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SENSORS APPLICATIONS SYMPOSIUM

MARCH 9-11, 2020 | KUALA LUMPUR, MALAYSIA



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2020 IEEE Sensors Applications Symposium (SAS 2020) Proceedings

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Welcome Message from the Chairs

Welcome to the 15th IEEE Sensors Applications Symposium 2020 in Kuala Lumpur, Malaysia!

The organizers of the IEEE Sensors Application Symposium (SAS'2020) are very happy to welcome the guests and delegates at the 15th edition of the annual prime event in the field of sensing technology and its applications presented under the auspices of the IEEE Instrumentation and Measurement Society. After being held in several global locations in America, Europe and Oceania in the past, this year's Symposium, for the very first time, is taking place in Asia, in the modern and fast-moving forward city of Kuala Lumpur, the capital of Malaysia. This new location allows the Symposium to extend its geographical coverage and better serve local engineering, research, industrial, and academic communities, as well as to pave the way for expansion of future activities of the IEEE Instrumentation and Measurement Society in the region. It also allows the international delegates of the SAS'2020 to visit, experience, appreciate, and learn first-hand the history, culture, nature, economy, achievements, and aspirations of the fast progressing Malaysia – one of the Asian “tigers”, as well as other countries of the South East Asia.

To organize this year's Symposium and to put together its program was not a trivial task due to a number of objective and subjective obstacles. Yet, the goal was achieved as a result of the close cooperation between the Steering, Organizing, and Technical Program Committees, efforts of helpers, academic and industry partners, and through the very valuable and efficient professional support, guidance, and actions by the Conference Catalysts. The resulting program of the 3-day SAS 2020 event includes variety of sessions covering various aspects of sensing, measurement and instrumentation technologies and methodologies, sensor design and fabrication, and numerous sensor applications. In total, the program of the Symposium includes over 73 carefully selected presentations, each of which was professionally reviewed by the extensive panel of specialists in the field. Authors of papers selected for the program of SAS'2020 will have the opportunity to extend and enhance their submissions with new findings and important supplementary materials, thus making them journal-quality manuscripts and submit them to a special issue of the IEEE Transactions on Instrumentation and Measurement.

We are particularly grateful also to the keynote speakers and tutorial organizers whose contributions significantly enhance the quality and content of the event. We believe that SAS 2020 would enable productive discussions and exchanges of ideas between the sensor developers, innovators and users, creation of new research and development consortia, formulation of new proposals, projects, and initiatives. And we also hope that the spirit of the event will be highly enthusiastic, energetic, and overall enjoyable.

SAS 2020 is committed to encouraging student engagement in the field of sensors, instrumentation, and measurement. We are pleased to see a significant proportion of the accepted presentations being authored by students.

SAS 2020 is taking place in the very center of the city of Kuala Lumpur. This allows the delegates and guests to experience the excitement of the ever bustling and fast progressing megalopolis, enjoy the first-class shopping and entertainment options, excellent restaurants serving a wide variety of cuisines, numerous socializing choices and many more all around the Symposium venue.

The IEEE SAS 2020 General Co-Chairs
Serge Demidenko & Gourab Sen Gupta

Symposium History

SAS 2019

March 11-13, 2019 | Sophia Antipolis, France

SAS 2018

March 12-14, 2018 | Seoul, Korea

SAS 2017

March 13-15, 2017 | Glassboro, New Jersey

SAS 2016

April 20-22, 2016 | Catania, Italy

SAS 2015

April 13-15, 2015 | Zadar, Croatia

SAS 2014

February 18-20, 2014 | Queenstown, New Zealand

SAS 2013

February 19-21, 2013 | Galveston, Texas

SAS 2012

February 7-9, 2012 | Brescia, Italy

SAS 2011

February 22-24, 2011 | San Antonio, Texas

SAS 2010

February 23-25, 2010 | Limerick, Ireland

SAS 2009

February 17-19, 2009 | New Orleans, Louisiana

SAS 2008

February 12-14, 2008 | Atlanta, Georgia

SAS 2007

February 6-8, 2007 | San Diego, California

SAS 2006

February 7-9, 2006 | Houston, Texas

SAS 2020 Organizing Committee

General Co-Chairs:

Serge Demidenko, Sunway University, Malaysia
Gourab Sen Gupta, Massey University, New Zealand

Technical Program Co-Chairs:

Sian Lun Lau, Sunway University, Malaysia
Fakhrul Alam,, Massey University, New Zealand
Alessandro Depari,, University of Brescia, Italy

Special Session Chairs:

Michele Magno, ETHZ, Switzerland

SAS Steering Committee:

Bruno Andò (Chair-elect), University of Catania, Italy
Alessandro Depari, Università degli Studi di Brescia, Italy
John Schmalzel, Rowan University, USA
Eric Matson, Purdue University, USA
Donghan Kim, Kyung Hee University, South Korea
Alain Pegatoquet, University Côte d'Azur
Michele Magno, ETHZ, Switzerland

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Narendiran Anandan, Tyndall National Institute, Ireland
Bruno Ando, University of Catania, Italy
Sebastian Bader, Mid Sweden University, Sweden
Behraad Bahreyni, Simon Fraser University, Canada
Domenico Balsamo, University of Newcastle, United Kingdom (Great Britain)
Paolo Bellagente, University of Brescia, Italy
Olivier Berder, Univ Rennes, CNRS, IRISA, France
Muhammad Khurram Bhatti, Information Technology University (ITU) Lahore, Pakistan
Dennis Brandão, EESC - USP, Brazil
Davide Brunelli, University of Trento, Italy
Diego Cabello, University of Santiago de Compostela, Spain
Justin Cappos, New York University, USA
Lukas Cavigelli, ETH Zurich, Switzerland
Nunzio Cennamo, University of Campania Luigi Vanvitelli, Italy
Domenico Ciunzo, University of Naples Federico II, IT, Italy
Antoine Courtay, University of Rennes 1, France
Dominique Dallet, IMS Laboratory - Bordeaux INP - University Bordeaux, France
Frank Daschner, University of Kiel, Germany
Serge Demidenko, Sunway University, Malaysia
Alessandro Depari, University of Brescia, Italy
Elijs Dima, Mid Sweden University, Sweden
Nicola Donato, University of Messina, Italy
Halit Eren, Curtin University, Australia
Paolo Ferrari, University of Brescia, Italy
Georg Fischer, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany
Stefan Forsström, Mid Sweden University, Sweden
Ada Fort, University of Siena, Italy
Valerio Freschi, University of Urbino, Italy
Vincent Frick, Université de Strasbourg, France
Guglielmo Frigo, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Matthieu Gautier, Univ Rennes, CNRS, IRISA, France
Boby George, Indian Institute of Technology Madras, India
Alireza Gheitasi, Australian College of Kuwait, Kuwait
Mikael Gidlund, Mid Sweden University, Sweden
Giada Giorgi, University of Padova, Italy
Eduardo Godoy, UNESP - São Paulo State University, Brazil

Xiang Gui, Massey University, New Zealand
Mingzhe Jiang, University of Turku, Finland
Donghan Kim, Kyung Hee University, Korea (South)
Yongho Kim, Purdue University, USA
Daniel Konings, Massey University, New Zealand
Sina Labbaf, University of California, Irvine, USA
Spyros Lalis, University of Thessaly, Greece
Sian Lun Lau, Sunway University, Malaysia
Aime' Lay-Ekuakille, University of Salento, Italy
Mathew Legg, Massey University, New Zealand
Gengchen Liu, University of California, Davis, USA
Michele Magno, ETH Zurich, Switzerland
Aamir Mahmood, Mid Sweden University, Sweden
Md Sohel Mahmood, University of Texas at Arlington, USA
Vincenzo Marletta, University of Catania, Italy
Liam Marsh, University of Manchester, United Kingdom (Great Britain)
Eric Matson, Purdue University, USA
Ciaran Moore, University of Canterbury, New Zealand
Marco Mugnaini, University of Siena, Italy
Gia Tuan Nguyen, University of Turku, Finland
Michael O'Toole, University of Manchester, United Kingdom (Great Britain)
Dinko Oletic, University of Zagreb, Croatia
Antonio Oliveira-Jr, Federal University of Goias, Brazil
Seongha Park, Argonne National Laboratory, USA
Marco Pasetti, University of Brescia, Italy
Alain Pegatoquet, LEAT, France
CongDuc Pham, University of Pau, France
Mayer Philipp, ETH Zurich, Switzerland
Tommaso Polonelli, University of Bologna, Italy
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Alessandro Pozzebon, University of Siena, Italy
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Gourab Sen Gupta, Massey University, New Zealand
Mauro Serpelloni, University of Brescia, Italy
Sangho Shin, Rowan University, USA
Ivanovitch Silva, Federal University of Rio Grande do Norte, Brazil
Emiliano Sisinni, University of Brescia, Italy
Ryszard Sroka, AGH University of Science and Technology, Poland
Robert Staraj, University Cote d'Azur, CNRS, LEAT, France
Russell Trafford, Rowan University, USA
Valerio Vignoli, University of Siena, Italy
Xiaying Wang, ETH Zurich, Switzerland
Wuliang Yin, The University of Manchester, United Kingdom (Great Britain)
Dario Zappa, University of Brescia, Italy
Le Zheng, Roswell Biotechnologies, USA
Yanyan Zhuang, University of Colorado, Colorado Springs, USA

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Keynote Speakers

Ong Soon Ee (Intel, Internet of Thing (IoT) Group)

Topic: *Internet of Thing (IoT) Group*



Speaker Biography:

Ong Soon Ee is currently the technologist and architect with Intel, Internet of Thing (IoT) Group, chartered to drive the new technology research and development of cutting-edge product. His domain of expertise includes IoT, Artificial Intelligent (AI), computing and robotics. He has extensive industry experiences and exposures as technical leaders from employments with several top tier technology companies, i.e. Sony, Motorola, Agilent and Altera. He was also co-founder of several local startup tech companies. With 20 years of intensive research and development career, he has portfolio of successful completed projects and products in the area of IoT, industrial robotics & equipment, automotive, computing device & silicon products, audio/video and others. He has publication at multiple international technical conferences. He is the co-founder of Aspire MINDS program, a collaborative national STEM program between Ministry of Science and local universities. He is also the committee member of Malaysian Invention and Design Society (MINDS), vice chairman of MINDS Penang Chapter, advisory panel for UM Industrial 4.0 Center, and committee member of IEEE Asian Test Symposium (ATS).

Dr. Shreekanth Mandayam (Rowan University, USA)

Topic: *Will AI and VR Save the World?*



Speaker Biography:

Shreekanth Mandayam was the Vice President for Research and the Executive Director of the South Jersey Technology Park at Rowan University in New Jersey, USA. He led the development of the research and technology enterprise at Rowan, leading to the university earning Carnegie Research Classification and establishing successful spin-out and spin-in companies on the university campus. As Professor of Electrical & Computer Engineering, he has established the Virtual Reality Center at Rowan University which conducts research sponsored by the National Science Foundation, NASA, US Department of Energy, US Army, US Navy, the Federal Aviation Administration and private industry. He has served as the Vice President of Finance, Conferences and Publications for the IEEE Instrumentation and Measurement Society and was the General Chair of the IEEE Sensors Applications Symposium from 2008-2013.

Technical Program Table of Contents

MA1: Medical and Biomedical Applications

Chairs: Seohyun Lee (The University of Tokyo, Japan)

Metrology in eye pressure measurements

Peter Pavlasek (Slovak University of Technology & Slovak Institute of Metrology, Slovakia); Stanislav Duris, Jan Rybar, Branislav Hucko and Jakub Palencar (Slovak University of Technology, Slovakia); Miroslav Chytil (Slovak Institute of Metrology, Slovakia)

Visualization and Data Analysis for Intracellular Transport using Computer Vision Techniques

Seohyun Lee, Hyuno Kim and Hideo Higuchi (The University of Tokyo, Japan); Masatoshi Ishikawa (University of Tokyo, Japan)

Preliminary investigation into low-cost stretch sensors for stomach deformation measurement

Gerald Olson, Clive Davies, Gourab Sen Gupta, Rose Davies and Luke Fullard (Massey University, New Zealand)

Detection of Mathematical Fluency Effects on Working Memory using Near Infrared Spectroscopy

Wei Chun Ung, Norashikin Yahya and Tong Boon Tang (Universiti Teknologi PETRONAS, Malaysia)

A PPG-ECG Combo System for the Monitoring of the Aging State of Arteries

Bruno Ando, Salvatore Baglio and Vincenzo Marletta (University of Catania, Italy); Emilio Ambra (STMicroelectronics, Italy); Francesco Garozzo (University of Catania, Italy); Martina Pace and Vincenzo Vinciguerra (STMicroelectronics, Italy); Giorgio Fallica (STMicroelectronics, Italy)

MB1: Internet of Things

Chairs: Alessandro Depari (University of Brescia, Italy), Divya Lohani (Shiv Nadar University, India)

CoAP + DTLS: A Comprehensive Overview of Cryptographic Performance on an IOT Scenario

Johann Westphall, Leandro Loffi, Carla Merkle Westphall and Jean Martina (Federal University of Santa Catarina, Brazil)

A self-organizing efficient power generation system in extreme condition for Waggle

Surin Jo (Soongsil University, Korea (South)); Jaemin Nam (Yonsei University, Korea (South)); Minju Kang (Jeju National University, Korea (South)); Kar Ee Ho and Eric Matson (Purdue University, USA)

IoT Enabled Low Cost Air Quality Sensor

Tyrel Glass, Sharafat Ali, Baden Parr, Johan Potgieter and Fakhrul Alam (Massey University, New Zealand)

Modeling IoT Enabled Automotive System for Accident Detection and Classification

Nikhil Kumar, Anurag Barthwal and Divya Lohani (Shiv Nadar University, India); Debopam Acharya (DIT University, India)

RTK-LoRA: High-Precision, Long-Range And Energy-Efficiency Localization for Mobile and Self-sustainable IoT devices

Mayer Philipp, Michele Magno and Armin Berger (ETH Zurich, Switzerland); Luca Benini (Swiss Federal Institute of Technology (ETH), Switzerland)

TA1: Smart Sensing: Machine Learning and Embedded Processing (Special Session)

Room: Millennium Ballroom

Chairs: Viviana Crescitelli (Hitachi, Ltd., Japan), Michele Magno (ETH Zurich, Switzerland)

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Bu Sung Lee (Nanyang Technological University, Singapore); Romphet Phattharaphon (Kasetsart University, Thailand); Seanglidet Yean and Jigang Liu (Nanyang Technological University, Singapore); Manoj Shakya (Kathmandu University, Nepal)

An RGB/Infra-Red Camera Fusion Approach for Multi-Person Pose Estimation in Low Light Environments

Viviana Crescitelli (Hitachi, Ltd., Japan)

Multi-modality sensor fusion for gait classification using deep learning

Syed Usama Yunas (The University of Manchester, United Kingdom (Great Britain)); Abdullah S Alharthi (Oxford Rd & The University of Manchester, United Kingdom (Great Britain)); Krikor Ozanyan (The University of Manchester, United Kingdom (Great Britain))

HR-SAR-NET: A Deep Neural Network for Urban Scene Segmentation from High-Resolution SAR Data

Xiaying Wang, Lukas Cavigelli, Manuel Eggimann, Michele Magno and Luca Benini (ETH Zurich, Switzerland)

TPS: SAS 2020 Poster Session

Chairs: Alessandro Depari (University of Brescia, Italy), Alain Pegatoquet (LEAT, France)

Adaptive Automatic Controller for Swing Assist by Pneumatic Artificial Muscle

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Yield Process Control based on the Production Data

Serge Demidenko (Sunway University, Malaysia); Nhan Duy Truong (RMIT University, Australia); Giovanni Maria Merola (Xi'an Jiaotong Liverpool University, China)

A comparative study of LSTM and ARIMA for energy load prediction with enhanced data preprocessing

Innocent Mpawenimana (Leat & Uca, France); Alain Pegatoquet (LEAT, France); Laurent Yvon Rodriguez (University Cote d'Azur / LEAT / CNRS UMR 7248, France); Cécile Belleudy (CNRS-LEAT, Université de Nice-Sophia Antipolis, France); Valérie Roy (Mines Paritech, France)

Fabrication of a Pseudo-reference Electrode on a Flexible Substrate and Its Application to Heavy Metal Ion Detection

Pawan Pathak, Woo Hyoung Lee, Rachel Li and Hyoung Cho (University of Central Florida, USA)

Short-Term Memory Based Online Learning Framework for Intelligent Sector Selection in IEEE 802.11ad

M. P. R. S. Kiran and P Rajalakshmi (Indian Institute of Technology Hyderabad, India)

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Kalyan Sasidhar, Dimple Shah, Ashwini Upasini and Vinay Palaparthy (DAIICT, India)

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Krati Rastogi, Anurag Barthwal and Divya Lohani (Shiv Nadar University, India); Debopam Acharya (DIT University, India)

Design of Cyanobyte: An Intermediate Representation to Standardize Digital Peripheral Datasheets for Automatic Code Generation

Nick Felker (Google, USA)

Provisioning IEEE Smart Transducer Standards (P21451.1) to Include Health Metrics via HEDS

Russell Trafford, Sangho Shin and John L Schmalzel (Rowan University, USA)

Development of Non-contact Composite Temperature Sensing (CTS) for photothermal Real-time quantitative PCR Device

Hsin-Yi Tsai (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan); Kuo-Cheng Huang (Instrument Technology Research Center, Taiwan); Liang-Chieh Chao (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan); Yun-Hao Tsai (National Cheng Kung University, Taiwan); Chih-Ning Hsu (ITRC, Narlabs, Taiwan); Dar-Bin Shieh (National Cheng Kung University & NCKU Hospital, Taiwan); Chih-Chung Yang (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)

A Novel Experimental Study to Enhance the Attentional State using EEG Signals

Jagadish. B and P Rajalakshmi (Indian Institute of Technology Hyderabad, India)

Exploitation of precise timing capabilities of single board computer for transcranial magnetic stimulation

Alessandro Depari, Paolo Ferrari, Alessandra Flammini, Stefano Rinaldi and Emiliano Sisinni (University of Brescia, Italy)

A Radial Basis Function Technique for the Early Detection and Measurement of Hip Implant Loosening

Shreekanth Mandayam (Rowan University, USA)

S11 Calibration Method for a Coaxial-loaded Cut-off Circular Waveguide using SOM Termination

Kouji Shibata (Hachinohe Institute of Technology, Japan)

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Amelia Beckley, Baden Parr, Sanjay Mathrani and Mathew Legg (Massey University, New Zealand); Andrew Drain (Engineers Without Borders, Cambodia)

Phase based Time Resolved Reflectance Spectroscopy using Time-of-Flight Camera for Fruit Quality Monitoring

Mukul Sarkar (Indian Institute of Technology, Delhi, India); Maher Assaad (Ajman University, United Arab Emirates); Nitin Gupta (IIT Delhi, India)

Model-based Calibration of a Magnetic Induction Spectroscopy System for Absolute Conductivity Measurement

Michael O'Toole (University of Manchester, United Kingdom (Great Britain)); Wuliang Yin (The University of Manchester, United Kingdom (Great Britain)); Anthony Peyton (University of Manchester, United Kingdom (Great Britain))

Development of a Hand-held 3D Scanning Acoustic Camera

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Chien-Fang Ding (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan); Ching-Ching Yang (Instrument Technology Research Center, National Applied Research Laboratories, Taiwan); Chin-Lin Kuo (Kaohsiung Medical University, Taiwan); Yu-Chen Hsieh and Chih-Chung Yang (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan); Kuo-Cheng Huang (Instrument Technology Research center, National Applied Research Laboratories, Taiwan); Wen-Tse Hsiao (Taiwan Instrument Research Institute, Taiwan)

Evaluation of a Digital Converter for Linear and Nonlinear Temperature Sensors

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An Efficient Multi-AMR Control Framework for Parcel Sorting Centers

Chee Henn Ch'ng (University Tunku Abdul Rahman, Malaysia); Soung Yue Liew and Chee Siang Wong (Universiti Tunku Abdul Rahman, Malaysia); Boon Yaik Ooi (UTAR, Malaysia)

LifeCount: A Device-free CSI-based Human Counting Solution for Emergency Building Evacuations

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Fingerprint-Based Visible Light Positioning using Multiple Photodiode Receiver

Adli Hasan, Tyrel Glass, Fakhrul Alam and Mathew Legg (Massey University, New Zealand)

On the use of LoRaWAN for the Internet of Intelligent Vehicles in Smart City scenarios

Paolo Ferrari, Emiliano Sisinni, Dhiego Fernandes Carvalho and Alessandro Depari (University of Brescia, Italy); Gabriel Signoretti (Federal University of Rio Grande do Norte, Natal, Brazil); Marianne Silva and Ivanovitch Silva (Federal University of Rio Grande do Norte, Brazil); Diego Silva (Universidade Federal do Rio Grande do Norte, Brazil)

A measurement system to investigate dielectric properties of flexible substrates for sensing applications

Salvatore Castorina, Bruno Ando and Salvatore Baglio (University of Catania, Italy); Ruben Crispino (DIEEI-University of Catania, Italy); Vincenzo Marletta (University of Catania, Italy)

TRR: Recent Results**Chairs: Alessandro Depari (University of Brescia, Italy), Alain Pegatoquet (LEAT, France)****An insole 3D force sensor for gait analysis**

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Long-Term Monitoring System for Marine Lobster Aquaculture in Vietnam

Nhan Le (University of Nice, France); Nguyen Thanh Hai (HoChiMinh City, University of Technology, Vietnam); Huu Nguyen Nguyen Tran (School of Computer Science and Engineering, HCMUT, VNU-HCM, Vietnam)

TT@S: TIM@SAS 2020**Chairs: Alessandro Depari (University of Brescia, Italy), Alain Pegatoquet (LEAT, France)****Blind Separation of Doppler Human Gesture Signals Based on Continuous-Wave Radar Sensors**

Lixin Ran (Zhejiang University, China)

TA2: MEMS and Nano-Sensors**Chairs: Behraad Bahreyni (Simon Fraser University, Canada), Serge Demidenko (Sunway University, Malaysia)****Fabrication of Tin Oxide Based Gas Sensor in Ethanol Gas Sensing**

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Ms. Aditi (Central Electronics Engineering Research Institute (CEERI) & Council of Scientific and Industrial Research (CSIR), India); Supriyo Das, Prateek Kothari and Surajit Das (CSIR-CEERI, India); Ram Gopal (CSIR-CEERI, Pilani, India)

Fail-Operational Shock Detection and Correction of MEMS-based Micro-Scanning LiDAR Systems

Philipp Stelzer, Andreas Strasser and Christian Steger (Graz University of Technology, Austria); Norbert Druml (Infineon Technologies Austria AG, Austria)

Design, Modeling and Simulation of MEMS Resonator for Humidity Sensor Application

Ashaashvini Mutharpavalar and Abdelaziz Yousif Ahmed (Universiti Teknologi PETRONAS, Malaysia); Nursyarizal Bin Mohd Nor (Universiti Teknologi Petronas, Malaysia)

Effect of Oscillator Phase Noise on Synchronous Demodulation Measurement Systems for Sensing Applications

Erfan Ghaderi and Behraad Bahreyni (Simon Fraser University, Canada)

TT@S: TIM@SAS 2020**Chairs: Alessandro Depari (University of Brescia, Italy), Alain Pegatoquet (LEAT, France)****Multi-Purpose Marine Sensor Buoy**

Alexander Przybysz, Carlos Duarte and Nathan Gheraldi (KAUST, Saudi Arabia); Jürgen Kosel (King Abdullah University of Science and Technology, Saudi Arabia); Michael Berumen (KAUST, Saudi Arabia)

Long Range Nuclear Radiation Monitoring System using LPWAN Technology

Arpit Khandelwal (Indian Institute of Technology Jodhpur, India)

CIG based Stress Identification Method for Maize Crop using UAV based Remote Sensing

Ajay Yaduvanshi (Indian Institute of Technology, Hyderabad, India); Mahesh Taparia (IIT Hyderabad, India); P Rajalakshmi (Indian Institute of Technology Hyderabad, India); Wei Guo (The University of Tokyo, India); Balaji Naik Banoth (PJTSAU Hyderabad, Telangana, India); Balaram Marathi (PJTSAU, Hyderabad, Telangana, India); Uday B Desai (IIT Hyderabad, India)

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Altahir Abdalla Altahir (Universiti Teknologi PETRONAS, Malaysia & University of Gezira, Sudan); Vijanth Sagayan Asirvadam (Universiti Teknologi Petronas, Malaysia); Patrick Sebastian (Universiti Teknologi PETRONAS, Malaysia); Nor Hisham Hamid (Universiti Teknologi Petronas, Malaysia)

Evaluation of a Bespoke Antarctic Meteorite Detection System in Polar Operating Conditions

Liam Marsh, Wouter van Verre, John Wilson, Geoffrey Evatt and Anthony Peyton (University of Manchester, United Kingdom (Great Britain))

TA3: Innovative Sensing

Chair: Hyoung Cho (University of Central Florida, USA)

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Nunzio Cennamo (University of Campania Luigi Vanvitelli, Italy); Bruno Ando and Salvatore Baglio (University of Catania, Italy); Francesco Arcadio (University of Campania Luigi Vanvitelli, Italy); Vincenzo Marletta (University of Catania, Italy); Luigi Zeni (University of Campania Luigi Vanvitelli, Italy)

A novel approach to optically distinguish plastics based on fluorescence lifetime measurements

Maximilian Wohlschläger (Technical University of Applied Sciences Rosenheim, Germany); Gerhard Holst (PCO AG, Germany); Martin Versen (Technical University of Applied Sciences, Rosenheim, Germany)

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Arshya Bamshad and Hyoung Cho (University of Central Florida, USA)

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Steve Chan (Harvard University, USA); Marco Zennaro (ICTP - The Abdus Salam International Centre for Theoretical Physics, Italy); Ermanno Pietrosevoli (ICTP, Italy); Marco Rainone (The Abdus Salam International Centre for Theoretical Physics, Italy); Ika Oktavianti (University of Sriwijaya, Indonesia); Parnmook Nopphawan (VIT Tall Energy Unit, Philippines)

TB3: Smart Agriculture and Smart Buildings

Chair: Baden Parr (Massey University, New Zealand)

Design of Low Cost Programmable LED Lighting System for Smart Buildings

Sanush K Abeysekera (Monash University Malaysia, Malaysia); Vineetha Kalavally (Monash University, Malaysia); Ye Chow Kuang (University of Waikato & Monash University, New Zealand); Melanie Ooi (University of Waikato, New Zealand)

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Dario Masucci, Carlo Venettacci, Stefano Panzieri and Lorenzo Colace (Roma Tre University, Italy)

Acoustic Identification of Grape Clusters Occluded by Foliage

Baden Parr, Mathew Legg and Fakhrul Alam (Massey University, New Zealand); Stuart Bradley (Inverse Acoustics Ltd, New Zealand)

Device Free Localization with Capacitive Sensing Floor

Nathaniel Faulkner, Baden Parr, Fakhrul Alam and Mathew Legg (Massey University, New Zealand); Serge Demidenko (Sunway University, Malaysia)

WA1: Robotics, Automation, and Data Fusion**Chairs: Alain Pegatoquet (LEAT, France), Hans-Peter Schmidt (OTH East Bavarian Technical University of Applied Sciences & aia Automation Institute, Germany)****Context-Aware Sensor Adaption of a Radar and Time-of-Flight Based Perception Platform**

Josef Steinbaeck (Infineon Technologies Austria AG, Austria); Andreas Strasser, Christian Steger and Eugen Brenner (Graz University of Technology, Austria); Gerald Holweg (Austria); Norbert Druml (Infineon Technologies Austria AG, Austria)

A Comprehensive Study of Performance-Autonomy Tradeoff on Smart Connected Glasses

Alexis Arcaya Jordan (Universite Cote d'Azur / LEAT / CNRS UMR 7248 & Ellcie-Healthy, France); Alain Pegatoquet (LEAT, France); Andrea Castagnetti (Ellcie-Healthy, France)

Robust hand tracking method by synchronized high-speed cameras with orthogonal geometry

Hyuno Kim and Yuji Yamakawa (The University of Tokyo, Japan); Masatoshi Ishikawa (The University of Tokyo)

Sensor Fusion for Analysis of Gait under Cognitive Load: Deep Learning Approach

Abdullah S Alharthi (Oxford Rd & The University of Manchester, United Kingdom (Great Britain)); Syed Usama Yunas (The University of Manchester, United Kingdom (Great Britain)); Krikor Ozanyan (The University of Manchester, United Kingdom (Great Britain))

Measurement Platform for Physical-Layer Analysis of Industrial and Automotive Ethernet

Alexander Gercikow (OTH East Bavarian Technical University of Applied Sciences, Germany); Sebastian Schaffenroth (aia Automation Institute, Germany); Hans-Peter Schmidt (OTH East Bavarian Technical University of Applied Sciences & aia Automation Institute, Germany); Alexander Koelpin (BTU & Chair for Electronics and Sensor Systems, Germany)

WB1: Sensors for Smart Mobility**Chair: Eric Matson (Purdue University, USA)****Initial Evaluation of Vehicle Type Identification using Roadside Stereo Microphones**

Billy Dawton, Shigemi Ishida, Yuki Hori, Masato Uchino and Yutaka Arakawa (Kyushu University, Japan); Shigeaki Tagashira (Kansai University, Japan); Akira Fukuda (Kyushu University, Japan)

Location Sensing using QR codes via 2D camera for Automated Guided Vehicles

Jacqueline Ang and Wai Kong Lee (Universiti Tunku Abdul Rahman, Malaysia); Boon Yaik Ooi (UTAR, Malaysia); Thomas Ooi (Intel Penang, FIZ 3, Malaysia)

Coarse Object Tracking Technique for Point Clouds

Anjani Josyula, Bhaskar Anand and Vivek Barsaiyan (Indian Institute of Technology Hyderabad, India); Mrinal Senapati (Indian Institute of Technology, Hyderabad, India); P Rajalakshmi (Indian Institute of Technology Hyderabad, India)

Accurate Perception for Autonomous Driving: Application of Kalman Filter for Sensor Fusion

Yaqin Wang, Eric Matson and Dongfang Liu (Purdue University, USA)

Enabling Live State-of-Health Monitoring for a Safety-Critical Automotive LiDAR System

Andreas Strasser, Philipp Stelzer and Christian Steger (Graz University of Technology, Austria); Norbert Druml (Infineon Technologies Austria AG, Austria)

WA2: Nonlinear Sensing: From Materials to Systems**Chairs: Liam Marsh (University of Manchester, United Kingdom (Great Britain))****A Multi-Jerk Equation Emulator Circuit Exhibiting Various Chaotic Behaviours**

Denil V Robinson and Chandrika Sreekantan Anoop (Indian Institute of Space Science and Technology, India)

A Digital Signal-Conditioner for Resistive Sensors and its Utility for Linearizing GMR-based Magnetometer

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

Feasibility study of fiber taper acoustic sensor by utilizing time domain reconstruction

Dicken Chan (Universiti Tunku Abdul Rahman, Malaysia); Horng Sheng Lin and Yeong Nan Phua (UTAR, Malaysia); Zulfadzli Yusoff (Multimedia University, Malaysia)

Demonstration of a Nonlinear Angular Rate Sensor based on Internal Resonance

Atabak Sarrafan, Soheil Azimi and Behraad Bahreyni (Simon Fraser University, Canada); Farid Golnaraghi (SFU, Canada)