, Harbin Institute of Technology, China
Cheng Yang, China Institute of Marine Technology and Economy, China

19: An Experimental Device for Calibration of Concentration and Velocity of Two-Phase Flow Based on Electrical Impedance Measurement System
Shihong Yue, Tianjin University, China
Jiacheng Wu, Tianjin University, China
Haitao Ma, Tianjin University, China

20: Parameter Measurement Fusion Algorithm Based on Choquet Integral
Xuezhen Liu, Tianjin University, China
Shihong Yue, Tianjin University, China
Lusheng Zhai, Tianjin University, China

21: Invisible Lighting System for Remote Surveillance

Chun-Han Chou, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

Chih-Chung Yang, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

Chen-Ju Lee, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

22: A Novel Method to Realize Continuous Input Power Control During Acoustic Droplet Ejection

Qing Guo, Tianjin University, China
Mengchuan Shao, Tianjin University, China
Xingguo Zhang, Tianjin University, China
Xiao Su, Tianjin University, China
Haixia Yu, Tianjin University, China
Dachao Li, Tianjin University, China

23: Evaluation of a Voltage Ramp Generator for Low Current Calibration

Marcus Pinto, Inmetro, Brazil
Regis Landim, Inmetro, Brazil
Rodrigo David, Inmetro, Brazil

24: Characterization of Absolute Phase Angle in Wideband Current Shunts at Inmetro

Rodrigo Rodrigues N. Zampilis, Inmetro, Brazil
Marcus Pinto, Inmetro, Brazil
Leonardo Souza, Inmetro, Brazil
Gean Geronymo, Inmetro, Brazil
Regis Landim, Inmetro, Brazil

25: Measurement of Very Fast Transient Overvoltages in Current Transformers at Open Air HV Substations

Daniel Slomovitz, UTE, Uruguay
Marcelo Brehm, UTE, Uruguay
Rogelio Sandler, UTE, Uruguay
Carlos Faverio, UTE, Uruguay
Leonardo Trigo, UTE, Uruguay
Alejandro Santos, UTE, Uruguay
Gonzalo Aristoy, UTE, Uruguay

26: Prediction of ki-67 Expression Level Based on Non-Small Cell Lung cancer

Chang Sun, Tianjin University, China
Yanqiu Wang, Tianjin University, China
Shihong Yue, Tianjin University, China
Jun Chen, Tianjin Medical University General Hospital, China
Qi Li, Tianjin University, China

27: A Microcontroller Based Charge Balanced Trapezoidal Stimulus Generator for FES System

Bijit Basumatary, Indian Institute of Technology Ropar, India
Rajat Suvra Halder, Indian Institute of Technology Ropar, India
Ashish Kumar Sahani, Indian Institute of Technology Ropar, India

28: Finite-Element Modeling of Biological Tissue Response to Focused Ultrasound with Different Intensity
Meiqi Kang, Tianjin University, China
Shengnan Zhang, Tianjin University, China
Yanbin Xu, Tianjin University, China
Changbin Li, Tianjin University, China
Feng Dong, Tianjin University, China

29: Deep Transfer Learning Strategy for Invasive Lung Adenocarcinoma Classification Appearing as Ground Glass Nodules
Chenchen Ma, Tianjin University, China
Shihong Yue, Tianjin University, China
Qi Li, Tianjin University, China

30: A Wireless Flexible Electrooculogram Monitoring System with Printed Electrodes
Shibam Debbarma, McGill University, Canada
Seyedfakhreddin Nabavi, McGill University, Canada
Sharmistha Bhadra, McGill University, Canada

31: Study of a Wireless Energy Transmission System for an Endoscopy Capsule with Dynamic Tuning
Lucas Murliky, Universidade Federal do Rio Grande do Sul, Brazil
Gustavo Oliveira, Universidade Federal do Rio Grande do Sul, Brazil
Gabriel Gosmann, Universidade Federal do Rio Grande do Sul, Brazil
Fernando Sousa, Universidade Federal de Santa Catarina, Brazil
Valner Brusamerello, Universidade Federal do Rio Grande do Sul, Brazil

32: Evaluation of Muscle Oxygen Saturation of Human by Measuring Skin Tissue on Medial Forearm
Hsin-Yi Tsai, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan
Chih-Chung Yang, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan
Cheng-Ru Li, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

33: Homogeneous Light Stimulation of Melanopsin and Cones with a Maxwellian View Device for the Human Eye
Patrick Flückiger, École Polytechnique Fédérale de Lausanne, Switzerland
Jessica Schmid, University of Applied Sciences and Arts Western Switzerland, Switzerland
Gilles Evéquoz, University of Applied Sciences and Arts Western Switzerland, Switzerland
Pierre Bressy, University of Applied Sciences and Arts Western Switzerland, Switzerland
Martial Geiser, University of Applied Sciences and Arts Western Switzerland, Switzerland

34: EOG Signal Compression Using Turning Point Algorithm
Alberto López Martínez, University of Oviedo, Spain
Francisco Javier Ferrero Martín, University of Oviedo, Spain
José Ramón Villar Flecha, University of Oviedo, Spain

35: Microwave Wearable System for Sensing Skin Hydration
Raissa Schiavoni, University of Salento, Italy
Giuseppina Monti, University of Salento, Italy
Annarita Tedesco, Universitè de Bordeaux, France
Luciano Tarricone, University of Salento, Italy
Emanuele Piuzzi, Sapienza University of Rome, Italy
Egidio De Benedetto, Università degli Studi di Napoli Federico II, Italy
Antonio Masciullo, University of Salento, Italy
Andrea Cataldo, University of Salento, Italy

36: Design of a QCM-Sensor for On-Line Monitoring Biofilm Growth
Miquel Àngel Amer, Universitat Politècnica de Catalunya / Escola Universitària Salesiana de Sarrià, Spain
Marc Navarro, Universitat Politècnica de Catalunya, Spain
Antoni Turó, Universitat Politècnica de Catalunya, Spain
Miguel García Hernandez, Universitat Politècnica de Catalunya, Spain

37: Reducing Motion Impact on Video Magnification Using Wavelet Transform and Principal Component Analysis for Heart Rate Estimation
Ahmed Alzahrani, Carleton University, Canada
Jila Hosseinkhani, Carleton University, Canada
Sreeraman Rajan, Carleton University, Canada
Eranga Ukwatta, University of Guelph, Canada

38: Development of Smart Alarm Based on Sleep Cycle Analysis
Zahrina Anwar, International Islamic University Malaysia, Malaysia
Teddy Surya Gunawan, International Islamic University Malaysia, Malaysia
Robiah Ahmad, Universiti Teknologi Malaysia, Malaysia
Mira Kartiwi, International Islamic University Malaysia, Malaysia

39: SensiTray: an Integrated Measuring Device for Monitoring Children's Mealtime Dietary Intake
Hunter Guru, Stanford University, United States
Anthony Weng, Stanford University, United States
Santosh Pitla, University of Nebraska - Lincoln, United States
Dipti Dev, University of Nebraska - Lincoln, United States

40: High Speed and High Precision Electrocardiographic and Plethysmographic Measurement Front-End
Hans Herrmann, University of Rostock, Germany
Hartmut Ewald, University of Rostock, Germany

41: RF Energy Harvester Integrated Self-Powered Wearable Respiratory Monitoring System
Dilruba Parvin, University of Missouri, United States
Omiya Hassan, University of Missouri, United States
Taeho Oh, University of Tennessee, United States
Syed Kamrul Islam, University of Missouri, United States

42: ECG Noise Removal and Efficient Arrhythmia Identification Based on Effective Signal-Piloted Processing and Machine Learning
Saeed Mian Qaisar, Effat University, Saudi Arabia
Dominique Dallet, University of Bordeaux, France

43: An Optimized Tongue Drive System for Disabled Persons
Komal Chand, University of the South Pacific, United States
Kavilash Chand, University of the South Pacific, United States
Rahul Kumar, University of the South Pacific, United States
Bibhya Sharma, University of the South Pacific, United States
Mansour Assaf, University of the South Pacific, United States
Sunil Das, University of Ottawa, Canada
Voicu Groza, University of Ottawa, Canada
Emil Petriu, University of Ottawa, Canada
Satyendra Biswas, Ahsanullah University of Science and Technology, Bandladesh

44: Reconstruction of Galvanic Skin Response Peaks via Sparse Representation
Grazia Iadarola, University of Sannio, Italy
Angelica Poli, Università Politecnica delle Marche, Italy
Susanna Spinsante, Università Politecnica delle Marche, Italy

45: Multi-Layer Convolutional Sparse Coding Framework for Restoration of Under-Sampled MR Images
Abdul Wahid, International Islamic University, Islamabad, Pakistan
Abdul Wahab Usman Ullah, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
Kushairy Kadir, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
Syed Saadain, Universiti Kuala Lumpur British Malaysian Institute, Malaysia

46: FPGA-Based 16-Bit 20 MHz Device for the Inductive Measurement of Electrical Bio-Impedance
Eiko Priidel, Tallinn University of Technology, Estonia
Ksenija Pesti, Tallinn University of Technology, Estonia
Mart Min, Tallinn University of Technology, Estonia
Jaan Ojarand, Tallinn University of Technology, Estonia
Olev Martens, Tallinn University of Technology, Estonia

47: Fusing Pressure-Sensitive Mat Data with Video Through Multi-Modal Registration
Daniel George Kyrollos, Carleton University, Canada
Randa Hassan, Carleton University, Canada
Yasmina Souley Dosso, Carleton University, Canada
James Robert Green, Carleton University, Canada

Virtual Demonstration: Using a Heat Flux Sensor for Heart Rate Measurement
Antti Immonen, LUT University, Finland
Andrey V. Mityakov, LUT University, Finland
Mikko Kuisma, LUT University, Finland

Virtual Demonstration: 2D Material-Based Conformal Electrode Array for Real Time Tactile Sensing
Liming Chen, University of Manchester, United Kingdom
Ziqi Chen, University of Manchester, United Kingdom
Jorge Ricardo Salas Avila, University of Manchester, United Kingdom
Wuliang Yin, University of Manchester, United Kingdom

Virtual Demonstration: TILE³, Compensating IMU Biases Through Redundant Configuration of Consumer-Grade MEMS Sensors
Giorgio de Alteriis, Università degli Studi di Napoli Federico II, University of Bergamo, Italy
Claudia Conte, Università degli Studi di Napoli Federico II, University of Bergamo, Italy
Domenico Accardo, Università degli Studi di Napoli Federico II, Italy

Virtual Demonstration: A Lite Emulator of Grid Operations
Carlo Guarnieri Calò Carducci, RWTH Aachen University, Germany
Alberto Dognini, RWTH Aachen University, Germany
Maliheh Haghgoo, RWTH Aachen University, Germany
Ferdinanda Ponci, RWTH Aachen University, Germany
Antonello Monti, RWTH Aachen University, Germany

Robots on Mars: the Early Explorations of the Perseverance Rover
5/18/2021 2:30:00 PM - 3:00:00 PM GMT+1

Special Guest Speaker: Sanjeev Gupta

Professor Sanjeev Gupta is an earth and planetary scientist whose expertise is on understanding ancient environmental changes on the Earth's surface and on Mars. He is a Long-Term Planner on the NASA Mars 2020 Perseverance rover mission which landed on Mars, February 2021. He also works on the Curiosity rover mission and the forthcoming ESA ExoMars mission due to launch in 2022.

Detection of Double-Layer Air Gap Defects Based on Terahertz Imaging Method
Huaiyuan Jiang, Tsinghua Shenzhen International Graduate School, China
Hongwei Mei, Tsinghua Shenzhen International Graduate School, China
Xingming Bian, North China Electric Power University, China
Lanxin Li, Tsinghua Shenzhen International Graduate School, China

Wavelength Scanning Interferometry for Topography of Microchannels at Roll-to-Roll Line with Optical Coherence Tomography
Janne Lauri, University of Oulu, Finland
Christina Liedert, VTT Technical Research Centre of Finland Ltd., Finland
Tapio Fabritius, University of Oulu, Finland

Microwave Quantification of Porosity Level in 3D Printed Polymers
Anna Case, Iowa State University, United States
Aaron McCarville, Iowa State University, United States
Mohammad Tayeb Al Qaseer, Iowa State University, United States
Reza Zoughi, Iowa State University, United States

Sound Velocity Measurement in Acoustic Leak Noise Correlation Systems
George Othon Glentis, University of Peloponnese, Greece
Konstantinos Angelopoulos, University of Peloponnese, Greece

Internal and External Defects Discrimination of Pipelines Using Composite Magnetic Flux Leakage Detection
Yue Long, Tsinghua University, China
Songling Huang, Tsinghua University, China
Lisha Peng, Tsinghua University, China
Wenzhi Wang, Tsinghua University, China
Shen Wang, Tsinghua University, China
Wei Zhao, Tsinghua University, China

[INVITED] Field Validation of a Detectable, Magnetic, Cementitious Grout for Rock Fracture Grouting
Lindsey Corson, University of Strathclyde, United Kingdom
Rebecca Lunn, University of Strathclyde, United Kingdom
Grainne El Mountassir, University of Strathclyde, United Kingdom
Alasdair E. Henderson, Royal BAM Group nv, United Kingdom
Kenneth Henderson, BAM Ritchies, United Kingdom
Christopher Reid, BAM Ritchies, United Kingdom

Corrugated Compliant Capacitor Towards Smart Bandage Application
Han Liu, Iowa State University, United States
Simon Laflamme, Iowa State University, United States
Eric Zellner, Iowa State University, United States
Sarah Bentil, Iowa State University, United States
Iris Rivero, Rochester Institute of Technology, United States

A Low-Cost Electrical Impedance Analyser for Interrogating Self-Sensing Cement Repairs
Jack McAlorum, University of Strathclyde, United Kingdom
Christos Vlachakis, University of Strathclyde, United Kingdom
Marcus Perry, University of Strathclyde, United Kingdom

Self-Sensing Concrete Repairs Based on Alkali-Activated Materials: Recent Progress
Marcus Perry, University of Strathclyde, United Kingdom
Lorena Biondi, University of Strathclyde, United Kingdom
Jack McAlorum, University of Strathclyde, United Kingdom
Christos Vlachakis, University of Strathclyde, United Kingdom

Ultrasonic Thickness Measurement Using the Martlet Wireless Sensing System
Yu Otsuki, Georgia Institute of Technology, United States
Peter Lander, Georgia Institute of Technology, United States
Yang Wang, Georgia Institute of Technology, United States

Renewable Energy Systems, Oil & Gas Industry
5/18/2021 3:00:00 PM - 4:30:00 PM GMT+1
Session Chair(s): Gordon Dobie, University of Strathclyde
Eike Grundkötter, Ruhr-Universität Bochum

Adaptive Power Management of Energy Autonomous Structural Health Monitoring Systems for Wind Turbines
Eike Grundkötter, Ruhr-University Bochum, Germany
Joachim Melbert, Ruhr-University Bochum, Germany

Degradation Prediction and Uncertainty Quantification for PEMFC Using NSGA-Optimized Deep Learning Method
Yucen Xie, University of Electronic Science and Technology of China, China
Jianxiao Zou, University of Electronic Science and Technology of China, China
Chao Peng, University of Electronic Science and Technology of China, China
Yun Zhu, University of Electronic Science and Technology of China, China

Flow Regimes Identification of Gas-Water Two-Phase Flow Using Conductance and Continuous Wave Ultrasonic Doppler Sensors
Shuo Zhang, Tianjin University, China
Xuewei Shi, Tianjin University, China
Chao Tan, Tianjin University, China
Feng Dong, Tianjin University, China

Research on Numerical Simulation of Stratified Gas-Liquid Flow Through Crescent Orifice Plate
Zhuo-Lan Xue, Tianjin University, China
Ying Xu, Tianjin University, China
Tao Zhang, Tianjin University, China
Jing-Li Zhang, Tianda Taihe Automatic Control Instrument Technology Co., Ltd, China
Zeng-Hui Chen, Tianda Taihe Automatic Control Instrument Technology Co., Ltd, China

A Three-Phase Flow Visualization Method Using Wire-Mesh Sensor Based on Continuous Phase Conductance Compensation
Lusheng Zhai, Tianjin University, China
Yuqing Wang, Tianjin University, China
Jie Yang, Tianjin University, China
Ningde Jin, Tianjin University, China

Signal Processing 2
5/18/2021 3:00:00 PM - 4:30:00 PM GMT+1
Session Chair(s): Antonio Moschitta, University of Perugia
Luca DeVito, University of Sannio

Adaptive Fourier Analysis in the Case of Data Loss
András Palkó, Budapest University of Technology and Economics, Hungary
László Sujbert, Budapest University of Technology and Economics, Hungary

Utilizing the Nonlinearity of GMI Sensors for Time-Proportional Magnetic Field Measurements
Marvin Sandner, Ostfalia University of Applied Sciences, Germany
Phil Meier, Ostfalia University of Applied Sciences, Germany
Kris Rohrmann, Ostfalia University of Applied Sciences, Germany
Marcus Prochaska, Ostfalia University of Applied Sciences, Germany

In-Situ Electrochemical Impedance Spectroscopy of Battery Cells by Means of Binary Sequences
Alessio De Angelis, University of Perugia, Italy
Roberta Ramilli, Università di Bologna, Italy
Marco Crescentini, Università di Bologna, Italy
Antonio Moschitta, University of Perugia, Italy
Paolo Carbone, University of Perugia, Italy
Pier Andrea, University of Perugia, Italy

Unbiased Sine-Wave Frequency Estimation by Parabolic Interpolation of DTFT Samples
Daniel Belega, University Politehnica Timisoara, Romania
Dario Petri, University of Trento, Italy

Windowing Compensation in Fourier Based Surrogate Analysis
Manouane Caza-Szoka, Universite du Quebec a Trois-Rivieres, Canada
Daniel Massicotte, Universite du Quebec a Trois-Rivieres, Canada

Impedance Characterization of a QCM-Based Measurement System in Liquid Media
Ada Fort, University of Siena, Italy
Enza Panzardi, University of Siena, Italy
Pietro Vaccarella, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy
Marco Mugnaini, University of Siena, Italy
Anna Lo Grasso, University of Siena, Italy

Determination of Fat, SNF and Protein Content in Cow Milk from the Voltage Output of 'MilkTester'
Suman Biswas, Indian Institute of Technology Kharagpur, India
Ajoy Mandal, National Dairy Research Institute, Kalyani, India
Moupali Chakraborty, Indian Institute of Technology Kharagpur, India
Karabi Biswas, Indian Institute of Technology Kharagpur, India

Investigation of Bacterial Cellulose-Based Fractional Order Element Behaviour
Riccardo Caponetto, Università di Catania, Italy
Giovanna Di Pasquale, Università di Catania, Italy
Salvatore Graziani, Università di Catania, Italy
Emanuele Murgano, Università di Catania, Italy
Antonino Pollicino, Università di Catania, Italy
Carlo Trigona, Università di Catania, Italy

Conditioning of Bacterial Cellulose-Based Motion Sensors
Giovanna Di Pasquale, Università di Catania, Italy
Salvatore Graziani, Università di Catania, Italy
Santhosh Kurukunda, Università di Catania, Italy
Antonino Pollicino, Università di Catania, Italy
Carlo Trigona, Università di Catania, Italy

Investigation of a 100 μm Magnetic Wire for Temperature Sensing Based on a Time Domain Readout
Gianluca Caposciutti, University of Pisa, Italy
Mirko Marracci, University of Pisa, Italy
Carlo Trigona, Università di Catania, Italy
Salvatore Baglio, Università di Catania, Italy
Bernardo Tellini, University of Pisa, Italy

1: Remote Fiber-Based Velocimeter for Interface-Strength Measurements
James Smith, Idaho National Laboratory, United States
Bradley Benefiel, Idaho National Laboratory, United States
Clark Scott, Subsurface Energy & Water Systems, United States

2: MRPM: Multistep Robust Prediction Machine for Degradation Time Series Projection
Wenjuan Mei, University of Electronic and Technology of China, China
Zhen Liu, University of Electronic and Technology of China, China
Yuanzhang Su, University of Electronic Science and Technology of China, China

3: Testing Path Searching for Digital Microfluidic Biochips Based on the Improved Particle Swarm Optimization
Wenbin Zheng, Harbin Institute of Technology, China
Jinlong Shi, Harbin Institute of Technology, China
Jiaqing Qiao, Harbin Institute of Technology, China
Ping Fu, Harbin Institute of Technology, China
Hongyuan Jiang, Harbin Institute of Technology, China

4: Absolute Wavenumber Determination for Distributed Feedback Laser from Absorption Spectral Profiles
Yudong Guo, Beihang University, China
Lijun Xu, Beihang University, China
Fanghao Lu, Beihang University, China
Zhang Cao, Beihang University, China

5: Multiphase Flowrate Measurement with Time Series Sensing Data and Sequential Model
Haokun Wang, University of Edinburgh, United Kingdom
Delin Hu, Institute for Digital Communications, University of Edinburgh, United Kingdom
Yunjie Yang, Institute for Digital Communications, University of Edinburgh, United Kingdom
Maomao Zhang, Tsinghua Shenzhen International Graduate School / Shenzhen LeEngStar Co.,Ltd, China

6: Optical Power Supply of a Wireless Temperature Sensor for Rotating Machines Monitoring Purpose
Racha Benarrait, CNRS, FRE 2012 Roberval, Sorbonne Universités, Université de Technologie de Compiègne, France
Frederic Lamarque, CNRS, FRE 2012 Roberval, Sorbonne Universités, Université de Technologie de Compiègne, France
Jeremy Terrien, Sorbonne Universités, Université de Technologie de Compiègne, France

7: Causes of Error for Turbine Radial Palette Measurement
Alessandro Pesatori, Politecnico di Milano, Italy
Michele Norgia, Politecnico di Milano, Italy

8: A Weak Current to Voltage Conversion Circuit Based on Resonant Amplifiers and Crystal Filters

Yifan Wang, University of Electronic Science and Technology of China, China
Kai Chen, University of Electronic Science and Technology of China, China
Xuan Gou, University of Electronic Science and Technology of China, China
Rongdie Chen, University of Electronic Science and Technology of China, China

9: A Versatile Direct-Digital Interface for Resistive Sensors Using Sigma-Delta Approach

Tapabrata Sen, Indian Institute of Technology Kharagpur, India
Anoop Chandrika Sreekantan, Indian Institute of Space Science and Technology, India
Siddhartha Sen, Indian Institute of Technology Kharagpur, India

10: Data Collection and Cloud Processing Architecture Applied to NILM Techniques for Independent Living

Rubén Nieto, University of Alcalá, Spain
Laura de Diego Otón, University of Alcalá, Spain
Álvaro Hernández, University of Alcalá, Spain
Jesús Ureña, University of Alcalá, Spain

11: A Simple Digitization Scheme for Resistive Sensors and its Adaptation for Remote Measurements

Elangovan K, Indian Institute of Space Science and Technology, India
Anoop Chandrika Sreekantan, Indian Institute of Space Science and Technology, India

12: Simulation Method for Ultrasonic Attenuation in Droplet Flow

Dandan Zheng, Tianjin University, China
Mi Wang, Tianjin University, China
Jun Dong, Tianjin University, China
Ying Xu, Tianjin University, China

13: A Modular Sampling Standard for Quantum Traceable Power Measurements: Comparison and Perspectives

Bruno Trinchera, INRiM, Italy
Danilo Serazio, INRiM, Italy

14: EIT Image Reconstruction Method Based on DnCNN

Qi Wang, Tianjin Polytechnic University, China
Hanyu Zhang, Tianjin Polytechnic University, China
Ronghua Zhang, Tianjin Polytechnic University, China
Xiuyan Li, Tianjin Polytechnic University, China
Jianming Wang, Tianjin Polytechnic University, China

15: Electromagnetic Imaging of Metal Defects Based on Bayesian Statistical Model

Qi Wang, Tianjin Polytechnic University, China
Kexin Liu, Tianjin Polytechnic University, China
Ronghua Zhang, Tianjin Polytechnic University, China
Xiuyan Li, Tianjin Polytechnic University, China
Xiaojie Duan, Tianjin Polytechnic University, China

16: High Precision Identification Method of Fan Main Shaft Defects Based on Rotating Magnetic Field Detection

Lisha Peng, Tsinghua University, China
Songling Huang, Tsinghua University, China
Shen Wang, Tsinghua University, China
Wei Zhao, Tsinghua University, China

17: B-Mode Ultrasound Images Guided Electrical Impedance Tomography Image Reconstruction via Cross Gradient

Yu Wang, Tianjin University, China
Shangjie Ren, Tianjin University, China
Feng Dong, Tianjin University, China

18: A Quality-Hierarchical Temperature Imaging Network for TDLAS Tomography

Jingjing Si, Yanshan University, China
Gengchen Fu, Yanshan University, China
Rui Zhang, University of Edinburgh, United Kingdom
Chang Liu, University of Edinburgh, United Kingdom

19: Overload Current Interruption Protection Method Based on Tunnel Magnetoresistive Sensor Measurement

Changxin Chen, Taiyuan University of Technology, North University of China, China
Wenchao Guo, North University of China, China
Chenbin Wang, North University of China, China
Yifeng Ren, North University of China, China
Tiehua Ma, North University of China, China

20: Wireless Stress Measurement on Metal Surface Based on Passive Integrated RFID Sensor Tag

Ximeng Cheng, University of Electronic Science and Technology of China, China
Yating Yu, University of Electronic Science and Technology of China, China
Lei Wang, University of Electronic Science and Technology of China, China
Cheng Sun, University of Electronic Science and Technology of China, China

21: An Improved MFL Method Fusing Multi-Space Magnetic Field Information for the Surface Defect Inspecting

Wenzhi Wang, Tsinghua University, China
Songling Huang, Tsinghua University, China
Lisha Peng, Tsinghua University, China
Yue Long, Tsinghua University, China
Shen Wang, Tsinghua University, China
Wei Zhao, Tsinghua University, China

22: Analysis of TDR Signals with Convolutional Neural Networks

Marco Scarpetta, Politecnico di Bari, Italy
Maurizio Spadavecchia, Politecnico di Bari, Italy
Gregorio Andria, Politecnico di Bari, Italy
Mattia Alessandro Ragolia, Politecnico di Bari, Italy
Nicola Giaquinto, Politecnico di Bari, Italy

23: Chipless RFID Tags as Microwave Sensors for Delamination Detection in Layered Structures
Katelyn Brinker, Iowa State University, United States
Reza Zoughi, Iowa State University, United States

24: Generative Data Augmentation for Learning-Based Electrical Impedance Tomography via Variational Autoencoder
Yangen Zhan, Tianjin University, China
Ru Guan, Tianjin University, China
Shangjie Ren, Tianjin University, China
Feng Dong, Tianjin University, China

25: Supershape Augmented Reconstruction Method for Electrical Impedance Tomography
Danping Gu, University of Science and Technology of China, China
Dong Liu, University of Science and Technology of China, China
Jiansong Deng, University of Science and Technology of China, China
Jiangfeng Du, University of Science and Technology of China, China

26: Bistatic Microwave Sensor for In-Situ Composite Inspection and Structural Health Monitoring
Katelyn Brinker, Iowa State University, United States
Anna Case, Iowa State University, United States
Mohammad Tayeb Al Qaseer, Iowa State University, United States

27: An Excitation Method for Fault Diagnosis of DC-AC Converter Based on Simulation
Yun Yang, Harbin Institute of Technology, China
Cen Chen, Harbin Institute of Technology, China
Xuerong Ye, Harbin Institute of Technology, China
Chengzhi Sun, Harbin Institute of Technology, China

1: Early Fault Diagnosis and Classification of Ball Bearing Using Enhanced Kurtogram and Gaussian Mixture Model

Youngsun Hong, Korea Institute of Industrial Technology, Korea
Minsu Kim, Hyundai Motor Company, Korea
Hyunho Lee, Samsung Heavy Industries, Korea
Jong Jin Park, Samsung Heavy Industries, Korea
Dongyeon Lee, Samsung Heavy Industries, Korea

Abstract: Ball bearing failure is one of the major obstacles to the effective operation of large mechanical systems. During maintenance, the initial diagnosis of a fault within the bearing is key to reducing repair costs and improving the efficiency of the system. However, such faults are difficult to accurately diagnose due to noise and the unusual and unpredictable phenomena that they cause in the peaks of the measured signal. In this paper, we present an effective analytical technique for the early diagnosis of ball bearing faults based on vibration data derived from the bearings. We apply a feature extraction technique based on spectral kurtosis (SK) and then filter the results using statistical approaches. The actual defects in the bearings are evaluated in terms of a Gaussian mixture model; principal component analysis is then used to reduce the misclassifications caused by noise and weak fault symptoms. We verified the proposed algorithm experimentally and compared the results of our diagnostic technique to those obtained using the root mean square (rms) of the vibration data to evaluate the performance of the SK-based technique.

2: FBG-Based Sensor Applied to Flow Rate Measurements

Alexandre Silva Allil, Federal University of Rio de Janeiro, Brazil
Fabio Da Silva Dutra, Petrobras, Brazil
Alex Dante, Federal University of Rio de Janeiro, Brazil
Cesar C. Carvalho, Federal University of Rio de Janeiro, Brazil
Regina Célia Da Silva Barros Allil, Federal University of Rio de Janeiro, Brazil
Marcelo Martins Werneck, Federal University of Rio de Janeiro, Brazil

Abstract: A flare system in oil platform is a combustion stack used to burn off excess gases that cannot be processed and gases that have to be eliminated in emergency shutdown to avoid the risk of explosion. Gas flow measurement in flares is still considered challenging because the measurement has to attend many specific demands, quite different from any other flow measurement application. For these types of measurements many sensor technologies are available, however they are all very expensive, and only a few ones can attend all demands. The objective of this paper is to present a flow rate sensor based on Fiber Bragg Grating (FBG), cross-correlation and heatwave travel time techniques. The system was developed with inexpensive components and is little-intrusive, capable of attaining the rangeability of the flare demand and independent of gas composition, pressure and temperature. DOI: 10.1109/TIM.2020.3014751

3: Error Corrections for Ultrawideband Ranging

Juri Sidorenko, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung IOSB, Germany
Volker Schatz, Fraunhofer IOSB, Germany
Norbert Scherer-Negenborn, Fraunhofer IOSB, Germany
Michael Arens, Fraunhofer IOSB, Germany
Urs Hugentobler, TUM, Germany

Abstract: Precise indoor localization is a major challenge in the field of localization. In this article, we investigate multiple error corrections for the ultrawideband (UWB) technology, in particular the DecaWave DW1000 transceiver. Both the time-of-arrival (TOA) and the time-difference-of-arrival (TDOA) methods are considered. Various clock-drift correction methods for TOA from the literature are reviewed and compared experimentally. The best performing method is extended to TDOA, corrections for the signal power dependence and the hardware delay are added, and two additional enhancements suggested. These are compared with each other and TOA in positioning experiments.

4: A Novel Method for Removing Baseline Drifts in Multivariate Chemical Sensor

Abhishek Grover, Indian Institute of Technology Delhi, India
Brejesh Lall, Indian Institute of Technology Delhi, India

Abstract: This article proposes a sensor signal processing method for removing baseline drifts in multimodal chemical sensors. The response of a sensor is modeled as an autoregressive (AR) process associated with an observation zero-mean Gaussian noise. The parameters of the state-space model are learned using the calibration data. The variance of the Gaussian noise is estimated using an adaptive online method. The AR process equation and the observation equation are used to construct the adaptive Kalman filter. Each sensor response is passed through a separate Kalman filter, and then, a regression technique is used to predict the sensor response.

5: Accelerometer Fault-Tolerant Model-Aided State Estimation for High-Altitude Long-Endurance UAV

Wonkeun Youn, Korean Aerospace Research Institute, Korea
Hyoungsik Choi, Korean Aerospace Research Institute, Korea
Am Cho, Korean Aerospace Research Institute, Korea
Sungyug Kim, Korean Aerospace Research Institute, Korea
Matthew Rhudy, Penn State Berks, United States

Abstract: This article proposes a novel fault-tolerant dynamic model-aided navigation filter to cope with accelerometer faults. An algorithm to estimate the three-axis accelerations of a high-altitude long-endurance (HALE) unmanned aerial vehicle (UAV) utilizing control input signals and aerodynamic coefficient parameters is newly proposed. To address the fault of the accelerometer, two model-aided navigation filters that utilize the measured acceleration, denoted as Acc-measure algorithm, and estimated acceleration, denoted as Acc-free algorithm, respectively, are effectively combined under the interacting multiple model (IMM) framework to integrate the optimality of Acc-measure algorithm and robustness of Acc-free algorithm. Flight test results demonstrated that the proposed algorithm yields robust attitude and wind estimation results in the presence of different types of accelerometer faults compared with Acc-measure and Acc-free algorithms while accurately detecting the fault of the accelerometer.

6: Aging Monitoring Method for Lithium-Ion Batteries Using Harmonic Analysis

Seon Hyeog Kim, Yonsei University, Korea
Hyeong Min Lee, Yonsei University, Korea
Yong-June Shin, Yonsei University, Korea

Abstract: Monitoring the aging battery cells is important to maintain battery performance. In this article, a harmonic analysis method for monitoring aging battery is proposed. The proposed diagnostic technique applies the designed 1-kHz sinusoidal signal, comprising a sinusoidal current component and a direct current component, to the battery. Harmonics are generated when signals passing through nonlinear systems are distorted. A battery is an asymmetric nonlinear system with different bidirectionality. The proposed in situ technique can be applied during charge/discharge cycles, even in the case of an apparent reduction of even harmonics. DOI: 10.1109/TIM.2020.3043097

7: Performance of EGNSS-Based Timing in Various Threat Conditions

Salomon Honkala, Finland, Finland
Sarang Thombre, Finnish Geospatial Research Institute FGI, Finland
Martti Kirkko-Jaakkola, National Land Survey, Finnish Geospatial Research Institute FGI, Finland
Hein Zelle, Netherlands Aerospace Center NLR, Netherlands

Abstract: We studied the performance of a GNSS timing receiver under different operating conditions, and tested techniques to improve robustness under interference and navigation message errors. We found that interference or meaconing-type spoofing can threaten GNSS timing but is detected by automatic gain control and carrier-to-noise ratio based methods. GNSS interruptions due to interference is bridged by a local oscillator holdover technique using a Kalman filter. Navigation message errors are mitigated by EGNOS, and constellation-wide timing errors are detected by dual-constellation (GPS-Galileo) cross-check. Dual-frequency operation mitigates first-order ionospheric effects and is robust to interference by allowing fall back to single frequency.

8: Visual Sensor Placement Based on Risk Maps

Altahir Altahir, Universiti Teknologi PETRONAS, Malaysia
Vijanth Asirvadam, Universiti Teknologi PETRONAS, Malaysia
Nor Hisham Hamid, Universiti Teknologi PETRONAS, Malaysia
Patrick Sebastian, Universiti Teknologi PETRONAS, Malaysia
Mohamed Abul Hass Ameen, University of Alabama, United States
Nordin Saad, Universiti Teknologi PETRONAS, Malaysia
Rosdiazli Ibrahim, Universiti Teknologi PETRONAS, Malaysia
Sarat C.Dass, Universiti Teknologi PETRONAS, Malaysia

Abstract: The research work on camera placement has focused on maximizing the coverage or minimizing the installation cost of video surveillance systems. Typical placement schemes mount surveillance cameras with no emphasis on the coverage demand divergences, which impacts the system's cost and efficiency. This paper addresses the camera placement problem based on an inverse modeling taxonomy. Thus, rather than performing the optimization on uniformly distributed grids,this paper introduces an underlying mechanism to elaborate the security sensitive zones prior to the coverage optimization. The outcome of the prioritization process is termed as Risk Maps.Obtained empirical results show the reliability of the placement using inverse modeling. Finally, the validation of the proposed placement scheme is carried out in a constraint environment. Digital Object Identifier 10.1109/TIM.2019.2927650

9: Automated Visual Defect Detection for Flat Steel Surface: a Survey

Qiwu Luo, Central South University, China
Xiaoxin Fang, Hefei University of Technology, China
Li Liu, University of Oulu, Finland
Chunhua Yang, Central South University, China
Yichuang Sun, University of Hertfordshire, United Kingdom

Abstract: Automated computer-vision-based defect detection has received much attention with the increasing surface quality assurance demands for the industrial manufacturing of flat steels. This article attempts to present a comprehensive survey on surface defect detection technologies by reviewing about 120 publications over the last two decades for three typical flat steel products of con-casting slabs and hot- and cold-rolled steel strips. According to the nature of algorithms as well as image features, the existing methodologies are categorized into four groups: statistical, spectral, model-based, and machine learning. These works are summarized in this review to enable easy referral to suitable methods for diverse application scenarios in steel mills. Realization recommendations and future research trends are also addressed at an abstract level. DOI: 10.1109/TIM.2019.2963555

10: Automated Visual Defect Classification for Flat Steel Surface: a Survey

Qiwu Luo, Central South University, China
Xiaoxin Fang, Hefei University of Technology, China
Jiaojiao Su, Central South University, China
Jian Zhou, Central South University, China
Bingxing Zhou, Central South University, China
Chunhua Yang, Central South University, China
Yichuang Sun, Central South University, China

Abstract: For a typical surface automated visual inspection (AVI) instrument of planar materials, defect classification is an indispensable part after defect detection, which acts as a crucial precondition for achieving the online quality inspection of end products. This article attempts to present a focused but systematic review of the traditional and emerging automated computer-vision-based defect classification methods by investigating approximately 140 studies on three specific flat steel products of con-casting slabs, hot-rolled steel strips, and cold-rolled steel strips. According to the natural image processing procedure of defect recognition, the diverse approaches are grouped into five successive parts: image acquisition, image preprocessing, feature extraction, feature selection, and defect classifier. Recent literature has been reviewed from an industrial goal-oriented perspective to provide some guidelines for future studies and recommend suitable methods for boosting the surface quality inspection level of AVI instruments. DOI: 10.1109/TIM.2020.3030167

11: Harmonic Amplitude Dispersion: When Production Intrinsic Prior Meets Oxygen Concentration Detection of Pharmaceutical Glass Vials

Zihuai Liu, Central South University, China
Yonggang Li, Central South University, China
Qiwu Luo, Central South University, China
Chunhua Yang, Central South University, China
Weihua Gui, Central South University, China

Abstract: In situ and accurate oxygen concentration detection is drawing great attention in the pharmaceutical manufacturing industry. This paper proposes a novel concept of harmonic amplitude dispersion (HAD) under the framework of wavelength-modulation-based tunable diode laser absorption spectroscopy (TDLAS/WMS). Then, a reliable production intrinsic prior of the long-term information entropy distribution pattern is learned from the demodulated 2nd harmonic signals. Interestingly, the performance in oxygen concentration detection can be improved in two rounds by the HAD concept. At last, the proposed HAD robustly narrowed the average variance in the signal peak-to-peak values by nearly 30%, and together with the HAD-guided OS-ELM, an average detection accuracy of 98.1% within an acceptable time cost of 300 ms/vial was realized during a long-term test. (10.1109/TIM.2020.3007294)

12: Headspace Oxygen Concentration Measurement for Pharmaceutical Glass Bottles in Open-Path Optical Environment Using TDLAS/WMS

Qiwu Luo, Central South University, China
Cao Song, Central South University, China
Chunhua Yang, Central South University, China
Weihua Gui, Central South University, China
Yichuang Sun, University of Hertfordshire, United Kingdom
Zoe Jeffrey, University of Hertfordshire, United Kingdom

Abstract: Accurate measurement of oxygen concentration for pharmaceutical glass bottles is of great significance to ensure the asepsis of medicine and stability of ingredients. With merits of high sensitivity, low cost, non-contact, and real time response, the wavelength-modulation-based tunable diode laser absorption spectroscopy (TDLAS/WMS) technology shows great potential to achieve in-site oxygen concentration detection by the single-line spectrum measurement. This paper focuses on headspace oxygen concentration measurement in open-path optical environment, which is extremely challenging owing to the short light path length and random ambient noises. This paper also designed a TDLAS/WMS prototype, the experimental results aiming at glass bottles with different oxygen concentration of 0%, 5%, 10% and 21% in open path optical environment indicate our method has achieved an encouraging average absolute error of 0.54%, and can survive well when the normalized SNR is within 0.85 to 1. These results promise that the proposed methodology can be widely applied in in-site AOI instrumentation of headspace oxygen concentration measurement for glass vials. (10.1109/TIM.2019.2958582)

13: Characteristics of Arbitrary Ramp Generator: a Tuning Voltage Setup for the FMCW Reflectometer

Gibin George, Birla Institute of Technology and Science, Pilani, India
Bittu N, Birla Institute of Technology and Science, Pilani, India
Janmejay Buch, Institute for Plasma Research, India
A. Amalin Prince, Birla Institute of Technology and Science, Pilani, India

Abstract: Ultra-wideband Voltage Controlled Oscillator (VCO), used as a frequency source for reflectometer, has a non-linear frequency response to the linear tuning voltages. A remotely configurable, custom instrument is presented, generating a non-linear voltage ramp of 0 to 20V with ultrafast sweep durations of â‰¥5Âµs. The instrument's voltage ramps are used to drive VCO to give a linear frequency response. The proposed design is developed using hardware-software co-design techniques and implemented on a system-on-chip (SoC) platform. The instrument can configure every voltage ramp's parameters to match the reflectometer application requirements.

14: Multi-Bs Spatial Spectrum Fusion for 2D DOA Estimation and Localization by Using UCA in Massive MIMO System

Di He, Shanghai Jiao Tong University, China
Xin Chen, Shanghai Jiao Tong University, China
Ling Pei, Shanghai Jiao Tong University, China
Fusheng Zhu, GuangDong Communications & Networks Institute, China
Lingge Jiang, Shanghai Jiao Tong University, China

Abstract: In the indoor environment, where global positioning system (GPS) fails, the presence of multipath, non-line-of-sight (NLOS), and dense scatterer yield unreliable position estimation. In this study, a novel spatial spectrum fusion estimation and localization (SSFEAL) algorithm using the uniform circular array (UCA) structure is proposed, which is based on the two-dimensional (2D) direction of arrival (DOA) estimation. The spatial spectrum of the incoherent narrowband uplink pilot signal on each frequency bin received at the distributed massive MIMO base stations is used for spectrum fusion. It is demonstrated that the proposed method using UCA gives higher-resolution estimation performance compared with the rectangular array in the localization accuracy. Comprehensive Monte Carlo simulation and real application test results show the validity and sub-meter precision in the indoor environment. (DOI: 10.1109/TIM.2020.3029363)

15: Feasibility Study of Permanent Magnet-Based Tumor Tracking Technique for Precise Lung Cancer Radiotherapy

Houde Dai, Quanzhou Institute of Equipment Manufacturing, Haixi Institutes, Chinese Academy of Sciences, China
Lifei Dong, Quanzhou Institute of Equipment Manufacturing, Haixi Institutes, Chinese Academy of Sciences, China
Bowen Lv, Quanzhou Institute of Equipment Manufacturing, Haixi Institutes, Chinese Academy of Sciences, China

Abstract: During lung cancer radiotherapy, tumor motion caused by respiration and heartbeat significantly affect the radiotherapy efficacy. The real-time and high-precision tracking of the lung tumor during the radiotherapy process remains a big challenge, as the traditional tracking methods have disadvantages such as slow tracking speed, radiation issue, or tracking and radiotherapy cannot be carried out at the same time. In this study, a magnetic tracking technique based on three permanent magnets was employed to localize the tumor in real-time.

16: Temperature and Nonlinearity Compensation of Pressure Sensor with Common Sensors Response

Jacek Pieniazek, Rzeszow University of Technology, Poland
Piotr Ciecinski, Rzeszow University of Technology, Poland

Abstract: Temperature sensitivity compensation of pressure sensor considering its nonlinearity is crucial to obtain a highly accurate measurement. Unfortunately, various software methods are known to have some drawbacks, thus a large number of calibration points is necessary to model the sensor response properly. This paper aims to present a new compensation method that features the utilization of common response of the given type of sensors and the reduction of particular sensor calibration data set, which subsequently reduces the duration of necessary experiments. Mathematical formulas, which are the basis of a solution, are derived from the sensor general model. Two cases have been considered and analyzed theoretically. The method is experimentally verified using two sets of sensors. There is a tenfold increase in accuracy after compensation. Furthermore, the comparison of various cases confirms the validity of sensors similarity assumption and correctness of a theoretical analysis presented in this paper.
https://doi.org/10.1109/TIM.2019.2910922

17: Wind Turbine Gearbox Failure Detection Based on SCADA Data: a Deep Learning-Based Approach

Luoxiao Yang, City University of Hong Kong, Hong Kong
Zijun Zhang, City University of Hong Kong, Hong Kong

Abstract: In this paper, we propose a deep joint variational autoencoder (JVAE) based monitoring method using wind farm supervisory control and data acquisition (SCADA) data to more effectively detect wind turbine gearbox failures. The JVAE utilizes two types of pre-defined parameters, behavior parameters (BPs) and conditional parameters (CPs), to produce reconstruction errors (REs) of the BP, which reflects the gearbox abnormality. DOI: 10.1109/TIM.2020.3045800

18: Deep Feature Clustering for Seeking Patterns in Daily Harmonic Variations

Chenjie Ge, Chalmers University of Technology, Sweden
Roger de Oliveira, Luleå University of Technology, Sweden
Irene Gu, Chalmers University of Technology, Sweden
Math Bollen, Luleå University of Technology, Sweden

Abstract: This article proposes a novel scheme for analyzing power system measurement data. The main question that we seek answers in this study is on a whether one can find some important patterns that are hidden in the large data of power system measurements such as variational data. The proposed scheme uses an unsupervised deep feature learning approach by first employing a deep autoencoder (DAE) followed by feature clustering. An analysis is performed by examining the patterns of clusters and reconstructing the representative data sequence for the clustering centers. The scheme is illustrated by applying it to the daily variations of harmonic voltage distortion in a low-voltage network. The main contributions of the article include: 1) providing a new unsupervised deep feature learning approach for seeking possible underlying patterns of power system variation measurements and 2) proposing an effective empirical analysis approach for understanding the measurements through examining the underlying feature clusters and the associated reconstructed data by DAE.

19: K- and W-Band Free-Space Characterizations of Highly Conductive Radar Absorbing Materials

Nagma Vohra, University of Arkansas, United States
Magda El-Shenawee, University of Arkansas, United States

Abstract: This work presents a characterization technique of highly conductive material in the K- and W-bands. The transmission line theory model is modified to adapt to the phase challenges observed in the measured S-parameters at high frequency. The S-parameters measurements are obtained using the nondestructive focused beam free-space system connected with the network analyzer and the millimeter-wave frequency extenders. The system provides measurements in a frequency range from 5.8 to 110 GHz, and it includes focused beam horn lens antennas to minimize sample edge reflection. The thru-reflect-line (TRL) calibration and the time-gated feature of the network analyzer are used. Good agreement between the measured and calculated S-parameters in the transmission mode is achieved using the extraction algorithm. The measured S-parameters are further used to obtain the electromagnetic shield effectiveness parameters and the percentage of power absorbed in the material. In addition, the return loss of the metal-backed material is calculated using the extracted permittivity to obtain the maximum absorption at the desired frequencies. DOI: 10.1109/TIM.2020.3041821

20: Test Setup for Dynamic On-State Resistance Measurement of High- and Low-Voltage GaN-HEMTs Under Hard and Soft Switching Operation

Benedikt Kohlhepp, Electromagnetic Fields, Germany
Daniel Kübrich, Electromagnetic Fields, Germany
Marvin Tannhäuser, Siemens AG, Germany
Andreas Hoffmann, Siemens AG, Germany
Thomas Dürbaum, Electromagnetic Fields, Germany

Abstract: GaN-HEMTs impress with excellent properties and therefore power electronics engineers pay a lot of attention to it. However, during switching operation some devices show increased on-state resistance. Since for switch mode power supply designers, the internal device structure is not apparent, measuring the on-state resistance under the targeted operating conditions is the only method to gain this information. In order to characterize the dynamic on-state resistance, this paper proposes clamping circuits for accurate measurement. Using a high resolution digitizer card ensures precise results. The presented measurement setup allows to measure the on-state resistance under hard and soft switching conditions with parameters of the intended application. In inverter applications, each switch works under hard as well as soft switching. Therefore, the transition between these two operating modes must also be studied in detail. Finally, an extension of the clamping circuit is presented allowing measurements with high-voltage GaN-HEMTs as well. First results verify this improved setup. doi: 10.1109/TIM.2020.2985186

21: Verification of a Capacitive Voltage Divider with 6-μrad Uncertainty Up to 100 kV

Gu Ye, VSL, Netherlands
Wei Zhao, National Institute of Metrology of China, China
Gert Rietveld, VSL, Netherlands

Abstract: The uncertainty level of the current-comparator-based capacitive voltage divider (CVD) used in the transformer loss measurement (TLM) reference setup of the Van Swinden Laboratorium (VSL) is extensively verified both from the component level and the system as a whole. Different on-site practical conditions are considered. The verification results show an agreement of better than $(6±6)×10^{-6}$ in ratio error and $(4±6)$ μrad in phase displacement between the component and system calibrations up to 100 kV, which is well within the required 10 μrad limit to achieve on-site TLM system calibrations with 20 μW /VA overall uncertainty at low power factors. 10.1109/TIM.2021.3056647

22: An Adaptive Particle Filter Technique for System State Estimation and Prognosis

Mohamed Ahwiadi, Lakehead University, Canada
Wilson Wang, Lakehead University, Canada

Abstract: System state estimation and prognostics are the key issues in dynamic system monitoring and management. Although the particle filter (PF) has been applied to model the nonlinear degradation feature of the system aging mechanism in several studies, it has two potential problems: the sample degeneracy and the impoverishment. To tackle these problems, a new adaptive particle filter (APF) technique is proposed in this article to enhance the performance of PFs. In the APF, a self-evaluation method is suggested to track the posterior distribution and detect the low-weight particles (sample degeneracy). A new adaptive weight adjustment approach is proposed to adaptively explore the posterior space, process those low-weight particles, and tackle the sample degeneracy. The effectiveness of the proposed APF technique is validated by simulation tests using several model conditions. It is also implemented for battery-health monitoring and prognosis. Test results show that the proposed APF technology can effectively capture and track the system's dynamic characteristics.
DOI: 10.1109/TIM.2020.2973850

23: An Enhanced Mutated Particle Filter Technique for System State Estimation and Battery Life Prediction

Mohamed Ahwiadi, Lakehead University, Canada
Wilson Wang, Lakehead University, Canada

Abstract: The particle filter (PF) has some limitations in real-world applications, for instant, the sample degeneracy and the impoverishment. Although several approaches have been proposed in the literature to tackle these problems, they have some limitations: for example, they cannot represent the entire probability density function (PDF) effectively. In this paper, an enhanced mutated PF (EMPF) technique is proposed to improve the performance of PFs. In the EMPF technique, first, an enhanced mutation approach is proposed to actively explore the posterior PDF to locate the high-likelihood area. Second, a new selection scheme is suggested to process low-weight particles for optimizing the posterior distribution and tackling sample degeneracy. Third, an outlier assessment method is adopted to monitor the overall pattern of the posterior distribution based on the interquartile range statistical analysis. The effectiveness of the proposed EMPF technique is verified by simulation tests. It is also implemented for the remaining useful life prediction of lithium-ion batteries. DOI: 10.1109/TIM.2018.2853900

24: Characterization of Cryogenic Material Properties of 3-D-Printed Superconducting Niobium Using a 3-D Lumped Element Microwave Cavity

Benjamin McAllister, University of Western Australia, Australia
Jeremy Bourhill, IMT Atlantique, France
Wing Him Jacob Ma, University of Western Australia, Australia
Tim Sercombe, University of Western Australia, Australia
Maxim Goryachev, University of Western Australia, Australia
Michael Tobar, University of Western Australia, Australia

Abstract: We present an experimental characterisation of the electrical properties of 3D-printed Niobium. The study was performed by inserting a 3D-printed Nb post inside an Aluminium cylindrical cavity, forming a 3D lumped element re-entrant microwave cavity resonator. The resonator was cooled to temperatures below the critical temperature of Niobium (9.25 K) and then Aluminium (1.2 K), while measuring the quality factors of the electromagnetic resonances. This was then compared with finite element analysis of the cavity and a measurement of the same cavity with an Aluminium post of similar dimensions and frequency, to extract the surface resistance of the Niobium post. The 3D-printed Niobium exhibited a transition to the superconducting state below 9.25 K, as well as a surface resistance of $3.1\pm0.54\times10^{-4}$ Ω. DOI: 10.1109/TIM.2020.3031364

25: A New Technique to Obtain an Equivalent Indirect Hysteresis Loop from the Distortion of the Voltage Measured in the Excitation Coil

Itsaso Artetxe Querejeta, Ceit, Spain
Fernando Arizti, Ceit, Spain
Ane Martinez-De-Guerenu, Ceit, Spain

Abstract: A new technique to calculate an equivalent indirect hysteresis loop, Bec-H loop, from the distortion of the voltage measured in the magnetic excitation coil is proposed. The aim is to facilitate the industrial implementation of magnetic characterization reducing hardware and error sources of the measuring system, as pick-up coils and their conditioning stages are not necessary. With the Bec-H technique, the characterization of two sets of materials with very different properties using a simplified electromagnetic system has been achieved. Specifically, the change in the microstructure of annealed low-carbon steel samples was monitored and the hardness of ultrahigh steel sheets was characterized. Moreover, the conventional hysteresis cycles and Bec-H loops are compared, and the obtained lineal relationships between the parameters derived from conventional hysteresis and Bec-H loops verify that the Bec-H loops can provide equivalent parameters for magnetic characterization of steel samples as conventional hysteresis loops. DOI: 10.1109/TIM.2020.3022444

26: Paving the Way for Suitable Metasurfaces' Measurements Under Oblique Incidence: Mono-/Bistatic and Near-/Far-Field Concerns

Humberto Fernández Álvarez, University of Oviedo, Spain
María Elena de Cos Gómez, University of Oviedo, Spain
Fernando Las-Heras Andrés, University of Oviedo, Spain

Abstract: Due to the growing demand of angularly stable metasurfaces, this paper aims to tackle the experimental characterization of metasurfaces (MTS) reflectivity under oblique incidence. The critical aspect for enlarging the angular margin that can be properly measured is analysed, using the phase reflection coefficient of an AMC, which is more challenging to retrieve than its amplitude. The suitability of monostatic versus bistatic measurements set-ups for comparison with plane-wave simulation is studied. The tradeoff between the manufactured prototype dimensions versus the required anechoic chamber size is addressed, which is not considered by most authors. Moreover, the errors from comparison between near-field measurements versus plane-wave simulation is unveiled, which is showed to be more critical when analysing angular stability.

27: A Low-Cost LED-Based Solar Simulator

Eduardo López-Fraguas, Carlos III University of Madrid, Spain
José Manuel Sánchez-Pena, Carlos III University of Madrid, Spain
Ricardo Vergaz, Carlos III University of Madrid, Spain

Abstract: Solar simulators are a fundamental instrument to characterize solar cells parameters, as they can reproduce the operating conditions under which the solar cells are going to work. However, these systems are frequently big, heavy, and expensive, and a small solar simulator could be a good contribution to test small prototyping devices manufactured in research labs, especially if it could manage the irradiation at any wavelength interval in a custom way. We have designed, developed, and calibrated a small solar simulator made entirely with LEDs, no optics inside, and electronically controlled through a PC using an Arduino microcontroller. The whole structure is 3-D printed in black PLA plastic. The electrical current through the LEDs, and thus the spectral irradiance of the simulator, is controlled with a very intuitive LabVIEW interface. As our calibration proves, we have built an easily reproducible and low- cost Class AAA solar simulator in a central illumination area of 1 cm2, according to the IEC60904-9 standard [...] DOI: 10.1109/TIM.2019.2899513

28: TScatNet: an Interpretable Cross-Domain Intelligent Diagnosis Model with Antinoise and Few-Shot Learning Capability

Chao Liu, Shanghai Jiao Tong University, China
Chengjin Qin, Shanghai Jiao Tong University, China
Xi Shi, Shanghai Jiao Tong University, China
Zengwei Wang, Shanghai Jiao Tong University, China
Gang Zhang, Shanghai Jiao Tong University, China
Yunti Han, Shanghai Jiao Tong University, China

Abstract: Currently, domain adaptation-based models eliminate domain shift by calibrating unlabeled target-domain data using labeled source-domain data. These models may fail when encountering unseen working conditions, lacking unlabeled target-domain data for learning domain-invariant features. This article develops a cross-domain diagnosis model named time-scattering convolutional network (TScatNet) to remedy these gaps. TScatNet extracts domain-invariant features using Morlet wavelet as the predefined convolutional kernel, modulus as nonlinearity, and scaling averaging as pooling layer. This predefined architecture eliminates domain shift without any domain adaptation, endows TScatNet few-shot learning capability, simplifies the hyperparameter tuning process, and brings interpretability. Experiments results shows TScatNet's excellent diagnosis performance.

29: Super-Resolution 3-D Laser Scanning Based on Interval Arithmetic

Peter Walecki, Brown University, United States
Gabriel Taubin, Brown University, United States

Abstract: Most 3-D laser scanners are based on 3-D optical triangulation algorithms, where the location of each 3-D point is estimated as the intersection of a camera ray and a plane of light projected by a laser line generator. Since a physical laser-line generator projects a sheet of light of finite thickness, inaccurate measurements and errors result from assuming that the plane of light is infinitesimally thin. We propose a new mathematical formulation for 3-D optical triangulation based on interval arithmetic, where 3-D points are only determined within certain bounds along the camera rays, and multiple measurements are used to tighten these bounds. https://doi.org/10.1109/TIM.2020.2987619

30: Gain Invariant Coordinate Reconstruction for SiPM Based pixelated Gamma Detectors with Multiplexed Readout

Harutyun Poladyan, Lakehead University, Canada
Oleksandr Bubon, Lakehead University, Canada
Aram Teymurazyan, University of Regina, Canada
Sergii Senchurov, Teleoptic PRC, Ukraine
Alla Reznik, Lakehead University, Canada

Abstract: In this article, we report on the Truncated Center of Gravity (TCoG) and Raised-To-the-Power (RTP) algorithms for calculation of gamma photon scintillation position as applied to our newly developed small-scale prototype PET system consisting of a pair of opposing detectors based on 24 Ã— 24 LYSO scintillation crystal matrices and 8 Ã— 8 SiPM arrays with 64:16 multiplexed readout. The major notable advantage of using TCoG or RTP algorithm in contrast to basic CoG is shown to be their independence of photosensor gain variations. An improvement in the calculation of scintillation positions is demonstrated both for TCoG and RTP algorithms, the Field of View (FOV) distortion inherent to CoG reconstruction is eliminated. On average, the Peak-to-Valley Ratio (PVR) is increased at least by a factor of 2.25. The energy resolution is âˆ¼13.5% when using CoG, TCoG, or RTP reconstruction algorithms. https://doi.org/10.1109/23.596981

31: POISON: Human Pose Estimation in Insufficient Lighting Conditions Using Sensor Fusion

Viviana Crescitelli, Hitachi Ltd., Research and Development Group, Japan
Atsutake Kosuge, Hitachi Ltd., Research and Development Group, Japan
Takashi Oshima, Hitachi Ltd., Research and Development Group, Japan

Abstract: POISON is an end-to-end deep neural network method to estimate the human pose in real-time and under the variability of lighting conditions. A lightweight version of the open-source library, OpenPose, is used to extract human keypoints from RGB and infrared images, and the contribution of each image is combined by a fusion step. We propose a method to fuse these two types of information, using a fusion strategy followed by a refinement stage DNN. Experimental results validate that POISON improves the performance of conventional single-camera methods by a factor 1.79Ã—. POISON achieves real-time performance on Intel Core i7 CPU. (DOI: 10.1109/TIM.2020.3043872)

32: Prediction of Oxygen Content Using Weighted PCA and Improved LSTM Network in MSWI Process

Jian Sun, Beijing University of Technology, China
Xi Meng, Beijing University of Technology, China
Junfei Qiao, Beijing University of Technology, China

Abstract: The accurate and real-time measurement of oxygen content in flue gas is the cornerstone of high incineration efficiency and economic benefits for municipal solid waste incineration (MSWI) plants.The weighted PCA feature extraction method, named WPCA, is developed to improve the information representation ability of the conventional PCA algorithm. An improved LSTM (ILSTM) network is designed whose main hyper-parameters are selected through the PSO algorithm without the manual influence.The hybrid model WPCA-ILSTM is proposed, combining with better data features and an accurate modeling framework. The prediction performance of the proposed model is verified by benchmark simulation and MSWI process data.

33: Participatory Air Quality and Urban Heat Islands Monitoring System

Mohamed Anis Fekih, University of Lyon, INSA Lyon, CITI, France
Walid Bechkit, University of Lyon, INSA Lyon, CITI, France
Hervé Rivano, University of Lyon, INSA Lyon, CITI, France
Manoël Dahan, University of Lyon, INSA Lyon, CITI, France
Florent Renard, University Jean Moulin Lyon 3, UMR CNRS Environment City Society, France
Luccille Alonso, University Jean Moulin Lyon 3, UMR CNRS Environment City Society, France
Florent Pineau, TOTAL Raffinage-Chimie, Laboratoire de la Qualité de l'Air, France

Abstract: The widespread use of low-cost environmental monitoring systems has given new impetus to smart city applications. In this paper, we present the 3M€™Air project that aims to explore the potential of participatory citizen measures using low-cost sensors to improve the local knowledge of air quality and temperature. We present the design, implementation and evaluation of our participatory monitoring system. To validate our platform, we have carried out multiple tests to compare our sensor nodes to reference stations and to each other. The results are satisfactory and show that our nodes can be used in environmental participatory monitoring.
https://doi.org/10.1109/TIM.2020.3034987

34: Anchor Calibration for Real-Time-Measurement Localization Systems

Peter Krapež, Faculty of Electrical Engineering, University of Ljubljana, Slovenia
Marko Munih, Faculty of Electrical Engineering, University of Ljubljana, Slovenia

Abstract: A quick calibration is desirable for new anchors that are positionally undetermined in working coordinate system. Accuracy of the anchor localization was studied by simulating a change in the number of additional CMs and their positions. Tests on real system with ultrawideband modules were performed to validate the improvements in anchor calibration when using additional CMs. Experimental results revealed improvement in anchor localization, where average error was improved by 0.01 m in first and 0.30 m in second scenario. Calibration of anchor positions in working coordinate system using additional CMs resulted in 3-D error of less than 0.32 m. 10.1109/TIM.2020.3005258

35: High Precision ADC Testing with Relaxed Reference Voltage Stationarity

Vivek Varier, University of Texas at Austin, United States
Nan Sun, UT Austin, United States

Abstract: This paper seeks to simplify the scope of on-chip built-in self-test (BIST) schemes for the static testing of analog-to-digital converters (ADCs) by relaxing the precision and constancy requirements for the reference voltage of the system. The proposed testing methodology is based on appropriate modifications to the €œStimulus Error Identification and Removal (SEIR)€ algorithm, which already addresses the stringent linearity constraints on the input stimulus. Simulation results with the proposed algorithm are presented for a prototype 14-bit SAR ADC; wherein the non-linearities of the input signal and the non-stationarities of the reference voltages are estimated to obtain the actual ADC performance. Once the ADC linearity is known, standard digital calibration schemes can be employed to achieve higher resolution. https://doi.org/10.1109/TIM.2020.3031208

36: Tracking of a Gunning Jet Using Particle Filtering in Infrared Image Sequences

Nikolaus Mutsam, Graz University of Technology, Austria
Franz Pernkopf, Graz University of Technology, Austria

Abstract: To counteract the wear of refractory linings, gunning is used as a common procedure in steelmaking to prolong the usability of the lining. We focus on tracking the gunning jet using infrared images. In particular, we use a particle filter with online learning to update the reference template. Template matching is used for tracker stabilization and object verification. We use a parametric model of the gunning jet for feature extraction and dynamic reference template generation. For tracker initialization, we combine template matching with geometric- and temperature-based constraints. We provide experiments on real and synthetic data to demonstrate the capabilities of the presented tracker. Paper DOI: 10.1109/TIM.2020.2972170

37: Novel Noniterative Orientation Estimation for Wearable Motion Sensor Units Acquiring Accelerometer, Gyroscope, and Magnetometer Measurements

Aras Yurtman, KU Leuven, Belgium
Billur Barshan, Bilkent University, Turkey

Abstract: We propose a novel noniterative orientation estimation method based on the physical and geometrical properties of the acceleration, angular rate, and magnetic field vectors to estimate the orientation of motion sensor units. The proposed algorithm aims that the vertical axis of the earth coordinate frame is as close as possible to the measured acceleration and that the north axis of the earth makes an angle with the detected magnetic field vector as close as possible to the estimated magnetic dip angle. We obtain the sensor unit orientation based on the rotational quaternion transformation between the earth and the sensor unit frames. We evaluate the proposed method by incorporating it into an activity recognition scheme for daily and sports activities, which requires accurately estimated sensor unit orientations to achieve invariance to the orientations at which the units are worn on the body. Using four different classifiers on a publicly available dataset, the proposed methodology achieves an average activity recognition accuracy higher than the state-of-the-art methods, as well as being computationally efficient enough to be executed in real time. 10.1109/TIM.2019.2930437

38: Composite Aircraft Lightning Strike Protection Damage Evaluation Using Microwave Microscopy

Leandro Rufail, Polytechnique Montreal, Canada
Jean-Jacques Laurin, Polytechnique Montreal, Canada

Abstract: This work presents a new application of microwave microscopy for the diagnostic of the painted lightning strike protection (LSP) mesh used in composite aircraft skin. A new flexible probe is presented. This probe can sweep over the surface of the composite skin and detect breaks in the LSP laying underneath. It is demonstrated that shielding of the probe feeding line leads to better balancing and consequently highly improved immunity to the presence of nearby objects. With this new approach it is possible to localize faults as small as one cut strand under the paint. Also, this technique features the possibility to measure the paint thickness with a resolution in the order of micrometers. DOI: 10.1109/TIM.2019.2941039

Technical Program: May 19th

[INVITED] Embedded Artificial Intelligence for Smart Sensing and IoT Applications
Tinoosh Mohsenin, University of Maryland Baltimore County, United States

Towards Always-on Event-Based Cameras for Long-Lasting Battery-Operated Smart Sensor Nodes
Moritz Scherer, ETH Zürich, Switzerland
Philipp Mayer, ETH Zürich, Switzerland
Alfio Di Mauro, ETH Zürich, Switzerland
Michele Magno, ETH Zürich, Switzerland
Luca Benini, University of Bologna, ETH Zürich, Switzerland

Smart Gravimetric System Based on Deep Learning for Enhanced Safety of Accesses to Public Places
Tommaso Addabbo, University of Siena, Italy
Ada Fort, University of Siena, Italy
Marco Mugnaini, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy
Matteo Intravaia, University of Siena, Italy
Marco Tani, University of Siena, Italy

Study Case in Mining Industry: Monitoring Rollers Using Embedded LoRaWAN
Ralf Moura, Vale S.A., Brazil
Danilo Bibancos, Superior Industries Inc., Brazil
Luiz Barreto, Vale S.A., Brazil
Alex Fracaroli, TCS S.A., Brazil
Eduardo Martinelli, Superior Industries Inc., Brazil

Enable Software-Defined Radios for Real-Time MIMO Channel Sounding
Daniel Stanko, Fraunhofer Institute for Integrated Circuits IIS, Germany
Gerd Sommerkorn, Technische Universität Ilmenau, Germany
Alexander Ihlow, Fraunhofer Institute for Integrated Circuits IIS, Germany
Giovanni Del Galdo, Fraunhofer Institute for Integrated Circuits IIS, Germany

Image Reconstruction for Electrostatic Tomography Based on Residual Network Considering the Prior Knowledge of Boundary Measurement
Chao Wang, Tianjin University, China
Xuechen Zhang, Tianjin University, China
Hongjun Sun, Tianjin University, China
Xiao Liang, Tianjin University, China
Jiamin Ye, Tianjin University, China

Improving Broadband Emission-Based Soot Pyrometry Using Convolutional Neural Networks
Alonso Rodríguez, Universidad Técnica Federico Santa María, Chile
Jorge Portilla, Universidad Técnica Federico Santa María, Chile
Juan Cruz, Universidad Técnica Federico Santa María, Chile
Felipe Escudero, Universidad Técnica Federico Santa María, Chile

Production of Data Set Based on Adjustable Rotary Table and Part Identification Based on Deep Learning
Yihan Meng, Harbin Engineering University, China
He Xu, Harbin Engineering University, China
Zhen Ma, Harbin Engineering University, China
Jiaqiang Zhou, Harbin Engineering University, China
Daquan Hui, Harbin Engineering University, China

Measuring Camera Exposure Time Using Equivalent Sampling
Márk Rátosi, University of Pannonia, Hungary
Gergely Vakulya, ElectrIT, Hungary
Gyula Simon, Óbuda University, Hungary

Investigation of Liquid Film in Horizontal Slug Flow Based on the Image Processing
Ting Xue, Tianjin University, China
Jingyu Zhao, Tianjin University, China
Tao Zhang, Tianjin University, China

Instrumentation of a Roving Inspection Test Rig with Surface Geometry Measurement of Fiber Bundles
Sophia Lehner, Montanuniversität Leoben, Austria
Stefan Neunkirchen, Montanuniversität Leoben, Austria
Ewald Fauster, Montanuniversität Leoben, Austria
Paul O'Leary, University of Leoben, Austria

Remote Ultrasonic Imaging of a Wire Arc Additive Manufactured Ti-6AI-4V Component Using Laser Induced Phased Array

Peter Lukacs, University of Strathclyde, United Kingdom
Geo Davis, University of Strathclyde, United Kingdom
Theodosia Stratoudaki, University of Strathclyde, United Kingdom
Stewart Williams, University of Cranfield, United Kingdom
Charles MacLeod, University of Strathclyde, United Kingdom
Anthony Gachagan, University of Strathclyde, United Kingdom

On the Use of Correlation Analysis in the Estimation of Finite-Time Delay in Soft Sensors Design

Salvatore Graziani, Università di Catania, Italy
Maria Gabriella Xibilia, Università di Messina, Italy

Multivariate Data Prediction in a Wireless Sensor Network Based on Sequence to Sequence Models

Carlos Raul Morales, Universidade Federal de Santa Catarina, Brazil
Fernando Rangel de Sousa, Universidade Federal de Santa Catarina, Brazil
Valner Brusamarello, Universidade Federal do Rio Grande do Sul, Brazil
Nestor Fernandes, Traceback Technologies, Brazil

A CNN-Based Approach to Measure Wood Quality in Timber Bundle Images

Marco Carratù, Università degli Studi di Salerno, Italy
Vincenzo Gallo, Università degli Studi di Salerno, Italy
Consolatina Liguori, Università degli Studi di Salerno, Italy
Antonio Pietrosanto, Università degli Studi di Salerno, Italy
Mattias O'Nils, Mid Sweden University, Sweden
Jan Lundgren, Mid Sweden University, Sweden

Medical & AI-Enabled Technologies for Smart Health Monitoring
5/19/2021 9:00:00 AM - 10:30:00 AM GMT+1
Session Chair(s): M. Shamim Hossain, King Saud University, KSA
Sivagunalan Sivanathan, University of South Wales Prifysgol De Cymru

[INVITED] Exploration of Smart eHealth Technologies in the Era of COVID-19 and beyond with Case Study of Using the Siamese Neural Networks for Early Detection of COVID-19 Cases from CT-Scans

Sabah Mohammed, Lakehead University, Canada

An Optimized Hardware Implementation of Deep Learning Inference for Diabetes Prediction

Md Maruf Hossain Shuvo, University of Missouri, United States
Omiya Hassan, University of Missouri, United States
Dilruba Parvin, University of Missouri, United States
Mengrui Chen, University of Missouri, United States
Syed Kamrul Islam, University of Missouri, United States

Attention Based Inception Model for Robust EEG Motor Imagery Classification
Syed Umar Amin, King Saud University, Saudi Arabia
Hamdi Altaheri, King Saud University, Saudi Arabia
Ghulam Muhammad, King Saud University, Saudi Arabia
Mansour Alsulaiman, King Saud University, Saudi Arabia
Wadood Abdul, King Saud University, SaudI Arabia

Real-Time Bluetooth Low Energy (BLE) Electrocardiogram Monitoring Device
Sivagunalan Sivanathan, University of South Wales, United Kingdom
Alexandre Oleon, University of South Wales, United Kingdom

Quality, Reliability & Safety 1 (TC-32)
5/19/2021 9:00:00 AM - 10:30:00 AM GMT+1
Session Chair(s): Lorenzo Ciani, DINFO - University of Florence
Giulio D'Emilia, University of L'Aquila

[INVITED] Investigating the Use of Low-Cost and Low-Power Millimeter Wave Radar to Improve Quality of Tomato Harvesting
Matthew Smithson, University of Waikato, New Zealand
Melanie Po-Leen Ooi, University of Waikato, New Zealand
Lauren Gris, University of Waikato, New Zealand
Ye Chow Kuang, University of Waikato, New Zealand
Merilyn Manley-Harris, University of Waikato, New Zealand

Reliability and Functional Analysis of IMU Systems Under Temperature-Based Stress Tests
Marco Carratù, Università degli Studi di Salerno, Italy
Marcantonio Catelani, University of Florence, Italy
Lorenzo Ciani, University of Florence, Italy
Gabriele Patrizi, University of Florence, Italy
Antonio Pietrosanto, Università degli Studi di Salerno, Italy

Pulse-Based Technique for Hard Faults Identification in Complex Wire Networks
Dhia Haddad, Technische Universität Chemnitz, Germany
Ahmed Yahia Kallel, Technische Universität Chemnitz, Germany
Najoua Essoukri Ben Amara, Université de Sousse, Tunisia
Olfa Kanoun, Technische Universität Chemnitz, Germany

Adaptive Variance Estimation of Sensor Noise Within a Sensor Data Fusion Framework
Dominik Schneider, Technische Hochschule Ingolstadt, Germany
Bernhard Liebhart, Technische Hochschule Ingolstadt, Germany
Christian Endisch, Technische Hochschule Ingolstadt, Germany

Distributed IoT System to Enhance Worker Safety in Large Open Areas
Marco Tani, University of Siena, Italy
Lorenzo Parri, University of Siena, Italy
Riccardo Moretti, University of Siena, Italy
Elia Landi, University of Siena, Italy
Ada Fort, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy

Award Ceremony & Plenary Presentation (Sheila Rowan)
5/19/2021 10:30:00 AM - 12:00:00 PM GMT+1
Session Chair(s): Pawel Niewczas, University of Strathclyde, Glasgow, Scotland
Kristen Donnell, Missouri University of Science and Technology, Missouri, United States

Gravitational-wave detectors: Challenges in Precision Measurement Technology for Fundamental Physics
Sheila Rowan, University of Glasgow, UK

Virtual Tour of Glasgow
5/19/2021 12:00:00 PM - 12:30:00 PM GMT+1
Session Chair(s): Jacqueline Malloy, University of Strathclyde, Glasgow, Scotland

COVID 101 – Best Practices from Pandemic Life,
Presented by the Women in Instrumentation and Measurement Committee
5/19/2021 12:30:00 PM - 1:30:00 PM GMT+1
Session Chair(s): Alison Cleary, University of Strathclyde, Glasgow, Scotland
Kristen Donnell, Missouri University of Science and Technology, Missouri, United States
Melanie Po-Leen Ooi, University of Waikato, New Zealand

Poster Session #3: Measurement for Human-Computer Interactions: Advanced Sensors, Imaging, Image Processing, Signal Processing, Robotics and Data Analytics
5/19/2021 1:30:00 PM - 2:30:00 PM GMT+1

1: Inter-Batch Gap Filling Using Compressive Sampling for Low-Cost IoT Vibration Sensors
Boon-Yaik Ooi, Universiti Tunku Abdul Rahman, Malaysia
Soung-Yue Liew, Universiti Tunku Abdul Rahman, Malaysia
Woan-Lin Beh, Universiti Tunku Abdul Rahman, Malaysia
Shervin Shirmohammadi, University of Ottawa, Canada

2: The Noninvasive and Optical Only Glucose Monitoring Investigation and Analysis
Yi-Hsiung Lee, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan
Yu-Hsuan Lin, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan
Hsin-Yi Tsai, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

3: An Autocorrelation Method for Asynchronous Vibration Feature Extraction in Blade Tip Timing
Zengkun Wang, Xi'an Jiaotong University, China
Zhibo Yang, Xi'an Jiaotong University, China
Haoqi Li, Xi'an Jiaotong University, China
Shuming Wu, Xi'an Jiaotong University, China
Ruqiang Yan, Xi'an Jiaotong University, China
Shaohua Tian, Xi'an Jiaotong University, China

4: Comparative Study of Electricity-Theft Detection Based on Gradient Boosting Machine
Zhongzong Yan, Hunan University, China
He Wen, Hunan University, China

5: A Virtual Blade Tip Timing Measurement Method for Foreign Object Damage

Shuming Wu, Xi'an Jiaotong University, China
Zhibo Yang, Xi'an Jiaotong University, China
Haoqi Li, Xi'an Jiaotong University, China
Zengkun Wang, Xi'an Jiaotong University, China
Shaohua Tian, Xi'an Jiaotong University, China
Ruqiang Yan, Xi'an Jiaotong University, China

6: Performance Degradation Prediction of Aircraft Auxiliary Power Unit Using the Improved SVR

Xiaolei Liu, Harbin Institute of Technology, China
Liansheng Liu, Harbin Institute of Technology, China
Lulu Wang, China Southern Airlines Engineering Technology Research Center, China
Xiyuan Peng, Harbin Institute of Technology, China

7: Anomaly Detection of Spacecraft Telemetry Data Using Temporal Convolution Network

Yuan Wang, Harbin Institute of Technology, China
Yan Wu, Harbin Institute of Technology, China
Qiong Yang, Institute of Navigation Satellite, China
Jun Zhang, Institute of Navigation Satellite, China

8: Fault Diagnosis Method of Diesel Engine Injector Based on Hierarchical Weighted Permutation Entropy

Yun Ke, Harbin Engineering University, China
Chong Yao, Harbin Engineering University, China
Enzhe Song, Harbin Engineering University, China
Liping Yang, Harbin Engineering University, China
Quan Dong, Harbin Engineering University, China

9: An Improved Sparse Reconstruction Algorithm Based on Singular Value Decomposition for Electrical Resistance Tomography

Shouxiao Li, Tianjin Agricultural University, China
Huaxiang Wang, Tianjin University, China
Joanna N. Chen, Tianjin University of Technology, China
Ziqiang Cui, Tianjin University, China

10: Identifying Pristine and Processed Animal Fibers Using Machine Learning

Oliver Rippel, RWTH Aachen University, Germany
Niclas Bilitewski, RWTH Aachen University, Germany
Khosrow Rahimi, RWTH Aachen University, Germany
Juliana Kurniadi, RWTH Aachen University, Germany
Andreas Herrmann, RWTH Aachen University, Germany
Dorit Merhof, RWTH Aachen University, Germany

11: Performance Evaluation of Range Hood Based on Visual Quantification

Rongbo Fan, Northwestern Polytechnical University, China
Zhongcheng Wang, Northwestern Polytechnical University, China
Jianhua Yang, Northwestern Polytechnical University, China
Jiajia Gao, Ningbo Fotile Kitchen Ware Co.,Ltd., China
Da Wang, Ningbo Fotile Kitchen Ware Co.,Ltd., China

12: An Image Reconstruction Algorithm Based on Two-Step Iterative Shrinkage/Thresholding for Electrical Resistance Tomography

Shouxiao Li, Tianjin Agricultural University, China
Joanna N. Chen, Tianjin University of Technology, China
Huaxiang Wang, Tianjin University, China
Ziqiang Cui, Tianjin University, China

13: Regularization Parameters Determination Method Based on Random Matrix Clustering

Yuanyuan Zhang, Tianjin University, China
Shihong Yue, Tianjin University, China
Jia Li, Tianjin University, China
Chang Sun, Tianjin University, China

14: Dorsal Hand Veins Biometrics Using NIR Images with Fusion of Classifiers at Score Level

Juan Manuel Ramirez-Cortes, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Julian Mauricio Ruiz-Echeverri, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Juan Carlos Bernal-Romero, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico

15: A Lightweight Ship Detection Method in Optical Remote Sensing Image Under Cloud Interference

Jinxiang Yu, Harbin Institute of Technology, China
Xiyuan Peng, Harbin Institute of Technology, China
Shaoli Li, Harbin Institute of Technology, China
Yibo Lu, Shanghai Institute of Satellite Engineering, China
Wenjia Ma, Shanghai Institute of Satellite Engineering, China

16: Investigation of Asymmetry in Horizontal Gas-Liquid Annular Flow Based on Planar Laser Induced Fluorescence

Ting Xue, Tianjin University, China
Tao Zhang, Tianjin University, China
Mengrui An, Tianjin University, China

17: Localization of Blood Vessels in In-Vitro LSCI Images with K-Means

Javier Lopez-Tiro, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Hayde Peregrina-Barreto, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Jose de Jesus Rangel-Magdaleno, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico

18: Constrained Model Predictive Control for Six-DOF Vibration Isolator of the Absolute Marine Gravimeter

Zhenxing Li, Tsinghua University, China
Kang Wu, Tsinghua University, China
Meiying Guo, Tsinghua University, China
Yicong Chen, Tsinghua University, China
Yi Wen, Tsinghua University, China
Lijun Wang, Tsinghua University, China

19: Method and Implementation of Rock Melon Detection and Localisation for Fast and Reliable Autonomous Harvesting

Michael Jay Ellis, University of Waikato, New Zealand
Melanie Po-Leen Ooi, University of Waikato, New Zealand
Shen Hin Lim, University of Waikato, New Zealand

20: Monocular Stereo Vision Based Method for Validating Path Accuracy of Industrial Robots

Xiao Li, China University of Petroleum, China
Wei Li, China University of Petroleum, China
Xiaokang Yin, China University of Petroleum, China
Xin Ma, Purdue University, United States
Xin'an Yuan, China University of Petroleum, China
Jianming Zhao, China University of Petroleum, China

21: Noise Attenuation on IMU Measurement for Drone Balance by Sensor Fusion

Minh Long Hoang, Università degli Studi di Salerno, Italy
Marco Carratù, Università degli Studi di Salerno, Italy
Vincenzo Paciello, Università degli Studi di Salerno, Italy
Antonio Pietrosanto, Università degli Studi di Salerno, Italy

22: Evaluation of Filtering Methods for the Prediction of Human Position During Walking by Means of Kinematical Models

Leticia González, University of Oviedo, Spain
Antonio Miguel López, University of Oviedo, Spain
Diego Álvarez, University of Oviedo, Spain
Juan Carlos Álvarez, University of Oviedo, Spain

23: 3D Printed Self-Sensing Alkali-Activated Coatings for Civil Infrastructure

Christos Vlachakis, University of Strathclyde, United Kingdom
Marcus Perry, University of Strathclyde, United Kingdom
Jack McAlorum, University of Strathclyde, United Kingdom

24: Enhancement of the Measurement Stability of Conductive Ink Based Sensor by Topology Optimization

Yudong Zhang, Harbin Engineering University, China
He Xu, Harbin Engineering University, China
Feng Sun, Harbin Engineering University, China
Yuhan Zhao, Harbin Engineering University, China

25: ESA-Net: A Network with Efficient Spatial Attention for Smoky Vehicle Detection

Jianan Zhou, Hunan University, China
Shaowei Qian, China Academy of Sciences, China
Zhongzong Yan, Hunan University, China
Jingbo Zhao, Hunan University, China
He Wen, Hunan University, China

26: Magnetic Resonance-Based Measurement System: Comparison of 2D and 3D Echo-Planar Imaging Sequences for Thermometry Application

Martina De Landro, Politecnico di Milano, Italy
Sanzhar Korganbayev, Politecnico di Milano, Italy
Khalid Ambarki, Siemens Healthcare SAS Saint-Denis, France
Juan Verde, Institute of Image-Guided Surgery, Strasbourg, France
Henrik Odeen, University of Utah, United States
Celine Giraudeau, Institute of Image-Guided Surgery, Strasbourg, France
Paola Saccomandi, Politecnico di Milano, Italy

27: A Calibration Method for 77GHz Millimeter-Wave Radar Based on Virtual Instrument Technology

Tianqi Xu, National Institute of Metrology of China, China
Lei Du, National Institute of Metrology of China, China

28: Evaluation of Coil Location of TMR-Based Electromagnetic Tomography Sensor

Chao Wang, Tianjin University, China
Xiao Liang, Tianjin University, China
Jiamin Ye, Tianjin University, China
Xuechen Zhang, Tianjin University, China

29: An Affordable Airborne Ultrasonic Sensor for Predictive Maintenance Applications

José Ramón Blanco González, Ingen10 SL, Spain
Juan Menéndez Blanco, TWave SL, Spain
Francisco Javier Ferrero Martín, University of Oviedo, Spain
Alberto López Martínez, University of Oviedo, Spain
José Ramón Villar Flecha, University of Oviedo, Spain

30: Linear Electrode Array for Flow Velocity Estimation

Ziqiang Cui, Tianjin University, China
Long Yan, Tianjin University, China
Pengyu Yang, Tianjin University, China
Yu Sun, Tianjin University, China
Huaxiang Wang, Tianjin University, China

31: Thermal Characterization of Electrical Resistance of 3D Printed Sensors

Mattia Alessandro Ragolia, Politecnico di Bari, Italy
Attilio Di Nisio, Politecnico di Bari, Italy
Anna Maria Lucia Lanzolla, Politecnico di Bari, Italy
Gianluca Percoco, Politecnico di Bari, Italy
Marco Scarpetta, Politecnico di Bari, Italy
Gianni Stano, Politecnico di Bari, Italy

32: A Cross-Conductive Sensor to Measure Bottled Water Quality

Tarikul Islam, Jamia Millia Islamia Central University, India
Arshi Salamat, Jamia Millia Islamia Central University, India
Sandeep Kumar Singh, Jamia Millia Islamia Central University, India
Mahfoozur Rehman, Aligarh Muslim University, India

33: Testing of an Ultrasonic Thermometer Developed at the Idaho National Laboratory

Joshua Daw, Idaho National Laboratory, United States
Lance Hone, Idaho National Laboratory, United States
Kris Woodbury, Idaho National Laboratory, United States

34: Ultrasound Attenuation Analysis of Liquid-Solid Mixtures with Multi-Frequency Ultrasound Excitation

Chao Tan, Tianjin University, China
Wenxiu Hou, Tianjin University, China
Feng Dong, Tianjin University, China

35: A Digital Readout Suitable for Resistive Sensors Affected with a Parasitic Capacitance Element

Elangovan K, Indian Institute of Space Science and Technology, India
Anoop Chandrika Sreekantan, Indian Institute of Space Science and Technology, India

36: Signal Processing Method for Flight Time Measurement of Gas Ultrasonic Flowmeter

Dandan Zheng, Tianjin University, China
Jianqiang Mei, University of Technology and Education, China
Yang Mao, Tianjin University, China
Zhibin Yang, Tianjin University, China

37: Spacecraft Leakage Detection Using Acoustic Emissions Based on Empirical Mode Decomposition and Support Vector Machine

Hongbing Ding, Tianjin University, China
Zhenxin Liang, Tianjin University, China
Lei Qi, Beijing Institute of Spacecraft Environment Engineering, China
Hongjun Sun, Tianjin University, China
Xixi Liu, Tianjin University, China

38: Vortex Convection Characteristics in Mist Flow Based on Fluctuating Pressure Measurement

Hongjun Sun, Tianjin University, China
Chenrui Song, Tianjin University, China
Hongbing Ding, Tianjin University, China
Jinxia Li, Civil Aviation University of China, China
Pengfei Lv, Tianjin University, China
Yuhang Liu, Tianjin University, China

39: General Density-Peaks-Clustering Algorithm

Tianyi Li, Tianjin University, China
Shihong Yue, Tianjin University, China
Chang Sun, Tianjin University, China

40: Phase Sensitive Detector for Multi-Electrode Electromagnetic Flowmeter

Kai Gao, Tianjin University, China
Ziqiang Cui, Tianjin University, China
Zihan Xia, Tianjin University, China
Huaxiang Wang, Tianjin University, China

41: On the Use of Wavelet Transform Based Adaptive Filtering for de-Noising of Pulse Oximeter Signals

Venumaheswar Rao B, Kakatiya Institute of Technology & Science, India
Ashoka Reddy Komalla, Kakatiya Institute of Technology & Science, India

42: Feature Extraction Method for Rolling Bear Fault Signal Based on Time-Delayed Feedback Asymmetric Tristable Stochastic Resonance

Xiao Su, Tianjin University, China
Peiming Shi, Yanshan University, China
Qing Guo, Tianjin University, China
Xingguo Zhang, Tianjin University, China
Haixia Yu, Tianjin University, China
Dachao Li, Tianjin University, China

43: Chaos Game Representation of Audio Signals

Madison Cohen-McFarlane, Carleton University, Canada
Kevin Dick, Carleton University, Canada
James Robert Green, Carleton University, Canada
Rafik Goubran, Carleton University, Canada

44: Sampling LFM Signal with Stretch Processing Based on Finite Rate of Innovation Method

Zhiliang Wei, Harbin Institute of Technology, China
Ning Fu, Harbin Institute of Technology, China
Yan Wang, School of Astronautics, Harbin Institute of Technology, China
Siyi Jiang, Harbin Institute of Technology, China
Liyan Qiao, Harbin Institute of Technology, China

45: Joint Carrier and 2D-DOA Estimation for L-Shaped Array Based on Sub-Nyquist Sampling

Siyi Jiang, Harbin Institute of Technology, China
Ning Fu, Harbin Institute of Technology, China
Zhiliang Wei, Harbin Institute of Technology, China
Liyan Qiao, Harbin Institute of Technology, China
Xiyuan Peng, Harbin Institute of Technology, China

46: Low Peak Derivative Sum of Sines

Manouane Caza-Szoka, Universite du Quebec a Trois-Rivieres, Canada
Daniel Massicotte, Universite du Quebec a Trois-Rivieres, Canada
Messaoud Ahmed Ouameur, Universite du Quebec a Trois-Rivieres, Canada

47: Recovery of Noisy Compressively Sensed Speech via Regularized Maximum Feasible Subsystem Algorithm

Fereshteh Fakhar Firouzeh, Carleton University, Canada
Sreeraman Rajan, Carleton University, Canada
John W. Chinneck, Carleton University, Canada

48: A Deep Convolutional Neural Network Classification of Heart Sound Using Fractional Fourier Transform
Ebrahim Ali Nehary, Carleton University, Canada
Zaid Abduh, Cairo University, Egypt
Sreeraman Rajan, Carleton University, Canada

Industry Session #1: Instrumentation and Measurement in Advanced Manufacturing: An Industry Perspective
5/19/2021 2:30:00 PM - 4:00:00 PM GMT+1
Session Chair(s): Peter Loftus, Evalu8ion Ltd
Matthew Maynard, University of Strathclyde

Paul Wilcox - Instrumentation and Measurement in Advanced Manufacturing : An Industry Perspective
Paul Wilcox, University of Bristol

Steven Stahley - Instrumentation and Measurement in Advanced Manufacturing : An Industry Perspective
Steven Stahley, Cummins Inc

Chris Jones - Instrumentation and Measurement in Advanced Manufacturing : An Industry Perspective
Chris Jones, Micro-Epsilon Ltd

Panel Discussion - Instrumentation and Measurement in Advanced Manufacturing : An Industry Perspective
Peter Loftus, Panel Chair, Evalu8ion Ltd
Paul Wilcox, Univerity of Bristol
Steven Stahley, Cummins Inc
Chris Jones, Micro-Epsilon Ltd

Data Acquisition Systems 1
5/19/2021 4:00:00 PM - 5:30:00 PM GMT+1
Session Chair(s): Pasquale Daponte, University of Sannio
Florian Strakosch, HTWK Leipzig

Compressive Sampling on RFSoC for Distributed Wideband RF Spectrum Measurements
Luca De Vito, University of Sannio, Italy
Francesco Picariello, University of Sannio, Italy
Sergio Rapuano, University of Sannio, Italy
Ioan Tudosa, University of Sannio, Italy

Improve the Sensing Matrix Model for Random Demodulation in the Case of Mixer with Non-Ideal Characteristics
Xiaodong Li, Harbin Institute of Technology, China
Ning Fu, Harbin Institute of Technology, China
Liyan Qiao, Harbin Institute of Technology, China

On Multi-Label Classification for Non-Intrusive Load Identification Using Low Sampling Frequency Datasets

Mohamed Aymane Ahajjam, TICLab, International University of Rabat, Morocco
Chaimaa Essayeh, TICLab, International University of Rabat, Morocco
Mounir Ghogho, TICLab, International University of Rabat, Morocco
Abdellatif Kobbane, ENSIAS, Mohammed V University in Rabat, Morocco

Performance Measurement of Piezoelectric Energy Harvester with Permanent Magnet Assembly for Wearable Devices

Mohamad Safiddin Mohd Tahir, International Islamic University Malaysia, Malaysia
Noor Hazrin Hany Mohamad Hanif, International Islamic University Malaysia, Malaysia
Muhammad Hafizuddin Che Kassim, Eng Engineering Sdn Bhd, Malaysia

Analysis and Evaluation of Vibration Sensors for Predictive Maintenance of Large Gears with an Appropriate Test Bench

Florian Strakosch, Leipzig University of Applied Sciences, Germany
Holger Nikoleizig, Leipzig University of Applied Sciences, Germany
Faouzi Derbel, Leipzig University of Applied Sciences, Germany

Emerging Wireless Communications for IoT/CPS Systems (TC-37)
5/19/2021 4:00:00 PM - 5:30:00 PM GMT+1
Session Chair(s): Gianfranco Miele, University of Cassino and Southern Lazio
Federico Tramarin, University of Modena and Reggio Emilia

[INVITED] Experimental Characterization of an IoV Framework Leveraging Mobile Wireless Technologies

Paolo Ferrari, University of Brescia, Italy
Emiliano Sisinni, University of Brescia, Italy
Paolo Bellagente, University of Brescia, Italy
Alessandro Depari, University of Brescia, Italy
Alessandra Flammini, University of Brescia, Italy
Marco Paset, University of Brescia, Italy

Data Transmission from ATEX Boxes by Means of LoRa Technology for Industrial Internet of Things (IIoT) Applications

Gabriele Di Renzone, University of Siena, Italy
Ada Fort, University of Siena, Italy
Marco Mugnaini, University of Siena, Italy
Alessandro Pozzebon, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy

Analysis and Initial Design of Bidirectional Acoustic Tag Modulation Schemes and Communication Protocol

Daniel Corregidor Luna, Universidad Politécnica de Madrid, Spain
Iván Masmitja, Universitat Politècnica de Catalunya, Spain
Juan Manuel López Navarro, Universidad Politécnica de Madrid, Spain
Spartacus Gomariz, Universidad Politécnica de Madrid, SARTI, Spain

SNR-Based Reinforcement Learning Rate Adaptation for Time Critical Wi-Fi Networks: Assessment Through a Calibrated Simulator

Giovanni Peserico, University of Padova, Autec s.r.l., Italy
Tommaso Fedullo, University of Padova, Italy
Alberto Morato, University of Padova, CMZ Sistemi Elettronici s.r.l., Italy
Federico Tramarin, University of Modena and Reggio Emilia, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy
Stefano Vitturi, National Research Council of Italy, IEIIT, Italy

Repeatability Analysis of Decoder–Based EMF Exposure Measurements in LTE Cellular Systems

Giovanni Betta, University of Cassino and Southern Lazio, Italy
Domenico Capriglione, University of Cassino and Southern Lazio, Italy
Gianfranco Miele, University of Cassino and Southern Lazio, Italy
Marco Donald Migliore, University of Cassino and Southern Lazio, Italy

Image Processing 2
5/19/2021 4:00:00 PM - 6:00:00 PM GMT+1
Session Chair(s): Marco Carratù, Università degli Studi di Salerno
Leila Es Sebar, Politecnico di Torino

[INVITED] Hyperspectral Imaging for Material Characterization
Silvia Serranti, *SAPIENZA - UNIVERSITA' DI ROMA, Italy*

Wavelet Multi-Resolution Analysis of Liquid Film Thickness in Vertical Upward Annular Flow
Ting Xue, Tianjin University, China
Mengrui An, Tianjin University, China
Jingyu Zhao, Tianjin University, China

Effect of Image Acquisition and Processing Parameters on the Estimation of Crowd-Induced Dynamic Loading on Stadium Grandstands
Simone Turrisi, Politecnico di Milano, Italy
Emanuele Zappa, Politecnico di Milano, Italy
Alfredo Cigada, Politecnico di Milano, Italy
Miguel Ruiz Vivanco, Politecnico di Milano, Italy
Nerea Carrera Avin, Politecnico di Milano, Italy

Computational Imaging for Drill Bit Wear Estimation
Salvatore Dello Iacono, Università degli Studi di Salerno, Italy
Giuseppe Di Leo, Università degli Studi di Salerno, Italy
Consolatina Liguori, Università degli Studi di Salerno, Italy

Characterization of 3D Image-Based Biometric Systems in Dynamic Acquisition Conditions
Giovanni Betta, University of Cassino and Southern Lazio, Italy
Marzia Salone D'Amata, University of Cassino and Southern Lazio, Italy
Consolatina Liguori, Università degli Studi di Salerno, Italy
Emanuele Zappa, Politecnico di Milano, Italy

A Low-Cost Automatic Acquisition System for Photogrammetry
Leila Es Sebar, Politecnico di Torino, Italy
Sabrina Grassini, Politecnico di Torino, Italy
Marco Parvis, Politecnico di Torino, Italy
Luca Lombardo, Politecnico di Torino, Italy

Quality, Reliability & Safety 2 (TC-32)
5/19/2021 4:00:00 PM - 5:30:00 PM GMT+1
Session Chair(s): Lorenzo Ciani, DINFO - University of Florence
Giulio D'Emilia, University of L'Aquila

How Simplifying a Condition Monitoring Procedure Affects its Performances
Antonella Gaspari, Politecnico di Bari, Italy
Emanuela Natale, University of L'Aquila, Italy
Giulio D'Emilia, University of L'Aquila, Italy

Study on Performance Improvements of a Flow Excitation System
Pengda Ren, Nanjing University of Aeronautics and Astronautics, China
Bin Wang, Nanjing University of Aeronautics and Astronautics, China
Youkun Zhu, Nanjing University of Aeronautics and Astronautics, China

Cascade Based Methods in Detecting Rotating Faults Using Vibration Measurements
Moise Avoci Ugwiri, Università degli Studi di Salerno, Italy
Marco Carratù, Università degli Studi di Salerno, Italy
Aime Lay-Ekuakille, University of Salento, Italy
Vincenzo Paciello, Università degli Studi di Salerno, Italy
Antonio Pietrosanto, Università degli Studi di Salerno, Italy

Femtocoulomb Range Triboelectric Noise Meter for Super-Low Noise Cables
Karl-Olov Wallin, Habia Cable AB, Sweden
Richard L. Andersson, Habia Cable AB, Sweden
Per Ängskog, University of Gävle, Sweden
Jose Chilo, University of Gävle, Sweden

Precision Chemical Compounds Analysis in Chemical Tank Reactors Using Conductivity Analysis and Model Predictive Control
Nawshin Rafiq, International Islamic University Malaysia, Malaysia
Teddy Surya Gunawan, International Islamic University Malaysia, Malaysia
Robiah Ahmad, Universiti Teknologi Malaysia, Malaysia
Azhar Rahman, Meditech Gloves Sdn Bhd, Malaysia
Mira Ka, Universiti Teknologi Malaysia, Malaysia

[INVITED] Experience of a Network of 7 Italian Laboratories in Testing Surgical Face Masks during the First Wave of COVID-19 Pandemic
Nicola Paone, Università Politecnica delle Marche, Italy

Novel Wearable Thermal-Color Dual Modal Imaging System for COVID-19 Temperature Screening
Maziyar Askari, University of Iowa, United States
Yang Liu, University of Iowa, United States

A Simple Multiparametric Analysis to Guide, Compare and Optimize the Design of "Lensless" LED Illuminators
Stefano Cattini, University of Modena and Reggio Emilia, Italy
Fabrizio Pancaldi, University of Modena and Reggio Emilia, Italy
Alessandro Bertacchini, University of Modena and Reggio Emilia, Italy
Andrea Parmeggiani, REI Foundation — REI Lab srl, Italy

An Uncertainty-Driven Analysis for Delayed Mapping SLAM
Davide Dorigoni, University of Trento, Italy
Daniele Fontanelli, University of Trento, Italy

Ruling Uncertainties in Range-Only Robot Localisation
Farhad Shamsfakhr, University of Trento, Italy
Luigi Palopoli, University of Trento, Italy
David Macii, University of Trento, Italy
Daniele Fontanelli, University of Trento, Italy

Technical Program: May 20th

J. Barry Oakes Presentation: Judy Amanor-Boadu
5/20/2021 9:00:00 AM - 10:00:00 AM GMT+1
Session Chair(s): Sergio Rapuano, University of Sannio, Italy
Ruqiang Yan, Xi'an Jiaotong University, China

Advanced Measurement & Data Analytics for Industrial Equipment Health Monitoring (TC-3 & TC-7)
5/20/2021 10:00:00 AM - 11:30:00 AM GMT+1
Session Chair(s): Weihua Li, South China University of Technology, China
Shibin Wang, Xi'an Jiaotong University, China

[INVITED] Advanced Measurement & Data Analytics for Industrial Equipment Health Monitoring
Ruqiang Yan, Xi'an Jiaotong University, China

Cost-Sensitive Fault Identification in Predictive Maintenance Applications: A Case Study
Roberto Bodo, Università degli Studi di Padova, Italy
Matteo Bertocco, Università degli Studi di Padova, Italy
Alberto Bianchi, Carel Industries SPA, Italy

Machine Anomaly Detection Under Changing Working Condition with Syncretic Self-Regression Auto-Encoder
Jingyao Wu, Xi'an Jiaotong University, China
Zhibin Zhao, Xi'an Jiaotong University, China
Hongbing Shang, Xi'an Jiaotong University, China
Chuang Sun, Xi'an Jiaotong University, China
Ruqiang Yan, Xi'an Jiaotong University, China
Xuefeng Chen, Xi'an Jiaotong University, China

A Global-Local Dynamic Adversarial Network for Intelligent Fault Diagnosis of Spindle Bearing
Jipu Li, South China University of Technology, China
Ruyi Huang, South China University of Technology, China
Jingyan Xia, South China University of Technology, China
Zhuyun Chen, South China University of Technology, China
Weihua Li, South China University of Technology, China

Development of a Cryogenic System for the Characterization of Advanced CMOS Technologies Down to 350 mK
Ismael Martinez, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Omar López-L, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Daniel Ferrusca, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Miguel Velázquez, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Edmundo Antonio Gutierrez-D, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Daniel Durini, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Francisco Javier De La Hidalga-W, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico

An FPGA-Based Low Latency AWG for Superconducting Quantum Computers
Yuchen Yang, University of Science and Technology of China, China
Zhongtao Shen, University of Science and Technology of China, China
Xing Zhu, Alibaba Quantum Laboratory, China
Chunqing Deng, Alibaba Quantum Laboratory, China
Shubing Liu, University of Science and Technology of China, China
Qi An, University of Science and Technology of China, China

Dynamic Measurement of Thickness Distribution in a Soap Film by Using a Phase-Modulated Large Lateral Shearing Interferometer
Xiaoyang Tang, Beihang University, China
Zhang Cao, Beihang University, China
Zhonghong Wang, Beihang University, China
Heng Xie, Beihang University, China
Lijun Xu, Beihang University, China

A Fast Feature Point Extraction Method for Optical Tracking System
Songlin Bi, University of Science and Technology of China, China
Yonggang Gu, University of Science and Technology of China, China
Zhihong Zhang, Stomatological Center, First Affiliated Hospital University of Science and Technology of China, China
JiaqI Zou, University of Science and Technology of China, China
Chao Zhai, University of Science and Technology of China, China
Ming Gong, University of Science and Technology of China, China

Fast Transient Harmonic Selective Extraction Based on Modulation-CDSC-SDFT
Jingwen Zhang, Huazhong University of Science and Technology, China
Zhenglei Wang, Huazhong University of Science and Technology, China
Xiaotao Han, Huazhong University of Science and Technology, China

A Calibration Method for Vehicular Dual-Channel Radar Doppler Velocimeter with Janus Configuration
Lei Du, National Institute of Metrology of China, China
Qiao Sun, National Institute of Metrology of China, China
Jie Bai, National Institute of Metrology of China, China
Xiaolei Wang, National Institute of Metrology of China, China
Tianqi Xu, National Institute of Metrology of China, China

Machine Learning Models for Drowsiness Detection
Harshit Meda, Indian Institute of Technology Ropar, India
Janapareddy Mohan Padmanabha Ganesh, Indian Institute of Technology Ropar, India
Ashish Kumar Sahani, Indian Institute of Technology Ropar, India

Developement of Automated Test System for Multibeam Communication Payloads
Jatin Trivedi, Space Applications Centre, ISRO, India
Amit Nihalchandani, Space Applications Centre, ISRO, India
Devanand Panjwani, Space Applications Centre, ISRO, India
Rakesh Vyas, Space Applications Centre, ISRO, India

Regional Navigation Reconstruction Strategy and Performance Simulation Based on Micro-Nano Satellites
Yang Liu, Innovation Academy for Microsatellites at the Chinese Academy of Sciences, China
Longfei Tian, Innovation Academy for Microsatellites at the Chinese Academy of Sciences, China
Guohua Liu, Innovation Academy for Microsatellites at the Chinese Academy of Sciences, China

A Neutron Generator Testing Platform for the Radiation Analysis of SRAM-Based FPGAs
Ludovia Bozzoli, Politecnico di Torino, Italy
Corrado De Sio, Politecnico di Torino, Italy
Boyang Du, Politecnico di Torino, Italy
Luca Sterpone, Politecnico di Torino, Italy

FPGA Implementation of Linear Combination for Single Pixel Image Reconstruction
Freddy Del Angel-Arrieta, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Carlos Morales-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Jose de Jesus Rangel-Magdaleno, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico

A Preliminary Investigation of the Robustness of a Measuring Instrument for Blood-pCO2 Measurement During ECC

Stefano Cattini, University of Modena and Reggio Emilia, Italy
Luca Accorsi, Science & Technology Park for Medicine, Italy
Stefano Truzzi, Science & Technology Park for Medicine, Italy
Alberto Ferrari, University of Modena and Reggio Emilia, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy

Planar MIT Sensor Array with Gradiometers for Local Hemorrhage Detection

Yixuan Chen, Tianjin University, China
Shu Zhao, Chinese Academy of Medical Sciences, Peking Union Medical, China
Chao Tan, Tianjin University, China
Feng Dong, Tianjin University, China

Recurrent LSTM Architecture for Appliance Identification in Non-Intrusive Load Monitoring

Laura de Diego Otón, University of Alcalá, Spain
David Fuentes-Jimenez, University of Alcalá, Spain
Álvaro Hernández, University of Alcalá, Spain
Rubén Nieto, University of Alcalá, Spain

Measuring Heart Rate with a Heat Flux Sensor

Antti Immonen, LUT University, Finland
Saku Levikari, LUT University, Finland
Heikki Peltonen, University of Jyväskylä, Finland
Mika Silvennoinen, University of Jyväskylä, Finland
Heikki Kyröläinen, University of Jyväskylä, Finland
Andrey V. Mityakov, LUT University, Finland
Pertti Silventoinen, LUT University, Finland
Mikko Kuisma, LUT University, Finland

Physical, Electromagnetic, Biomedical & Chemical Measurements 1
5/20/2021 10:00:00 AM - 11:30:00 AM GMT+1
Session Chair(s): Grzegorz Fusiek, University of Strathclyde
Reza Ghiri, Texas A and M

[INVITED] Flexible Microfiber Sensors for Health Monitoring

Fei Xu, Nanjing University, China

Progress in Real-Time Capacitance Tomography of Multiphase Flows Based on the Maxwell-Wagner-Sillars Effect

Rafiul Rasel, Ohio State University, United States
Qussai Marashdeh, Tech4Imaging, United States
Fernando Teixeira, Ohio State University, United States

Measurement Methodology to Characterize Permittivity-Mass Concentration Relations of Aerated Bulk Materials
Thomas Suppan, Graz University of Technology, Austria
Markus Neumayer, Graz University of Technology, Austria
Thomas Bretterklieber, Graz University of Technology, Austria
Hannes Wegleiter, Graz University of Technology, Austria
Stefan Puttinger, Johannes Kepler University Linz, Austria

Ultra-Wide Band Microwave Chemical Sensing with Time-Domain Measurement Systems
Reza Ebrahimi Ghiri, Texas A&M University, United States
Kamran Entesari, Texas A&M University, United States

Dual-Band Metamaterial-Inspired Microwave Sensor for Liquid Dielectric Spectroscopy
Mahdieh Gholami Mayani, Comillas Pontifical University, Spain
Francisco Javier Herraiz-Martínez, Comillas Pontifical University, Spain
Javier Matanza Domingo, Comillas Pontifical University, Spain
Romano Giannetti, Comillas Pontifical University, Spain

Plenary Presentation (Erling Riis)
5/20/2021 11:30:00 AM - 12:30:00 PM GMT+1
Session Chair(s): Matthew Maynard, University of Strathclyde, Glasgow, Scotland
Gordon Flockhart, University of Strathclyde, Glasgow, Scotland

Atomic-Based Quantum Sensors – the Journey Out of The Lab
Erling Riis, University of Strathclyde

Industry Session #2: Quantum Enabled Instrumentation and Measurement: An Industry Perspective
5/20/2021 1:00:00 PM - 2:30:00 PM GMT+1
Session Chair(s): Michael Lengden, University of Strathclyde
James Bain, M Squared Lasers Ltd

Graeme Malcolm - Quantum Enabled Instrumentation and Measurement: An Industry Perspective
Graeme Malcolm, M Squared Lasers Ltd

David Vettese - Quantum Enabled Instrumentation and Measurement: An Industry Perspective
David Vettese, Alpine Quantum Technology

Tim Ballance - Quantum Enabled Instrumentation and Measurement: An Industry Perspective
Tim Ballance, ColdQuanta

Panel Discussion - Quantum Enabled Instrumentation and Measurement: An Industry Perspective
Miles Padgett, Panel Chair, University of Glasgow
Graeme Malcolm, M Squared Lasers Ltd
David Vettese, Alpine Quantum Technology
Tim Ballance, ColdQuanta

Circuits & Embedded Systems 1
5/20/2021 2:00:00 PM - 3:30:00 PM GMT+1
Session Chair(s): Zheng Liu, University of British Columbia
Teddy Surya Gunawan, Universiti Teknologi Malaysia

Experimental Study on the Power Consumption of Timers Embedded Into Microcontrollers
Ferran Reverter, Universitat Politècnica de Catalunya, Spain
Manel Gasulla, Universitat Politècnica de Catalunya, Spain

An Automated V-I Acquisition System for Microbolometer Array with FPGA-Based Drive
Julio Hernandez, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Jose de Jesus Rangel-Magdaleno, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico
Ricardo Jimenez, Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico

Self-Timed Ring Oscillator Based Time-to-Digital Converter: A 0.35µm CMOS Proof-of-Concept Prototype
Assia El-Hadbi, Institut National des Postes et Télécommunications, Morocco
Oussama Elissati, Institut National des Postes et Télécommunications, Morocco
Laurent Fesquet, Université Grenoble Alpes, France

Simple and Robust Microcontroller-Based Acquisition System for Differential Capacitive Sensors
Alessandro Depari, University of Brescia, Italy
Emiliano Sisinni, University of Brescia, Italy
Paolo Bellagente, University of Brescia, Italy
Paolo Ferrari, University of Brescia, Italy
Alessandra Flammini, University of Brescia, Italy
Stefano Rinaldi, University of Brescia, Italy

Wireless Sensor Nodes for Early Detection of Food Degradation in Restaurants and Commercial Kitchens
Jorge Enrique Quiroz Oviedo, Universidad Nacional de San Agustín, Peru
Tobias Alanko, University of Gävle, Sweden
Jorge Javier Mendoza Montoya, Andina Néstor Cáceres Velásquez University Juliaca, Peru
Mauricio Postigo-Malaga, Universidad Nacional de San Agustín, Peru

Environmental Monitoring & Agriculture, Food Production & Food Safety
5/20/2021 2:00:00 PM - 3:30:00 PM GMT+1
Session Chair(s): Yong Yan, University of Kent
Sabrina Grassini, Politecnico di Torino

Robot-Assisted Measurement of Heavy Metals in Indoor Dust Using ICP-MS
Heidi Fleischer, University of Rostock, Germany
Janne Widmer, Innerstädtisches Gymnasium Rostock, Germany
Sascha Statkevych, Innerstädtisches Gymnasium Rostock, Germany
Regina Stoll, University of Rostock, Germany
Thomas Roddelkopf, University of Rostock, Germany

A Novel Technique for Earthquakes Magnitude Estimation
Marco Carratù, Università degli Studi di Salerno, Italy
Antonio Espírito-Santo, University of Beira Interior, Portugal
Gustavo Monte, Universidad Tecnologica Nacional, Argentina
Vincenzo Paciello, Università degli Studi di Salerno, Italy

Area Yield Performance Evaluation of a Nonchemical Weeding Robot in Organic Farming
Leif Ole Harders, West Coast University of Applied Sciences, Germany
Vitali Czymmek, West Coast University of Applied Sciences, Germany
Florian Johannes Knoll, naiture GmbH & Co. KG, Germany
Stephan Hußmann, West Coast University of Applied Sciences, Germany

Deep Learning for Improving the Storage Process: Accurate and Automatic Segmentation of Spoiled Areas on Apples
Nikita Stasenko, Skolkovo Institute of Science and Technology, Russia
Elizaveta Chernova, Skolkovo Institute of Science and Technology, Russia
Dmitrii Shadrin, Skolkovo Institute of Science and Technology, Russia
George Ovchinnikov, Skolkovo Institute of Science and Technology, Russia

Regression Applied to Measure Normalized Difference Vegetation Index in Soybean Images with Visible Color Spaces Collected by Smartphones
Murilo Caminotto Barbosa, Londrina State University, Brazil
Ana Carolina Sottana de Padua, Londrina State University, Brazil
Deryk Sedlak Ribeiro, Londrina State University, Brazil
Alan Salvany Felinto, Londrina State University, Brazil
Lucas Henrique, Londrina State University, Brazil
Marcelo Giovanetti, Londrina State University, Brazil

Measurement in Medical, Biomedical & Healthcare Systems 2
5/20/2021 2:00:00 PM - 3:30:00 PM GMT+1
Session Chair(s): Octavian Postolache, Instituto Universitário de Lisboa

Heart Rate Variability Analysis with Wearable Devices: Influence of Artifact Correction Method on Classification Accuracy for Emotion Recognition
Gloria Cosoli, Università Politecnica delle Marche, Italy
Angelica Poli, Università Politecnica delle Marche, Italy
Lorenzo Scalise, Università Politecnica delle Marche, Italy
Susanna Spinsante, Università Politecnica delle Marche, Italy

A Flexible and Low-Cost Solution to Measure and Stimulate NNS Skills of Premature Babies
José Miguel Costa Pereira, ESTSetúbal/IPS, Portugal
Vítor Manuel Viegas, CINAV-Escola Naval, Base Naval de Lisboa, Portugal
Octavian Adrian Postolache, ISCTE – Instituto Universitário de Lisboa, Portugal
Pedro Manuel Girão, Instituto Superior Técnico, Universidade de Lisboa, Portugal

A Wavelet-Based Methodology for Features Extraction in Postural Instability Analysis

Bruno Ando, Università di Catania, Italy
Salvatore Baglio, Università di Catania, Italy
Salvatore Castorina, Università di Catania, Italy
Ruben Crispino, Università di Catania, Italy
Vincenzo Marletta, Università di Catania, Italy
Giovanni Mostile, Università di Catania, Italy
Mario Zappia, Università di Catania, Italy

Brain-Computer Interfaces for Daily-Life Applications: A Five-Year Experience Report

Leopoldo Angrisani, Università degli Studi di Napoli Federico II, Italy
Pasquale Arpaia, Università degli Studi di Napoli Federico II, Italy
Egidio De Benedetto, Università degli Studi di Napoli Federico II, Italy
Antonio Esposito, Politecnico di Torino, Italy
Nicola Moccaldi, Universita degli Studi di Napoli Federico II, Italy
Marco Parvis, Politecnico di Torino, Italy

Multiple Weighted Frequency-Difference Method for Electrical Impedance Tomography

Qingwei Hu, Tianjin University, China
Yanbin Xu, Tianjin University, China
Ziqi Liu, Tianjin University, China
Changbin Li, Tianjin University, China
Feng Dong, Tianjin University, China

Measurement Theory & Metrology 1
5/20/2021 2:00:00 PM - 3:30:00 PM GMT+1
Session Chair(s): Sabrina Grassini, Politecnico di Torino
Dimitar Ninevski, University of Leoben

Estimating Parameters of a Sine Wave by the Method of Variable Projection

Paul O'Leary, University of Leoben, Austria
Dimitar Ninevski, University of Leoben, Austria

Effects of Inaccurate Electrode Positioning in Subsurface Resistivity Measurements for Archeological Purposes

Marcantonio Catelani, University of Florence, Italy
Lorenzo Ciani, University of Florence, Italy
Giulia Guidi, University of Florence, Italy
Gabriele Patrizi, University of Florence, Italy
Nicola Casagli, University of Firenze, Italy
Mattia Ceccatelli, University of Firenze, Italy
Veronica Pazzi, University of Firenze, Italy
Luca Cappuccini, University of Firenze, Italy

A Novel Measurement Technique for DC Voltage and Current Reducing the DMM Loading Effects

Emilio Torres, Universitat Politècnica de Catalunya, Spain
Carlos Monzo, Universitat Oberta de Catalunya, Spain
Ferran Reverter, Universitat Politècnica de Catalunya, Spain

Frequency and the PMU Standard
Artis Riepnieks, Pacific Northwest National Laboratory, United States
Dani Strickland, Loughborough University, United Kingdom
Rod White, Semi-retired metrologist, New Zealand
Harold Kirkham, Pacific Northwest National Laboratory, United States

Comparison of Ultrasonic Attenuation Model in Mid-Wavelength Region for Droplet Measurement
Dandan Zheng, Tianjin University, China
Wenqin Wang, Tianjin University, China
Mi Wang, Tianjin University, China
Jun Dong, Tianjin University, China

Ophthalmic Instrumentation & Measurement
5/20/2021 2:00:00 PM - 3:30:00 PM GMT+1
Session Chair(s): Luigi Rovati, University of Modena and Reggio Emilia
Mario Giardini, University of Strathclyde

[INVITED] Automated Algorithmic Assessment of Retinal Images: Experiences from Real-World Applications
Sam Philip, JJR MacLeod Centre for Diabetes and Endocrinology, United Kingdom

An Imaging-Based Autorefractor
Matteo Menolotto, Tyndall National Institute, Ireland
Iain Livingstone, NHS Forth Valley, United Kingdom
Mario Ettore Giardini, University of Strathclyde, United Kingdom

Fast 3-Dimensional Estimation of the Foveal Avascular Zone from Octa
Giovanni Ometto, City, University of London, United Kingdom
Giovanni Montesano, City, University of London, United Kingdom
Usha Chakravarthy, Queen's University Belfast, United Kingdom
Frank Kee, Queen's University Belfast, United Kingdom
Ruth Hogg, Queen's University Belfast, United Kingdom
David Crabb, City, University of London, United Kingdom

A Machine Learning Approach for a Vision-Based Van-Herick Measurement System
Tommaso Fedullo, University of Padova, Italy
Davide Cassanelli, University of Modena and Reggio Emilia, Italy
Giovanni Gibertoni, University of Modena and Reggio Emilia, Italy
Federico Tramarin, University of Modena and Reggio Emilia, Italy
Luciano Quaranta, University of Pavia / IRCCS Fondazione Policlinico San Matteo, Italy
Giovanni De Angelis, IRCCS Fondazione Policlinico San Matteo, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy

Stereo Vision Based Optic Nerve Head 3D Reconstruction Using a Slit Lamp Fitted with Cameras: Performance Trial with an Eye Phantom
Ian Coghill, University of Strathclyde, United Kingdom
Mario Ettore Giardini, University of Strathclyde, United Kingdom

1: Design of on Board X-Band Data Transmission System of SVOM Mission
Yuanyuan Dai, Innovation Academy for Microsatellites at the Chinese Academy of Sciences, China
Yang Liu, Innovation Academy for Microsatellites at the Chinese Academy of Sciences, China
Shunjing Yu, Shanghai Engineering Center for Microsatellites, China

2: Generalized Minimax-Concave Regularization for Aero-Engine Fan Acoustic Mode Measurements
Zepeng Li, Xi'an Jiaotong University, China
Baijie Qiao, Xi'an Jiaotong University, China
Bi Wen, AECC Sichuan Gas Turbine Establishment, China
Xuefeng Chen, Xi'an Jiaotong University, China

3: An Improved Error Correction Algorithm for SINS Based on Star Sensor
Yanze Zhu, Northwestern Polytechnical University, China
Rong Ma, Northwestern Polytechnical University, China
Yihong Quan, XianYang Natural GAS Corporation, China
Di Pan, State Graid Beijing Electric Power Construction, China

4: A Huber Function Based Restoration Algorithm for Astronomy Image Compression
Lei Xin, Qian Xuesen Laboratory of Space Technology, China
Feng Li, Qian Xuesen Laboratory of Space Technology, China
Xue Yang, Qian Xuesen Laboratory of Space Technology, China
Shijie Sun, Beihang University, China
Yu Zhou, DFH Satellite Co., Ltd, China
Zhijia Liu, DFH Satellite Co., Ltd, China

5: Lithium-Ion Battery SoC Estimation Based on Unscented Kalman Filter Considering Temperature Effects
Filippe Tertuliano, Federal University of Paraíba, Brazil
Euler Macêdo, Federal University of Paraíba, Brazil
Juan Villanueva, Federal University of Paraíba, Brazil

6: Miniaturised Bidirectional Acoustic Tag to Enhance Marine Animal Tracking Studies
Iván Masmitja, Universitat Politècnica de Catalunya, Spain
Daniel Corregidor Luna, Universidad Politécnica de Madrid, Spain
Juan Manuel López Navarro, Universidad Politécnica de Madrid, Spain
Enoc Martinez, Universidad Politécnica de Madrid, Spain
Joan Navarro, Institut de Ciencies del Mar, CSIC, Spain
Spartacus Gomariz, Universidad Politecnica de Madrid, SARTI, Spain

7: Exploiting Augmented Reality and Internet of Things for Gamma Ray Experiments in Educational Field

Rosario Schiano Lo Moriello, Università degli Studi di Napoli Federico II, Italy
Enzo Caputo, Università degli Studi di Napoli Federico II, Italy
Francesco de Pandi, Università degli Studi di Napoli Federico II, Italy
Annalisa Liccardo, Università degli Studi di Napoli Federico II, Italy

8: LoRaWAN Transmission System Capability Assessment in Industrial Environment Under Temperature and Humidity Characterization

Gabriele Di Renzone, University of Siena, Italy
Ada Fort, University of Siena, Italy
Marco Mugnaini, University of Siena, Italy
Giacomo Peruzzi, University of Siena, Italy
Alessandro Pozzebon, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy

9: DNN-Based RFID Antenna Tags Localization

Sohel Patel, Missouri University of Science and Technology, United States
Maciej Zawodniok, Missouri University of Science and Technology, United States

10: Microstrip Patch Antenna Bioinspired in Primrose Flower for WLAN and Bluetooth Applications

Dailan Bernardes, Universidade Estadual do Maranhão, Brazil
Ewaldo Santana, Universidade Estadual do Maranhão, Brazil
Paulo Fernandes de Silva Júnior, Universidade Estadual do Maranhão, Brazil
Maciel A. Oliveira, Universidade Estadual do Maranhão, Brazil

11: Design and Implementation of IoT Platform for Electrical Resistance Tomography System

Qian Zhang, Tianjin University, China
Ziqiang Cui, Tianjin University, China
Long Yan, Tianjin University, China
Zihan Xia, Tianjin University, China
Huaxiang Wang, Tianjin University, China

12: Development of Smart Surveillance System Using Cloud for Security Application

Abdul Wahab Usman Ullah, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
Jawad Ali Shah, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
Kushsairy Kadir, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
Abdul Wahid, International Islamic University, Islamabad, Pakistan

13: Pilot Analysis on Soil Moisture Impact on Underground to Aboveground LoRaWAN Transmissions for IoUT Contexts

Stefano Parrino, University of Siena, Italy
Giacomo Peruzzi, University of Siena, Italy
Alessandro Pozzebon, University of Siena, Italy

14: A UWB–Based Localization System: Analysis of the Effect of Anchor Positions and Robustness Enhancement in Indoor Environments
Luigi Ferrigno, University of Cassino and Southern Lazio, Italy
Gianfranco Miele, University of Cassino and Southern Lazio, Italy
Filippo Milano, University of Cassino and Southern Lazio, Italy
Valentina Pingerna, University of Cassino and Southern Lazio, Italy

15: Long Range (LoRa) Transmission Through Ice: Preliminary Results
Irene Cappelli, University of Siena, Italy
Gabriele Di Renzone, University of Siena, Italy
Ada Fort, University of Siena, Italy
Marco Mugnaini, University of Siena, Italy
Alessandro Pozzebon, University of Siena, Italy
Valerio Vignoli, University of Siena, Italy

16: Comparison of RTV Coating Thickness Identified by Different Frequency Domain Thermal Characteristics
Chenglong Cong, Tsinghua Shenzhen International Graduate School, China
Hongwei Mei, Tsinghua Shenzhen International Graduate School, China
Hui Niu, Inner Mongolia Extra High Voltage Power Supply Bureau Inner Mongolia Electric Power (Group) Co.,Ltd., China

17: Implementation of a PLC Field Analyzer on a G3 Modem Platform
Giovanni Artale, University of Palermo, Italy
Giuseppe Caravello, University of Palermo, Italy
Antonio Cataliotti, University of Palermo, Italy
Valentina Cosentino, University of Palermo, Italy
Dario Di Cara, National Research Council of Italy, Italy

18: Thermography of Photovoltaic Panels and Defect Detection Under Outdoor Environmental Conditions
Christian Schuss, University of Oulu, Finland
Kari Remes, University of Oulu, Finland
Kimmo Leppänen, Mettler-Toledo GmbH, Switzerland
Bernd Eichberger, Graz University of Technology, Austria
Tapio Fabritius, University of Oulu, Finland

19: An Advanced PV Simulation Model for Electric Vehicles with Photovoltaic Installations
Christian Schuss, University of Oulu, Finland
Bernd Eichberger, Graz University of Technology, Austria
Tapio Fabritius, University of Oulu, Finland

20: Measurement of Circumferential Liquid Film Thickness in Horizontal Gas-Liquid Annular Flow Using Ultrasound
Mi Wang, Tianjin University, China
Dandan Zheng, Tianjin University, China
Wenqin Wang, Tianjin University, China

21: Water Content Measurement by an Orthogonal Two-Dimensional Electromagnetic Field Based Microwave Sensor

Hui-Min Ma, Tianjin University, China
Ying Xu, Tianjin University, China
Tao Zhang, Tianjin University, China
Yi-Guang Yang, Tianjin University, China
Jing Wang, Tianjin University, China
Xi-Gang Wang, Tianjin Institute of Metrological Supervision and Testing, China

22: The Influence of Pseudo-Slug Flow on the Measurement Characteristics of Venturi

Jing Wang, Tianjin University, China
Ying Xu, Tianjin University, China
Hai-Tao Wu, Tianjin University, China
Yi-Guang Yang, Tianjin University, China
Tao Zhang, Tianjin University, China
Xi-Gang Wang, Tianjin Institute of Metrological Supervision and Testing, China

23: Study on the Measurement Method of Wet Gas Flow Velocity by Ultrasonic Flow Meter

Dandan Zheng, Tianjin University, China
Mengxu Zhai, Tianjin University, China
Jiayu Hu, Tianjin University, China

24: Pseudo-Slug Detection of Horizontal Gas-Liquid Flow Using Ultrasonic Transducer

Lusheng Zhai, Tianjin University, China
Haiyan Xia, Tianjin University, China
Jie Yang, Tianjin University, China
Yinglin Wu, Tianjin University, China

25: Gas-Liquid Two-Phase Flow Pattern Identification by Differential Pressure and Ultrasonic Echoes

Bixiao Sun, Tianjin University, China
Chao Tan, Tianjin University, China
Xuewei Shi, Tianjin University, China
Shangjie Ren, Tianjin University, China
Feng Dong, Tianjin University, China

26: Efficient Selection of Time Domain Features for Leakage Detection in Pipes Carrying Liquid Commodities

George Othon Glentis, University of Peloponnese, Greece
Kristina Georgoulaki, University of West Attica, Greece
Konstantinos Angelopoulos, University of Peloponnese, Greece

27: Dealing with Stochastic Signals and Physical Phenomena Impacting Pipeline Leak Localization Accuracy

Georgios-Panagiotis Kousiopoulos, Aristotle University of Thessaloniki, Greece
Nikolaos Karagiorgos, Aristotle University of Thessaloniki, Greece
Dimitrios Kampelopoulos, Aristotle University of Thessaloniki, Greece
Vasileios Konstantakos, Aristotle University of Thessaloniki, Greece

28: An RMS-Based Approach for Leak Monitoring in Noisy Industrial Pipelines
Dimitrios Kampelopoulos, Aristotle University of Thessaloniki, Greece
Nikolaos Karagiorgos, Aristotle University of Thessaloniki, Greece
Georgios-Panagiotis Kousiopoulos, Aristotle University of Thessaloniki, Greece
Dimitrios Porlidas, Hellenic Petroleum S.A., Greece

29: Conceptual Design and Evaluation of an Optical Sensor for Wide-Area High-Voltage Metering and Protection Applications
Grzegorz Fusiek, University of Strathclyde, United Kingdom
Pawel Niewczas, University of Strathclyde, United Kingdom

30: Performance Assessment Framework for Electrical Capacitance Tomography Based Mass Concentration Estimation in Pneumatic Conveying Systems
Thomas Suppan, Graz University of Technology, Austria
Markus Neumayer, Graz University of Technology, Austria
Thomas Bretterklieber, Graz University of Technology, Austria
Hannes Wegleiter, Graz University of Technology, Austria
Stefan Puttinger, Johannes Kepler University Linz, Austria

31: Quantitative Sound Velocity Reconstruction Based on Ultrasonic Tomography
Miaobo Wang, Tianjin University, China
Chao Tan, Tianjin University, China
Yong Bao, University of Edinburgh, United Kingdom
Feng Dong, Tianjin University, China

32: Miniaturized Magnetic Energy Harvester: Lightweight and Safe Transformer Design
Gabriel Gruber, Graz University of Technology, Austria
Markus Neumayer, Graz University of Technology, Austria
Thomas Bretterklieber, Graz University of Technology, Austria
Alexander Siegl, Graz University of Technology, Austria
Richard Felsberger, Graz University of Technology, Austria

33: Integer Linear Programming for Optimizing the Position of IEDs in Medium Voltage Smart Grids
Claudio Sterle, Università degli Studi di Napoli Federico II, Italy
Vincenzo Caragallo, e-distribuzione S.p.A., Italy
Annalisa Liccardo, Università degli Studi di Napoli Federico II, Italy
Adriano Masone, Università degli Studi di Napoli Federico II, Italy

34: Measurement System for Time Variable Subcycle Impedance on Power Lines
Christoph Nieß, Hochschule Ruhr West, University of Applied Sciences, Germany
Jan-Philipp Kitzig, Hochschule Ruhr West, University of Applied Sciences, Germany
Gerd Bumiller, Hochschule Ruhr West, University of Applied Sciences, Germany

35: Multi-State Appliances Identification Through a NILM System Based on Convolutional Neural Network

Giovanni Bucci, University of L'Aquila, Italy
Fabrizio Ciancetta, University of L'Aquila, Italy
Edoardo Fiorucci, University of L'Aquila, Italy
Simone Mari, University of L'Aquila, Italy
Andrea Fioravanti, University of L'Aquila, Italy

36: High-Precision Metrology with High-Resolution Computed Tomography Using 3D X-Ray Microscopes

Herminso Villarraga-Gómez, Carl Zeiss Industrial Metrology, LLC, United States
N. Kotwal, Carl Zeiss X-ray Microscopy, Inc., United States
V. Ninov, Carl Zeiss X-ray Microscopy, Inc., United States
L. Omlor, Carl Zeiss Industrielle Messtechnik GmbH, Germany

37: Ai Based RF Amplifier Power Delivery and Measurement Control Method for Transient Load Conditions

Abdullah Eroglu, North Carolina A&T State University, United States
Thisara Walpita, North Carolina A&T State University, United States

38: Converting an Electrochemical Current Into a Fluorescence Signal, a New Strategy for the High Sensitive Detection of Electron Transfer Events

Rabia Djoumer, LEM UMR 7591 CNRS, Université de Paris, France
Christophe Demaille, LEM UMR 7591 CNRS, Université de Paris, France
Arnaud Chovin, LEM UMR 7591 CNRS, Université de Paris, France
Agnès Anne, LEM UMR 7591 CNRS, Université de Paris, France

39: Simultaneous Detection of Acceleration and Liquid Adhesion Using Light Intensity-Based Hetero-Core Fiber Optic Sensors

Miyuki Kadokura, Soka University, Japan
Kenta Suzuki, Soka University, Japan
Hiroshi Yamazaki, Soka University, Japan
Michiko Nishiyama, Soka University, Japan
Kazuhiro Watanabe, Soka University, Japan

40: Water Gauge Development Based on Multiple Hetero-Core Fiber Optic Surface Plasmon Resonance Sensors

Michiko Nishiyama, Soka University, Japan
Koji Yuhashi, Soka University, Japan
Shoichi Kubodera, Soka University, Japan
Kazuhiro Watanabe, Soka University, Japan

41: Lite Emulator of Grid Operations

Carlo Guarnieri Calò Carducci, RWTH Aachen University, Germany
Alberto Dognini, RWTH Aachen University, Germany
Maliheh Haghgoo, RWTH Aachen University, Germany
Ferdinanda Ponci, RWTH Aachen University, Germany
Antonello Monti, RWTH Aachen University, Germany

42: Conducted Noise Voltage Measurement Using Shoe-Shaped Wearable Devices in a Raised-Floor Office Room

Naruto Arai, NTT Corporation, Japan
Toshihisa Masuda, NTT Corporation, Japan
Masato Maruyama, NTT Corporation, Japan
Jun Kato, NTT Corporation, Japan
Ken Okamoto, NTT Corporation, Japan
Ken Sasaki, University of Tokyo, Japan

43: Localized Surface Strain Measurement for Load Detection Using Diamond Like Carbon Coating on a Linear Guide

David Krampert, Bosch Rexroth AG, Germany
Sebastian Unsleber, Bosch Rexroth AG, Germany
Leonhard Reindl, Albert-Ludwigs-University Freiburg, Germany

44: Development of a Design for SiPMs Readout in Cryogenic Environment for Large Area Photon Detectors

Niccolo' Gallice, Università degli Studi di Milano, Italy
Andrea Zani, Istituto Nazionale di Fisica Nucleare - Sezione di Milano, Italy
Paola Sala, INFN - Sezione di Milano, Italy
Massimo Lazzaroni, Università degli Studi di Milano, Italy
Mauro Citterio, INFN - Sezione di Milano

45: Frequency Span Optimization for Asymmetric Resonance Curve Fitting

Kostiantyn Torokhtii, Università Roma Tre, Italy
Andrea Alimenti, Università Roma Tre, Italy
Nicola Pompeo, Università Roma Tre, Italy
Enrico Silva, Università Roma Tre, Italy

46: Nanoparticle-Based Fiber Optofluidic Laser for Label-Free Protein Detection

Xi Yang, University of Electronic Science and Technology of China, China
Yanqiong Wang, University of Electronic Science and Technology of China, China
Yiling Liu, University of Electronic Science and Technology of China, China
Wanjing Zhao, University of Electronic Science and Technology of China

47: Measurement and Signal Processing Techniques for Extracting Highly Accurate and Wideband RCS

Rachel Jarvis, University of Oklahoma, United States
Justin Metcalf, University of Oklahoma, United States
Jessica Ruyle, University of Oklahoma, United States
Jay McDaniel, University of Oklahoma, United States

48: A Novel Single-Element Inductance-to-Digital Converter with Automatic Offset Eliminator

Narayanan P. P., Indian Institute of Technology Palakkad, India
Sreenath Vijayakumar, Indian Institute of Technology Palakkad, India

49: A Switched-Capacitor CVC and CFC for Capacitive Sensors Representable Using π-Model

Pinku Sebastian, Indian Institute of Technology Palakkad, India
Narayanan P. P., Indian Institute of Technology Palakkad, India
Sreenath Vijayakumar, Indian Institute of Technology Palakkad, India

Closing Ceremony
5/20/2021 4:30:00 PM - 5:00:00 PM GMT+1
Session Chair(s): Deepak Uttamchandani, University of Strathclyde, Glasgow, Scotland
Matthew Maynard, University of Strathclyde, Glasgow, Scotland