IEEE SENSORS 2022

Dallas, Texas USA – Oct 30 – Nov 2, 2022

IEEE SENSORS 2022 CONFERENCE PROGRAM

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WELCOME IEEE SENSORS 2022

Howdy! Welcome to IEEE SENSORS 2022!

On behalf of the organizing committee of the 2022 IEEE SENSORS Conference, we are excited to welcome you to the City of Dallas, Texas, USA. The IEEE SENSORS Conference will be held on Oct. 30 – Nov. 2, 2022 at the Hyatt Regency Dallas. We are enthusiastic and excited about the first in-person conference after two years of virtual meetings due to the pandemic. There is no doubt that we all miss face-to-face interaction and networking opportunities. The organizing committee, in addition to working with the technical program committee and the track chairs to ensure paper quality, has planned several special focus and social programs, and recruited invited speakers from the pool of IEEE Sensors Journal authors to enhance the attendees' experience.

Despite the pandemic, environmental and economic challenges, 2022 marks an unprecedented time to be involved in sensor technologies. The technical areas for sensors and their applications face exciting, urgent opportunities. IEEE SENSORS 2022 brings together research scientists, engineers, practitioners and society leaders from around the world to present their latest research, ideas, findings, and opinions. The IEEE SENSORS conference continues to be the platform for researchers to share their exciting presentations as well as for attendees to experience a synergistic environment for inspiration and collaboration.

The 2022 SENSORS features three keynote speakers. Dr. Baher Haroun, Senior Fellow at Texas Instruments Inc. and Director of Advanced Technology Exploration at Kilby Labs, TI, will present a speech titled "Smart Sensing: Mixed Signal Active Sensing for Precision and Energy Efficiency". Dr. Sarah Lisanby, Director of the Division of Translational Research at the National Institute of Mental Health (NIMH), will present a speech titled "Brain-Behavior Quantification and Synchronization". Last but not least, Dr. Katia Grenier, who is heading a research team at the LAAS-CNRS, France, will give a presentation on "Microwaving Cells for Molecular, Cellular and Tissue Sensing: Which Status, Challenges and Prospects for Health and Medicine". The keynote speakers will share their visions on diverse topics of sensing technologies and applications.

The 2022 SENSORS Conference started a new initiative of inviting IEEE Sensors Journal authors to present their research work published in 2021. The invitations were based on the numbers of paper downloads on the IEEE Xplore website between January 2021 and March 2022. 95 international speakers have accepted our invitation and will present their works in the 17 oral sessions. Besides these, on Oct. 30, 6 tutorials will be offered in two tracks. On Nov. 1, as part of the Industry Day programs, two oral Industry Track sessions will host 7 invited industry experts on standards, product research and development. Panel discussion in these two sessions will provide an opportunity for sharing industry and commercialization experiences. On Nov. 2, at the Meet the Editors panel participants can meet and discuss with Editors-in-Chief and Topical Editors of Sensors Council sponsored journals, including IEEE Sensors Journal, IEEE Sensors Letters, IEEE Internet of Things Journal, and IEEE Journal on Flexible Electronics.

2022 SENSORS also features 17 invited international speakers in the 14 technical tracks and 3 focused session tracks. The speakers were invited according to their expertise and accomplishments in the specific tracks. This year, we received a total of 654 paper submissions, of which 389 were accepted after a rigorous peer-review process. These submissions will be presented during the conference, as 178 papers in the 32 oral presentation sessions and 211 papers in two interactive forum poster sessions. The accepted papers will be published in the Conference Proceedings and electronically archived in the IEEE Xplore digital library. Submissions were from academia (86.4 %), research facilities and government laboratories (5.5 %), industry (7.5 %), and other (0.6 %). The submitted papers came from all the regions of the world, with about 29.2 % from Europe, 32.7 % from Asia/Pacific, 34.1 % from North America, and about 4 % from Latin America and Middle East/Africa. Three Best Student Paper and three Best Paper awards, as well as one Best Industry Practice Paper and one Live Demo award will be presented to the awardees in the closing ceremony on Nov. 2.

The 2022 SENSORS Conference launched an initiative of promoting female researchers and leaders' participation in the organization of the conference. Twelve of the 25 organizing committee members are female. The number of female track co-chairs increased from 1 in 2021 to 8 (24.24%) in 2022. The organizing committee members and track co-chairs were nominated and invited also based on geographical balance and continuity consideration, including researchers with experience from the past conferences, while also opening the door to new volunteers who committed to serve in the next conference as well. We appreciate very much the nomination support from many researchers all over the world and feel very honored by the enthusiasm expressed by female colleagues in the IEEE technical societies and the Sensors Council.

This year, the Women in Sensors (Wise) committee will host two programs. Four female leaders in academia and industry were invited to share their research and management experiences: Prof. Elizabeth Loboa, Provost of Southern Methodist University; Prof. Celia Shahnaz from Bangladesh University of Engineering and Technology who serves as the IEEE Women In Engineering (WIE) Chair-Elect; Dr. Bérengère Lebental from CNRS, Research Director at Université Gustave Eiffel and LPICM; and Prof. Pooi See Lee from Nanyang Technological University, Singapore. An interactive panel will be facilitated for communication between the speakers and audience. For the first time in the SENSORS Conference, a Big Idea Pitch competition is sponsored by IEEE Sensors Council WiSe Committee and Young Professionals (YP) Committee to motivate young students and researchers to pursue business ideas based on their research and learn from coaches and judges how to pitch their visions.

The 2022 SENSORS organizing committee also works closely with the Sensors Council Outreach Initiative team and several Sensors Council local chapters to promote the participation of researchers who reside in Africa and Latin America. Travel grants and registration discounts are available for application. We also host a meeting for local chapter chairs for networking and discussion of promoting membership. Travel supplement grants are also available for students to apply as an effort to encourage their participation.

We invite all attendees to join us in the cowgirl/cowboy-theme welcome reception in the evening of Oct. 30, and the Gala banquet dinner followed by Texas line dance to country music on Nov. 1. On Oct 31, IEEE Sensors Council Young Professionals (YP) committee will host a YP reception for networking and old-fashion Halloween fun.

The 2022 SENSORS conference welcomes everyone to participate in the multidisciplinary conversation in order to accelerate technologies advancing sensors for benefiting and enriching humanity. We sincerely thank all the organizing committee and technical committee members for volunteering and working hard to organize this conference and for the strong support from everyone involved.

We welcome everyone with Southern Hospitality to enjoy the culture, arts, sports, sightseeing, shopping, and gastronomy in the Dallas Fort-Worth Metroplex.

We look forward to seeing y'all in Dallas. Howdy!

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Track 3: Chemical, Electrochemical and Gas Sensors

D. M. G. Preethichandra, Central Queensland University, Australia

Xiaoshan Zhu, University of Nevada Reno, USA

Hamida Hallil, Bordeaux University, France

Track 4: Microfluidics and Biosensors

Chirasree RoyChaudhuri, Indian Institute of Engineering Science and Technology (IIEST), India

Hyejin Moon, University of Texas at Arlington, USA

Track 5: Optical Sensors

Cristian Manzoni, Institute for Photonics and Nanotechnologies (IFN) - CNR, Italy

Rona Chandrawati, University of New South Wales (UNSW Sydney), Australia

Track 6: Physical Sensors: Temperature, Mechanical, Magnetic and Others

Siavash Pourkamali, University of Texas at Dallas, USA

Hadi Heidari, University of Glasgow, Scotland, UK

Dong-Weon Lee, Chonnam National University, Korea

Track 7: Acoustic and Ultrasonic Sensors

H. F. Zhang, University of North Texas, USA

Bernhard Jakoby, Johannes Kepler University Linz, Austria

Track 8: Sensor Networks and IOT

Yacine Ghamri-Doudane, La Rochelle University, France

Elena Gaura, Coventry University, UK

Henry Leung, University of Calgary, Canada

Track 9: Emerging Sensor Technologies and Applications

Mark Cheng, The University of Alabama, USA

Theerawit Wilaiprasitporn, Vidyasirimedhi Institute of Science and Technology, Thailand

Track 10: Sensor Systems: Signals, Processing and Interfaces

Sara Moccia, The BioRobotics Institute and Department of Excellence in Robotics & AI, Scuola Superiore Sant'Anna, Italy

Boby George, Indian Institute of Technology Madras, India

Track 11: Actuators, Energy Harvesting and Powering Sensors

Smitha Rao Hatti, Michigan Technological University, USA

D. Kourtiche, Lorraine University, France

Track 12: Sensor Data Processing

Marco Jose da Silva, Federal University of Technology Parana, Brazil

Valérie Renaudin, University Gustave Eiffel, France

Track 13: Wearable Sensors and Systems

Hung Cao, UC Irvine, CA, USA

John S. Ho, National University of Singapore, Singapore

Track 14: Sensors in Industrial Practices

Stephen F. Bart, MEMS Sensor Business Group || TDK - InvenSense, USA

J. P. Brusey, Coventry University, UK

Track 15: Live Demonstration of Sensors and Sensing Technologies

Tao Li, University of Cincinnati, USA

Calogero Maria Oddo, Sant'Anna School of Advanced Studies, Pisa, Italy

Track 16.1 Focused Session: In-field Detection of Chemical, Biological and Security Threats

Eduard Llobet, Universitat Rovira i Virgili, (URV) Spain

M.P. Pina, Instituto de Nanociencia y Materiales de Aragón (CSIC-Unizar). Chemical & Environmental Engineering Department, University of Zaragoza, Spain

Track 16.2 Focused Session: Microwave and Hot Carrier based Sensors

Karthik Shankar, University of Alberta, Canada

Mohammad Hossein Zarifi, The University of British Columbia, Canada

Track 16.3 Focused Session: Bio-Remote Sensing and Integrated Artificial Intelligence Systems

Kianoush Rassels, TU-Delft, The Netherlands

Paddy French, TU-Delft, The Netherlands

Track 16.4 Focused Session: Photoplethysmography Sensors and Applications

Antti Vehkaoja, Tampere University, Finland

Christoph Hoog Antink, Technical University Darmstadt, Germany

Track 16.5 Focused Session: Nanomaterials based Sensors

Sameer Sonkusale, Tufts University, USA

Shideh Kabiri Ameri, Queen's University, Canada

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SENSORS JOURNAL

The IEEE Sensors Journal is a peer-reviewed, semi-monthly online journal devoted to sensors and sensing phenomena. The first issue of IEEE Sensors Journal published in the year 2001 after the motion for its approval was passed at the February 2000 TAB meeting.

4.325	0.037	0.636
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The fields of interest of the IEEE Sensors Journal are the theory, design , fabrication, manufacturing and applications of devices for sensing and transducing physical, chemical and biological phenomena, with emphasis on the electronics and physics aspect of sensors and integrated sensors-actuators. IEEE Sensors Journal deals with the following:

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- Chemical and Gas Sensors
- Microfluidics and Biosensors
- Optical Sensors
- Physical Sensors: Temperature, Mechanical, Magnetic, and others
- Acoustic and Ultrasonic Sensors
- Sensor Packaging
- Sensor Networks
- Sensor Applications
- Sensor Systems: Signals, Processing, and Interfaces
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- Sensors in Industrial Practice

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IEEE SENSORS LETTERS

IEEE Sensors Letters is an electronic journal dedicated to publishing short manuscripts, quickly, on the latest and most significant developments in the field of sensors. The quick turnaround is motivated by a desire to perform a vital function: efficient publication of papers that require urgent dissemination. The scope of the journal includes all aspects of sensors and sensing technology including the theory, design, fabrication, manufacturing, signal processing, interface circuits and applications of devices for sensing and transducing physical, chemical and biological phenomena. Papers are limited to 4 pages with the stipulation that at least one column of each paper be devoted exclusively to references.

IEEE Sensors Letters is a hybrid Open Access journal. For a fee, authors have the option of making their articles freely available to all.

KEYNOTE - MONDAY, OCTOBER 31, 2022

Brain-Behavior Quantification and Synchronization

Sarah Lisanby, Director, Division of Translational Research, National Institute of Mental Health (NIMH), USA

Behavior is the primary output of the brain, so understanding its neural origins is key to advancing neuroscience and supporting brain health. Understanding behavior in its full complexity requires a detailed, multidimensional analysis of a broad range of behaviors in the context of the environment. Tools for quantifying neural activity with high temporal and spatial resolution already exist, but behavior is often measured at lower resolution, making discovery of causal linkages challenging. Tools for measuring the full richness of species-appropriate behaviors, and synchronizing these to neural activity, are presently lacking. Recognizing this gap, the Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Initiative 2.0 Report calls for more sophisticated methods of quantifying behavioral, environmental, and internal state influences on individuals. This talk will survey the current state of the art of brain-behavior quantification and synchronization, highlighting gaps where novel tool development could make a transformative impact. We envision opportunities to link brain and behavior at the same resolution in real time, to bring neural recording into real world settings with ambulatory systems, to infer internal states from quantified behaviors, and artificial intelligence tools to decode internal states from tagged neural activity. Realizing that vision will entail the development of novel sensors, data fusion platforms, and advanced computational approaches for high dimensionality and multi-modal data streams. New paradigms to establish causal relationships between neural activity and behavior across species may ultimately enable the development of closed-loop therapeutic interventions for patients with complex neurobehavioral disorders that currently lack effective treatments.

Smart Sensing: Mixed Signal Active Sensing for Precision and Energy Efficiency

Baher Haroun, Senior Fellow, FIEEE, Kilby Labs, Texas Instruments Inc., USA

Many sensing methods have been used for decades to measure fundamental parameters. There is increasing need for more precise, lower cost and more pervasive sensing, driven by autonomous vehicles, robotics, industrial automation, security and health/wellness needs. This talk will go over multiple active sensing examples to highlight methods where mixed signal monitoring around the sensor or Actuator/Sensor can enhance precision and/or energy efficiency. Examples in magnetic, ultrasonic, mmWave and optical sensing systems will be discussed.

KEYNOTE - WEDNESDAY, NOVEMBER 2, 2022

Microwaving Cells for Molecular, Cellular and Tissue Sensing: Which Status, Challenges and Prospects for Health and Medicine

Katia Grenier, LAAS-CNRS, France

Microwaves and millimeterwaves constitute a current and quasi ubiquitous element of our surrounding and living environment. They are not only used for rapid food heating but also widely known and increasingly exploited for wireless communications, automotive radars, home automation and now with the explosion of data transfer from connected objects. In addition, microwave and millimeterwave dielectric spectroscopy is a powerful technique to non-destructively and non-invasively sense materials. This method exploits the interaction of the electromagnetic field with matter and probes the dynamics of molecule reorientation, predominantly water molecules with its relaxation phenomenon centered around 20 GHz for bulk water, and the variations between the bulk and bounded contributions. Investigations such as macroscale moisture content measurements in agronomy, water detection in soils have been successfully carried out and exploited in industry. Dealing with biological research and biomedical applications, where non-invasive, label-free and contact-less abilities as well as in-liquid measurements constitute important leitmotivs, investigations have been conducted for long with a strong emphasis on microwave imaging for cancer detection, as well as treatments and ablations with localized heated probes. With the advent of microtechnologies and the miniaturization of microwave sensors in association to microfluidic implementations, the non-destructive and label-free analysis of molecules, cells and tissues by microwave dielectric spectroscopy has become possible. The talk will therefore provide a status on the developed sensors and the associated instrumentation, as well as on the reached sensing capabilities demonstrated on different biological and living materials and at different scales, from the molecular, cellular to the tissue level and more recently with the microtissues. It will more particularly highlight the major challenges that needed to be addressed and the remaining ones to face. Based on the illustration of the main achievements, prospects will be given towards a better biological understanding, the early diagnostic of diseases and their treatment, and towards personalized medicine.

Tutorials - SUNDAY, OCTOBER 30, 2022

Sensing using THz radiation

Michael S. Shur, Rensselaer Polytechnic Institute, USA

Terahertz sensing is enabling technology for detection of biological and chemical hazardous agents, cancer detection, detection of mines and explosives, providing security in buildings, airports, and other public space, short-range covert communications (in THz and sub-THz windows), and applications in radioastronomy, space research, defense, VLSI fabrication, and hardware cyber security. Sub-THz detection will become the key technology for the WIFI 6G enabled by Si CMOS at 3 nm and below technology nodes. This tutorial will review the-state-of-the-art of existing THz sources, detectors, sensing systems, and applications.

Printed Nanostructures Based Sensors

Ravinder Dahiya, University of Glasgow, UK

Semiconducting nanostructures such as nanowires (NWs) and Nanoribbons (NRs) have attracted significant attention in recent years for various type of sensing as they offer attractive physical, chemical and optical properties. They have been developed using conventional micro/nanofabrication methods as well as using printing technologies. The latter is particularly attractive because of resource efficiency of printing methods and that they could open interesting avenues for next generation manufacturing of sustainable electronics. As a result, the nanostructure based electronic layers have been printed on different types of substrates to develop sensors, energy devices, and electronic devices and circuits in flexible form factors. This tutorial will present such recent advances related to printed nanostructures-based sensors. The tutorials will cover topics such as – semiconducting nanowire growth mechanisms, methods for printed electronics layers, fabrication of various sensors (photodetectors, touch, temperature, bio/chemical etc.) based on printed nanostructures, and application of these sensors in robotics, prosthetics and wearable systems.

Low Power Sensors and Machine Learning for Industrial IoT

Nan Xie, University of Calgary, Canada
Henry Leung, University of Calgary, Canada

It is believed that low power and ultra-low power sensors would outnumber any other IoT devices by 2030. LPWAN (Low Power, Wide Area Network) technology has stood out as a promising low cost, long-range solution that enables battery-powered or energy-harvesting sensors to provide multiple years of services. In this tutorial, we will provide a comprehensive overview of LPWAN and compare various technologies including LoRa, Sigfox, ZigBee, BLE, LTE-M, and NB-IoT etc. Industrial battery-powered sensor applications for smart cities and field study for underground sensor deployment will be illustrated. We will also walk through the end-to-end data integration steps from sensors, radio gateway, network server to the loud data platform using real life use case examples. Important security challenges and best practices for battery-powered sensors will be elaborated. Since low power sensors are constrained by power and resources, integration with computationally intensive Machine Learning (ML) for intelligent processing and decision making becomes a unique challenge. This tutorial will discuss and review various methods for applying ML to low power sensor solutions, including traditional centralized learning, federated ML, and TinyML for edge computing. Development trend and future research opportunities for low power sensors will also be presented.

Optical Fibre Sensors - Past, Present and Future

Gilberto Brambilla, University of Southampton, UK

Optical Fibre Sensors represents a 2 billion dollar market, which is expected to reach $ 4 billions by the end of the decade. This tutorial will provide a review of the most important sensors, including distributed optical fibre sensors, gyroscopes, chemical sensors, electromagnetic sensors, focusing on the sensing principles and the main applications. The review will also investigate prospects for future developments and possible future research in the field.

Trends for Wearable and Medical Devices

Subhas Chandra Mukhopadhyay, Macquarie University, Australia

An increase in world population along with a significant aging portion is forcing rapid rises in healthcare costs. The healthcare system is going through a transformation in which continuous monitoring of inhabitants is possible even without hospitalization. Moreover, independent lifestyle and the need forces almost one-third of population in cities to live alone which increases the possibility of unforseen incidents. The advancement of sensing technologies, embedded systems, wireless communication technologies, nano-technologies, and miniaturization makes it possible to develop smart medical systems to monitor activities of human beings continuously. Wearable sensors detect abnormal and/or unforeseen situations by monitoring physiological parameters along with other symptoms. Therefore, necessary help can be provided in times of dire need. This tutorial reviews the latest reported systems and the trends on wearable and medical devices to monitor activities of humans and issues to be addressed to tackle the challenges.

Emerging Multivariable Gas Sensors: Moving on Beyond the Midlife Crisis of Gas Sensor Arrays

Radislav A. Potyrailo, GE Research, USA

Contemporary demanding gas-monitoring needs are bringing existing gas sensor designs to their fundamental performance limits in their accuracy and stability in real-world deployments. This tutorial will focus on bridging the gap between existing and required gas detection capabilities as provided by available single-output sensors, sensor arrays, and traditional analytical instruments. We will stimulate scientific and engineering senses of attendees by (1) posing "quiz" questions on design rules of traditional analytical instruments, (2) posing questions on possibilities for new principles of gas sensing and (3) by demonstrating on how these questions are addressed in building multivariable sensors that provide new performance capabilities. We will show how individual multivariable gas sensors are designed based on multi-dimensional response principles to overcome insufficient multi-gas selectivity and stability of existing single-output sensors and sensor arrays. Such performance is attractive in scenarios when traditional analytical instruments cannot be used because of their size, power, and periodic maintenance requirements. By the end of the tutorial, attendees will have a good understanding of design rules for building stable multi-gas sensors, will see practical examples of operation of multivariable gas sensors, and will relate to how these sensors may be utilized in their envisioned applications.

Program Grid – Sunday, October 30

Time		
8.30		
9:00 9:30 10:00	Registration **Room: Trinity A**	
10:30 11.00 11.30	Printed Nanostructures Based Sensors **Room: Cumberland FG**	Sensing using THz radiation **Room: Cumberland L**
12.00 12:30 13.00	Lunch **Room: Reunion E**	
13.30 14:00 14.30	Trends for Wearable and Medical Devices **Room: Cumberland FG**	Optical Fibre Sensors - Past, Present and Future **Room: Cumberland L**
15:00	Coffee Break **Room: Reunion Foyer**	
15:30 16:00 16.30	Emerging multivariable gas sensors. moving on beyond the midlife crisis of gas sensor arrays **Room: Cumberland FG**	Low Power Sensors and Machine Learning for Industrial IoT **Room: Cumberland L**
17:00 17:30		
18.00 18:30 19.00 19:30	**Welcome Reception**	

Program Grid - Monday, October 31

Monday, October 31, 2022

Time	Session
7:00 – 8:00	Registration — Room: Trinity A
8:30	Opening Ceremony — Room: Riverview Ballroom
9:00 – 9:30	Keynote — Room: Riverview Ballroom
10:00	Coffee Break — Room: Marsalis A

Parallel Sessions (10:30 – 11:30)

- Sensor Materials, Fabrication & Packaging — Room: Cumberland F
- Microfluidics & Biosensors I — Room: Cumberland G
- Ultrasonous Physical Sensors — Room: Cumberland H
- Biomedical Applications — Room: Cumberland J
- Vibrations I — Room: Cumberland K
- Journal Presentations - Introduction — Room: Cumberland L
- Journal Presentations - Optical Technologies — Room: Cumberland B

Time	Session
12:00 – 13:00	Lunch — Room: Marsalis B
13:30 – 15:00	Poster Session — Room: Marsalis A
15:30	Coffee Break — Room: Marsalis A

Parallel Sessions (16:00 – 17:00)

- Microfluidics & Biosensors II — Room: Cumberland F
- Force & Pressure Sensors — Room: Cumberland G
- Emerging Sensor Applications — Room: Cumberland H
- Biomedical Sensor Systems & Signal Processing — Room: Cumberland J
- Journal Presentation - Smart Cyber-Physical — Room: Cumberland K
- Journal Presentation - Radar Sensing — Room: Cumberland L
- Acoustic & Ultrasonic Sensors — Room: Cumberland B

Time	Session
	NSE Poster Session — Room: Cumberland L
	Best Paper Evaluation — Room: Pegasus Ballroom A
17:30 – 18:30	VIP Reception — Room: Pegasus B

Program Grid – Tuesday, November 1

Tuesday November 1, 2022

Registration
Room: Trinity A

Safver Hangut
Room: Reunion Ballroom

Coffee Break
Room: Marsalis A

Lunch
Room: Marsalis B

Coffee Break
Room: Marsalis A

Gala Dinner
Room: Reunion Ballroom

Time						
10:30 / 11:00 / 11:30	Sensor Materials, Fabrication & Packaging II — Room: Cumberland F	Microfluidics & Biosensors III — Room: Cumberland G	Pressure & Temperature Sensors — Room: Cumberland H	Contactless Sensor Application — Room: Cumberland J	Wearables II — Room: Cumberland K	Journal Presentations - New Devices & Systems — Room: Cumberland L	Journal Presentations - Modeling & Phenomenology — Room: Cumberland B	Industry Track 1 — Room: Moreno AB
14:30 / 15:00	Sensor Phenomenology, Modeling & Evaluation I — Room: Cumberland F	Chemical, Electrochemical & Gas Sensors I — Room: Cumberland G	IoT & Wireless Sensor Networks — Room: Cumberland H	Energy Harvesters & Actuators Session — Room: Cumberland J	Sensor Systems & Applications — Room: Cumberland K	Focused Session: Microwave & Hot Carrier Basic Sensors I — Room: Cumberland L	Journal Presentations - Chemical & Gas Sensors — Room: Cumberland B	Big Idea Pitch Competition — Room: Cumberland A
16:00 / 16:30 / 17:00	Optical Sensors I — Room: Cumberland F	Sensors in Industrial Practices I — Room: Cumberland G	Sensor Data Processing I — Room: Cumberland H	Journal Presentations - Physical Sensing I — Room: Cumberland J	Wearables III — Room: Cumberland K	Journal Presentations - Wireless & Networking — Room: Cumberland L	Journal Presentations - Wireless & Networking Sensing — Room: Cumberland B	Industry Track 2 — Room: Moreno AB

Program Grid – Wednesday, November 2

Wednesday November 2, 2022

Time				
7:00				
7:30				
8:00	Registration Room: Trinity A			
8:30				
9:00	Katia Grenier Room: Reunion Ballroom			
9:30				
10:00	Coffee Break Room: Marsalis A			
10:30	Chemical, Electrochemical & Gas Sensors III Room: Cumberland F	Sensor Data Processing II Room: Cumberland G	Journal Presentations - Physical Sensing II Room: Cumberland H	Journal Presentations - Smart & Bio-Inspired Systems Room: Cumberland J	Journal Presentations - Silicon & CMOS Room: Cumberland K	Journal Presentations - Wearable Sensing Room: Cumberland L	Journal Presentations - Device Technologies I Room: Cumberland B
11:00				
11:30				
12:00	Lunch Room: Marsalis B			
12:30				
13:00				
13:30	Poster Session Room: Marsalis A			
14:00				Editor Forum Room: Cumberland A
14:30				
15:00	Optical Sensors II Room: Cumberland F	Sensor Network Applications Room: Cumberland G	Sensor Data Processing III Room: Cumberland H	Focused Session: Nanomaterials Based Sensors I Room: Cumberland J	Focused Session: Bio-Remote Sensing & Integrated Artificial Intelligence Systems Room: Cumberland K	Journal Presentations - Device Technologies II Room: Cumberland L
15:30				
16:00	Award Ceremony Room: Reunion Ballroom			
16:30				
17:00	Closing Remarks Room: Reunion Ballroom			

TECHNICAL PROGRAM: SUNDAY, 30 OCTOBER 2022

9:00 – 10:30
Registration
Room: Reunion Foyer

10:30 – 12:00
TUTORIAL: Printed Nanostructures Based Sensors
Ravinder Dahiya
Room: Cumberland FG
Session Chair(s): Wai Lee & J. B. Lee

10:30 – 12:00
TUTORIAL: Sensing Using THz Radiation
Michael S. Shur
Room: Cumberland L
Session Chair(s): Danling Wang, Brent Lunceford

12:00 – 13:30
Lunch
Room: Reunion E

13:30 – 15:00
TUTORIAL: Trends for Wearable and Medical Devices
Subhas Chandra Mukhopadhyay
Room: Cumberland FG
Session Chair(s): Venkat Bhethanabotia & Wai Lee

13:30 – 15:00
TUTORIAL: Optical Fibre Sensors - Past, Present and Future
Gilberto Brambilla
Room: Cumberland L
Session Chair(s): Brent Lunceford & Sue Gong

15:00 – 15:30
Coffee Break
Room: Reunion Foyer

15:30 – 17:00
TUTORIAL: Low Power Sensors and Machine Learning for Industrial IoT
Nan Xie and Henry Leung
Room: Cumberland L
Session Chair(s): Sue Gong & Danling Wang

15:30 – 17:00
TUTORIAL: Emerging Multivariable Gas Sensors: Moving on Beyond the Midlife Crisis of Gas Sensor Arrays
Radislav A. Potyrailo
Room: Cumberland FG
Session Chair(s): J.B. Lee & Venkat Bhethanabotla

18:00 – 20:00
Welcome Reception
Room: Marsalis B

TECHNICAL PROGRAM: MONDAY, 31 OCTOBER 2022

7:00 – 8:30
Registration
Room: Reunion Foyer

8:30 - 9:00
Opening Ceremony
Room: Reunion Ballroom

9:00 - 10:00
KEYNOTE: Brain-Behavior Quantification and Synchronization
Sarah Lisanby
Room: Reunion Ballroom
Session Chair(s): J.-C. Chiao & Zeynep Celik

10:00 – 10:30
Coffee Break
Room: Marsalis A

10:30 - 12:00
Sensor Materials, Fabrication & Packaging I
Room: Cumberland F
Session Chair(s): Arum Han & Hyejin Moon

10:30
2668: INVITED:Large-Scale 2D Surface-Micromachined Optical Ultrasound Transducer (SMOUT) Array for 3D Acoustic Tomography
Zhiyu Yan, Jun Zou
Texas A&M University, United States

11:00
2128: Combining Electrothermal Actuation with Piezoelectric Actuation and Sensing in a Dynamic Mode AFM Microcantilever
Hazhir Mahmoodi Nasrabadi, Nastaran Nikooienejad, M. Bulut Coskun, S. O. Reza Moheimani
University of Texas at Dallas, United States

11:15
2202: Design of Density-Variable Devices for Excretable Rumen Sensors for Cattle
Yusuke Yashiro, Michitaka Yamamoto, Seiichi Takamatsu, Toshihiro Itoh
University of Tokyo, Japan

11:30
2578: An Inkjet-Printed Piezoresistive Bidirectional Flow Sensor
Debarun Sengupta{2}, Srikanth Birudula{2}, Heinrich Wortche{1}, Ajay Giri Prakash Kottapalli{2}
{1}Hanze University of Applied Sciences, Netherlands; {2}University of Groningen, Netherlands

11:45
2215: A Fully Integrated Miniatured Capacitive Angle Encoder Based on MEMS Fabrication and ASIC Implementation
Jiahui Shi, Hua Liao, Bowen Xing, Bin Zhou, Qi Wei, Rong Zhang
Tsinghua University, China

10:30 – 12:00
Microfluidics & Biosensors I
Room: Cumberland G
Session Chair(s): Weihua Guan & Chirasree RoyChaudhuri

10:30
2664: INVITED: Lab-on-a-Smartphone (LOS): A Smartphoneintegrated, Optoelectrowetting-Driven Environmental Sensor for On-Site Detection of Water Quality
Si Kuan Thio{1}, Sung-Yong Park{2}
{1}National University of Singapore, Singapore; {2}San Diego State University, United States

11:00
2485: Ex Vivo Blood Viscosity Monitoring with Piezoelectric MEMS Resonators
Michael Schneider{2}, Júlia Santasusagna{2}, Ingrid Anna Maria Magnet{1}, Ulrich Schmid{2}
{1}Medical University of Vienna, Austria; {2}Technische Universität Wien, Austria

11:15
2113: A Miniature Microclimate Thermal Flow Sensor for Horticultural Applications
Dennis Alveringh{3}, Daniël Bijsterveld{1}, Tomas van Den Berg{1}, Henk-Willem Veltkamp{1}, Kevin Batenburg{1}, Remco Sanders{1}, Joost Lötters{2}, Remco Wiegerink{1}
{1}University of Twente, Netherlands; {2}University of Twente and Bronkhorst High-Tech B.V., Netherlands; {3}University of Twente and Salland Engineering Europe B.V., Netherlands

11:30
2205: Tunable Microfluidic Chip for Single-Cell Deformation Study
Ruiyun Zhang, Shuaihua Zhang, Ziyu Han, Xuexin Duan
Tianjin University, China

11:45
2067: Modular Microfluidic PDMS Blocks Using a Magnetic Connection System
Rafael Ecker, Manuel Langwiesner, Tina Mitteramskogler, Andreas Fuchsluger, Marcus Hintermüller, Bernhard Jakoby
Johannes Kepler University Linz, Austria

10:30 – 12:00
Miscellaneous Physical Sensors
Room: Cumberland H
Session Chair(s): Hadi Heidari & Massood Tabib-Azar

10:30
2674: INVITED: Near-Zero Power Integrated Microsystems for the IoT
Matteo Rinaldi
Northeastern University, United States

11:00
2380: A Wireless, Zero-Power and Multiplexed Sensor for Wound Monitoring
Zhilu Ye, Minye Yang, Nabeel Alsaab, Pai-Yen Chen
University of Illinois Chicago, United States

11:15
2087: A Magnetic Sensor Based on a Nanometric Spin Transfer Torque
Magnetic Tunnel Junction Suitable for Monolithic Integration
Hugo Nicolas{2}, Ricardo Sousa{1}, Ariam Mora-Hernández{1}, Ioan-Lucian
Prejbeanu{1}, Luc Hebrard{4}, Jean-Baptiste Kammerer{4}, Joris Pascal{3}
{1}CEA Spintec, France; {2}FHNW, Switzerland; {3}University of Applied Sciences
and Arts Northwestern, Switzerland; {4}University of Strasbourg, France

11:30
2474: An X-Band Microwave Thermoelectric Power Detector in 0.18-μm CMOS
Technology
Jian-Hua Li, Xiaoping Liao
Southeast University, China

11:45
2023: Influence of Size Effect on Dynamic Characteristics of Hot-Film Wall Shear
Stress Sensor
Peng Pang, Binghe Ma, Zhonggang Zhang, Jian Luo, Jinjun Deng
Northwestern Polytechnical University, China

10:30 - 12:00
Biomedical Applications
Room: Cumberland J
Session Chair(s): Theerawit Wilaiprasitporn & Jose L. Contreras-Vi

10:30
2672: INVITED:Towards Low-Cost, Wearable, Wireless EEG-Based Headset for
Closed-Loop BCI Applications
Jose Contreras-Vidal{2}, Alexander Craik{2}, Jose Gonzalez-Espana{2}, Ayman
Alamir{1}, Jeff Feng{2}
{1}University of Houston, United States; {2}University of Houston, United States

11:00
2097: Millirobot Magnetic Manipulation for Ocular Drug Delivery with Sub
Millimeter Precision
Céline Vergne{2}, José Inácio{2}, Thomas Quirin{2}, David Sargent{1}, Joris
Pascal{2}
{1}Magnebotix AG, Switzerland; {2}University of Applied Sciences and Arts
Northwestern, Switzerland

11:15
2477: Terahertz Detection of Deoxyribonucleic Bases, Viruses and Nano Particles
Massood Tabib-Azar
University of Utah, United States

11:30

2659: Classification of Colorectal Cancer Polyps via Transfer Learning and Vision-Based Tactile Sensing

Nethra Venkatayogi{2}, Ozdemir Can Kara{2}, Jeff Bonyun{2}, Naruhiko Ikoma{1}, Farshid Alambeigi{2}
{1}MD Anderson Cancer Center, United States; {2}University of Texas at Austin, United States

11:45

2046: Flexible Multilayer Tactile Sensor on a Soft Robotic Fingertip

Sriramana Sankar{2}, Ariel Slepyan{2}, Mark Iskarous{2}, Wen-Yu Cheng{1}, Rene Debrabander{2}, Jinghua Zhang{2}, Arnav Gupta{3}, Nitish Thakor{2}
{1}Florida Atlantic University, United States; {2}Johns Hopkins University, United States; {3}University of Illinois Chicago, United States

10:30 – 12:00
Wearables I
Room: Cumberland K
Session Chair(s): Antti Vehkaoja & John Ho

10:30

2670: INVITED: Photoplethysmograpy – the Present and Future Workhorse of Wearable Physiological Monitoring

Steven LeBoeuf
Valencell, Inc., United States

11:00

2547: Detection of Normal and Paradoxical Splitting in Second Heart Sound (S2) Using a Wearable Accelerometer Contact Microphone

Brian Sang{1}, Haoran Wen{5}, Pranav Gupta{1}, Arash Shokouhmand{6}, Samiha Khan{3}, Joseph A. Puma{4}, Amisha Patel{4}, Philip Green{4}, Negar Tavassolian{6}, Farrokh Ayazi{2}
{1}Georgia Institute of Technology, United States; {2}Georgia Institute of Technology, StethX Microsystems Inc., United States; {3}New York Institute of Technology College of Osteopathic Medicine, United States; {4}Sorin Medical P.C., United States; {5}St

11:15

2486: Sleep Monitoring with Intraorally Measured Photoplethysmography (PPG) Signals

Seyedfakhreddin Nabavi, John Cogan, Asim Roy, Brandon Canfield, Robert Kibler, Collin Emerick
Dianyx Innovations Inc., United States

11:30

2257: Wearable Bioimpedance Sensing for Quantifying Knee Health in Juvenile Idiopathic Arthritis

Emily Moise{2}, Samer Mabrouk{2}, Priya Brito{1}, Lori Ponder{1}, Sampath Prahalad{1}, Omer T. Inan{2}
{1}Emory University, United States; {2}Georgia Institute of Technology, United States

11:45
2131: A Low-Cost, Open Source Wireless Body Area Network for Clinical Gait Rehabilitation
Jack Twiddy{1}, Kaila Peterson{1}, Grace Maddocks{1}, Ryan MacPherson{2}, Ricky Pimentel{2}, Max Yates{1}, Cortney Armitano-Lago{2}, Adam Kiefer{2}, Brian Pietrosimone{2}, Jason Franz{2}, Michael Daniele{1}
{1}North Carolina State University, United States; {2}University of North Carolina at Chapel Hill, United States

10:30 - 12:00
Journal Presentations – Introduction
Room: Cumberland L
Session Chair(s): John Vig

10:30
2705: 20 Years of IEEE Sensors Journal
Sandro Carrara{1}, Gerald Gerlach{2}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Technische Universität Dresden, Germany

11:00
2695: How to Bridge the Gap Between Academic and Industry-Oriented Sensor Research
Gerald Gerlach
Technische Universität Dresden, Germany

11:30
2757: Self-Packaged, Flexible, Bendable MEMS Sensors and Energy Harvesters
Zeynep Çelik-Butler, H. M. Ashfiqul Hamid
University of Texas at Arlington, United States

11:45
2715: Frequency-Modulated MEMS Gyroscopes: a Review
Xin Zhou, Xingjing Ren, Sheng Yu, Xuezhong Wu, Dingbang Xiao
National University of Defense Technology, China

10:30 - 12:00
Journal Presentations - Optical Technologies
Room: Cumberland B
Session Chair(s): Chang-hee Won

10:30
2775: Tactile Sensing Systems for Tumor Characterization: a Review
Chang-Hee Won{3}, Jong-Ha Lee{2}, Firdous Saleheen{1}
{1}EDDA Technology Inc., United States; {2}Keimyung University, Korea; {3}Temple University, United States

10:45
2718: Towards Robust Blood Pressure Estimation from Pulse Wave Velocity Measured by Photoplethysmography Sensors
Richard Byfield, Morgan Miller, Jonathan Miles, Giovanna Guidoboni, Jian Lin
University of Missouri, United States

11:00
2691: A Hybrid Camera System for High-Resolutionization of Target Objects in Omnidirectional Images
Chinthaka Premachandra, Masaya Tamaki
Shibaura Institute of Technology, Japan

11:15
2724: Tuning Electrical Properties of Amorphous Ga2O3 Thin Films for Deep UV Phototransistors
Maria Isabel Pintor-Monroy[1], Martin Gregorio Reyes-Banda[2], Carlos Avila-Avendano[2], Manuel A. Quevedo-López[2]
[1]imec, Belgium; [2]University of Texas at Dallas, United States

11:30
2785: Deep UV Sensors Enabling Solar-Blind Flame Detectors for Large-Area Applications
Carlos Avila-Avendano[2], Maria Isabel Pintor-Monroy[2], Adelmo Ortiz-Conde[1], Jesus A. Caraveo-Frescas[2], Manuel A. Quevedo-López[2]
[1]Universidad Simón Bolívar, Venezuela; [2]University of Texas at Dallas, United States

11:45
2748: Development of an Optical Detection-Based Universal Biochemical Blood Analysis Platform
Sangeeta Palekar, Jayu Kalambe
Shri Ramdeobaba College of Engineering and Management, India

12:00 – 13:30
Lunch
Room: Marsalis B

13:30 – 15:30
WiSe Session
Room: Cumberland L
Celia Shahnaz, Bérengère Lebental, Elizabeth G. Loboa, Nanshu Lu
Session Chair(s): Hamida Hallil Abbas & Shawana Tabassum

13:30 – 15:30
Interactive Forum: Sensor Materials, Fabrication & Packaging III
Room: Marsalis A
Session Chair(s): Arum Han

2095: A Heat Conduction Structure for the Etching Process of MEMS Devices With Support Anchors
Jianjun Ma[2], Bowen Xing[2], Pu Chen[1], Bin Zhou[2], Qi Wei[2], Rong Zhang[2]
[1]East China Institute of Photo-Electron IC, China; [2]Tsinghua University, China

2142: Design and Fabrication of a Selective Sensor for the Measurement of CO Gas
Anjitha R G, Palash Kumar Basu
Indian Institute of Space Science and Technology, Trivandrum, India

2396: Ultrasensitive and Low-Cost Insole for Gait Analysis Using Piezoelectrets

Omar Ben Dali{2}, Youssef Sellami{2}, Sergey Zhukov{2}, Heinz von Seggern{2}, Niklas Schäfer{2}, Bastian Latsch{2}, Gerhard Martin Sessler{2}, Philipp Beckerle{1}, Mario Kupnik{2}
{1}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; {2}Technische Universität Darmstadt, Germany

2434: Organophosphate Pesticide Sensor Using Copper Oxide Modified on Homemade Screen-Printed Carbon Electrodes

Thithat Tantiraksachai{1}, Natnarin Pudchakarn{1}, Pattapol Punsuwan{1}, Porpin Pungetmongkol{1}, Chanchana Thanachayanont{2}
{1}Chulalongkorn University, Thailand; {2}National Science and Technology Development Agency, Thailand

2460: Silicon Nanostructure Based Surface Acoustic Wave Gas Sensor

Muhammad Izzudin Ahmad Asri{1}, Mohammed Nazibul Hasan{1}, Yusri Md Yunos{1}, Marwan Nafea{2}, Mohamed Sultan Mohamed Ali{1}
{1}Universiti Teknologi Malaysia, Malaysia; {2}University of Nottingham, Malaysia

2552: A Method of Fabricating Dielectric with Enhanced Dielectrostriction Effect by Applying Electric Field

Huiyang Yu{1}, Xin Ye{1}, Yifei Pan{1}, Chenxi Guo{1}, Zefang Chen{1}, Jiacheng Tu{1}, Zhe Wu{1}, Qingying Ren{2}, Jianqiu Huang{3}, Yifeng Li{1}
{1}Nanjing Tech University, China; {2}Nanjing University of Posts and Telecommunications, China; {3}Southeast University, China

2012: Effects of the Bias Magnetic Field and Annealing on the Magnetization of Terfenol-D Films

Keli Zhao, Yuhui Zhang, Guangyao Pei, Jian Luo, Binghe Ma
Northwestern Polytechnical University, China

2040: A Needle-Shaped Electrochemical Sensor in Platinum for Robust Monitoring of Anaesthetics

Federica Barbeni, Sandro Carrara
École Polytechnique Fédérale de Lausanne, Switzerland

2164: Integration of a Humidity Sensor with Power Electronic Applications

Weiyi Chen, Alexander Berwald, Alicia Hauke, Victoria Zimmermann, Christoph Bayer, Michael Jank
Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany

2367: Stiction Reduction in MEMS Fabrication via Naphthalene Sublimation

Hamed Nikfarjam, Sepehr Sheikhlari, Siavash Pourkamali
University of Texas at Dallas, United States

2397: ZnO Nanoparticle Printing for UV Sensor Fabrication

Hendrik Joost van Ginkel, Mattia Orvietani, Joost Romijn, Guo Qi Zhang, Sten Vollebregt
Delft University of Technology, Netherlands

2639: Stencil Printing of Low-Cost Carbon-Based Stretchable Strain Sensors

Visva Moorthy, Panagiotis Kassanos, Etienne Burdet, Eric Yeatman
Imperial College London, United Kingdom

13:30 - 15:30
Interactive Forum: Microfluidics & Biosensors IV
Room: Marsalis A
Session Chair(s): Sung-Yong Park & Hyejin Moon

2006: Sensitive Detection of Adrenaline Using Electrochemically Surface-Treated rGO-AuNPs Electrode
Haodong Lu{2}, Yue Huang{2}, Xiaoshan Zhu{2}, William R. Heineman{1}
{1}University of Cincinnati, United States; {2}University of Nevada Reno, United States

2104: Dual-Mode Annular Spoof Surface Plasmon Polariton Based THz Compact Bio-Sensors with Increased Sensitivity and Bandwidth
Anirban Sarkar{1}, G M Hasan Ul Banna{2}, Bige Unluturk{2}, Wen Li{2}
{1}Indian Institute of Technology Mandi, India; {2}Michigan State University, United States

2132: Toward an Aptasensor for Monitoring of Tacrolimus
Bang Hyun Lee, Angélica Farias-Aroche, Stefano Menegatti, Michael Daniele
North Carolina State University, United States

2169: Micro Coriolis Mass Flow Sensor with Large Channel Diameter by Wet Etching of Silicon
Qihui Yu{1}, Mahdieh Yariesbouei{1}, Remco Wiegerink{1}, Joost Lötters{2}
{1}University of Twente, Netherlands; {2}University of Twente and Bronkhorst High-Tech B.V., Netherlands

2181: Ionic Polymer Metal Composite-Based Microfluidic Flow Sensor for Bio-MEMS Applications
Paul Motreuil-Ragot, Gabriel Turcan, Bjorn de Wagenaar, Andres Hunt, Pasqualina Sarro, Massimo Mastrangeli
Delft University of Technology, Netherlands

2301: Micro Coriolis Mass Flow Sensor Based on Electroplated Nickel Tubes
Mahdieh Yariesbouei{1}, Remco Sanders{1}, Remco Wiegerink{1}, Joost Lötters{2}
{1}University of Twente, Netherlands; {2}University of Twente and Bronkhorst High-Tech B.V., Netherlands

2310: Dielectric Characterisation of Body Phantoms Using Microstrip Line Coupled Complementary Split Ring Resonators
Muhammad Qamar, Muhammad Usman Ejaz, Akram Alomainy, Mohamed Thaha
Queen Mary University of London, United Kingdom

2317: Effects of Ions on Liposome-Immobilized Biosensors for the Detection of Alpha-Synuclein
Kotaro Kamitani{1}, Masanori Sawamura{2}, Hodaka Yamakado{2}, Yuya Takahashi{1}, Carl Frederik Werner{1}, Masayuki Sohgawa{3}, Minoru Noda{1}
{1}Kyoto Institute of Technology, Japan; {2}Kyoto University, Japan; {3}Niigata University, Japan

2373: Immuno-Microfluidic System with Electrospun Polystyrene Microfibrous Reactor: Application for Rapid Salivary Cortisol Detection

Yecan Wang{2}, Hiroshi Murakami{2}, Toshihiro Kasama{2}, Shigenobu Mitsuzawa{1}, Satoru Shinkawa{1}, Ryo Miyake{2}, Madoka Takai{2}
{1}Honda Motor Co., Ltd., Japan; {2}University of Tokyo, Japan

2378: On the Effect of Hematocrit on Dielectric Blood Coagulometry Measurements

Liam Matthews, Dante Disharoon, Sina Pourang, Anirban Sen Gupta, Michael Suster, Pedram Mohseni
Case Western Reserve University, United States

2395: Colorectal Cancer Biosensor Using Vertically-Oriented Silicon Nanowires

Daniel Keefe{2}, Rasheid Smith{2}, Bingtao Gao{2}, Walla Malkawi{2}, Sean Geary{2}, Pashtoon Kasi{1}, Saima Sharif{2}, Aliasger Salem{2}, Fatima Toor{2}
{1}Cornell University, United States; {2}University of Iowa, United States

2432: Electro-Mechanical Measurement of Cardiomyocytes for Drug Toxicity Screening

Pooja P. Kanade{2}, Nomin-Erdene Oyunbaatar{1}, Dong-Su Kim{1}, Dong-Weon Lee{1}
{1}Chonnam National University, Korea; {2}MEMS and Nanotechnology Lab, Chonnam National University, Korea

2439: Microfluidic Droplet-Based High-Throughput Screening of Filamentous Fungi

Yuwen Li, Jing Dai, Won-Bo Shim, Arum Han
Texas A&M University, United States

2512: Utilizing Lateral Plate Transducer Modes for High Quality Acoustofluidics in Silicon-Based Chips

Andreas Fuchsluger{1}, Annalisa De Pastina{2}, Norbert Cselyuszka{2}, Nikolai Andrianov{2}, Ali Roshanghias{2}, Tina Mitteramskogler{1}, Rafael Ecker{1}, Thomas Voglhuber-Brunnmaier{1}, Mohssen Moridi{2}, Bernhard Jakoby{1}
{1}Johannes Kepler University Linz, Austria; {2}Silicon Austria Labs GmbH, Austria

13:30 – 15:30
Interactive Forum: Physical Sensors I
Room: Marsalis A
Session Chair(s): Hadi Heidari

2035: Fully Integrated Front-End CMOS-MEMS Transducer for Low-Cost Real-Time Breath Monitoring

Rafel Perelló-Roig, Francisca Orvay, Ivan de Paúl, Jaume Verd, Sebastia Bota, Jaume Segura
University of the Balearic Islands, Spain

2079: In Situ Resistance Trimming of Directly Deposited Thin-Film Strain Gauges

Rico Ottermann{2}, Shuowen Zhang{2}, Berend Denkena{3}, Heinrich Klemme{3}, Dennis Kowalke{3}, Michael Korbacher{1}, Folke Dencker{2}, Marc Christopher Wurz{2}
{1}Bosch Rexroth AG, Germany; {2}Leibniz University Hannover, Institute of Micro Production Technology, Germany; {3}Leibniz University Hannover, Institute of Production Engineering and Machine Tools, Germany

2102: Sensitive Stretchable Textile Transducer Based on Lycra1880/PEGDA/PEDOT:PSS

Hankai Wu, Cyril Lahuec, Fabrice Seguin, Laurent Dupont, Alexandre Khaldi
IMT Atlantique, France

2155: Reflective-Mode Submersible Microwave Sensor

Lijuan Su{1}, Pau Casacuberta{1}, Paris Vélez{1}, Jonathan Muñoz-Enano{1}, Marta Gil{2}, Ferran Martín{1}
{1}GEMMA/CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}Universidad Politécnica de Madrid, Spain

2162: An Electric Field Microsensor with Self-Compensation for Sensitivity Drift

Zhaozhi Chu{3}, Pengfei Yang{2}, Xiaolong Wen{4}, Chunrong Peng{1}
{1}Aerospace Information Research Institute, Chinese Academy of Sciences, China; {2}Beijing Information Science and Technology University, China; {3}Institute of Microelectronics of Chinese Academy of Sciences, China; {4}University of Science and Technolo

2185: Investigation of Mechanical Properties of a Smart Hydrogel-Based Impedimetric Bending Sensor Platform

Benozir Ahmed{2}, Christopher Reiche{2}, Florian Solzbacher{2}, Julia Körner{1}
{1}Leibniz University Hannover, Institute of Electrical Engineering and Measurement Technology, Germany; {2}University of Utah, United States

2200: Single Layer Piezoresistive Polyimide Pressure Sensor Based on Carbon Nanotubes

Tim Mike de Rijk{2}, Marco Antonio Cen-Puc{2}, Jan Kleine Piening{2}, Walter Lang{1}
{1}IMSAS, University of Bremen, Germany; {2}Universität Bremen, Germany

2232: Non-Orthogonality and Amplitude Mismatch of Vertical Hall Based Angular Sensors Due to In-Plane Shear Stress

Reto Besserer{2}, Yves Mermoud{2}, Tobias Gnos{2}, Serge Reymond{1}, Pavel Kejik{1}, Jens Muttersbach{1}, Christoph Würsch{2}, Samuel Huber{2}
{1}MPS Tech Switzerland Sàrl, Switzerland; {2}OST Eastern Switzerland University of Applied Sciences, Switzerland

2236: Imageless Electrical Impedance Tomography for Highly Sensitive Object Dynamics Detection

Mingde Zheng, Hassan Jahanandish, Bibek Samanta
Nokia Bell Labs, United States

2253: Light Harvesting Self-Powered Strain Sensor Using 3C-SiC/Si Heterostructure

Viet Thanh Nguyen{4}, Duy Van Nguyen{4}, La Thanh Hung Nguyen{4}, Braiden Tong{1}, Canh-Dung Tran{4}, Hidetoshi Takahashi{3}, Van Thanh Dau{1}, Nam-Trung Nguyen{1}, Dzung Viet Dao{2}, Toan Dinh{4}
{1}Griffith University, Australia; {2}Griffith University, Queensland Micro- and Nanotechnology Centre, Australia; {3}Keio University, Japan; {4}University of Southern Queensland, Australia

13:30 - 15:30
Interactive Forum: Physical Sensors II
Room: Marsalis A
Session Chair(s): Dong-Weon Lee

2268: Nano-Gap Contact MEMS Torsional Mode Acceleration Switch Wake-Up Sensor

Yul Koh{2}, Duan Jian Goh{2}, Sagnik Ghosh{2}, Han Xuan Wong{2}, Jaibir Sharma{2}, Amit Lal{1}, Eldwin J. Ng{2}, Joshua En-Yuan Lee{2}
{1}Cornell University, United States; {2}IME, Agency for Science, Technology and Research, Singapore

2358: MEMS Self-Packaged Capacitive Absolute Pressure and Force Sensors for High-Temperature Application

Muhannad Ghanam, Thomas Bilger, Frank Goldschmidtboeing, Peter Woias
Laboratory for Design of Microsystems, IMTEK, Albert-Ludwigs-Universität Freiburg, Germany

2375: A Passive Micromechanical Counting Mechanism

Philip Schmitt, Martin Hoffmann
Ruhr-Universität Bochum, Germany

2376: Contactless Sensing of Soil Electrical Conductivity Using High Frequency Electromagnetic Induction

Dorijan Špikić, Matija Švraka, Darko Vasić
University of Zagreb, Croatia

2407: Real-Time Machine Learning Enabled Low-Cost Magnetometer System

Talha Siddique, Md Shaad Mahmud
University of New Hampshire, United States

2509: A Printed Paper-Based RFID Tag for Wireless Humidity Sensing

Seyedfakhreddin Nabavi, Hossein Anabestani, Sharmistha Bhadra
McGill University, Canada

2608: Development of a FHE Based Temperature and Humidity Sensing System for Asset Monitoring Applications

Masoud Panahi, Anthony Hanson, Dinesh Maddipatla, Simin Masihi, Valliammai Palaniappan, Himanaga Rama Krishn Emani, Binu Narakathu, Bradley Bazuin, Massood Atashbar
Western Michigan University, United States

13:30 - 15:30
Interactive Forum: Ultrasonic Sensors & Sensor Systems
Room: Marsalis A
Session Chair(s): Shahrzad Towfighian & Corinne Dejous

2064: Design and Characterization of Macroscopic Indirect Photoacoustic Gas Sensor
Ananya Srivastava{1}, Yuanji Tian{2}, Achim Bittner{1}, Alfons Dehé{2}
{1}Hahn-Schickard Gesellschaft, Germany; {2}Hahn-Schickard Gesellschaft / IMTEK, Albert-Ludwigs-Universität Freiburg, Germany

2172: Guided Wave Resonance to Identify Damage in Thin Composite Plates
Subhadeep Basu, Supriya Gain, Arijit Sinharay, Tapas Chakravarty
Tata Consultancy Services Limited TCS Research, India

2241: Effects of Droplet Volumes on Acoustothermal Heating in 128° YX LiNbO$_3$ Substrates
Pradipta Das, Yuqi Huang, Theresa Evans-Nguyen, Venkat Bhethanabotla
University of South Florida, United States

2294: Microbalance Humidity Sensors Based on Electrospun Graphene Oxide Composites
Shuo Xu, Jie He, Zhenyu Wei, Jianqiu Huang
Southeast University, China

2339: 3D Sonar on Mars
Jaime Aru{1}, Erik Verreycken{2}, Dennis Laurijssen{2}, Jan Steckel{2}
{1}Cosys-Lab University of Antwerp, Belgium; {2}Cosys-Lab, University of Antwerp, Belgium

2426: A Design and Modeling Software Tool for Prototyping for Ultrasonic Transceivers
Fred Livingston, Edward Grant
North Carolina State University, United States

13:30 - 15:30
Interactive Forum: Prototype Emerging Sensors
Room: Marsalis A
Session Chair(s): Massood Tabib-Azar & Mark Cheng

2084: Compact High-Performance Vibration Sensor Based on Single-Backplate MEMS Technology
Somu Ashutosh Goswami{1}, Christian Bretthauer{1}, Andreas Bogner{1}, Abhiraj Basavanna{1}, Sebastian Anzinger{1}, Marco Haubold{1}, Gunar Lorenz{1}, Johann Strasser{1}, Daniel Weber{1}, Lorenzo Servadei{2}, Robert Wille{3}
{1}Infineon Technologies AG, Germany; {2}Infineon Technologies AG, Technical University of Munich, Germany; {3}Technische Universität München, Germany

2292: Smart Electronic Cigarettes with Built-In Aerosol Sensors
Hao Jiang
Lawrence Technological University, United States

2369: All-Digital Plug and Play Passive RFID Sensors for Indoor Temperature and Humidity Monitoring
Xuran Zhu{1}, Qi Zhang{1}, Mark Matlin{2}, Yizheng Chen{1}, Ying Yang{1}, Tingxuan Li{1}, Wenge Zhu{1}, Yongji Wu{1}, Huijuan Zhao{1}, Rich Pollack{2}, Marek Urban{1}, Hai Xiao{1}
{1}Clemson University, United States; {2}Phase IV Engineering, United States

2391: Wireless Power Transfer Through Soil for Energizing an Underground Soil Moisture Sensor

Sheng Ding{1}, John Sanchez{1}, Aidan Jackson{1}, Shad Roundy{1}, Ramesh Goel{1}, Cody Zesiger{2}, Darrin Young{1}
{1}University of Utah, United States; {2}Utah State University, United States

2565: A Novel In-Situ Method for Measuring Soil Organic Carbon Using Photoacoustic Sensor

Md Faishal Yousuf{2}, Md Shaad Mahmud{2}, Baikun Li{1}, Yu Lei{1}, Haiying Tao{1}
{1}University of Connecticut, United States; {2}University of New Hampshire, United States

2584: A Facile Coplanar Reverse Electrowetting-on-Dielectric Configuration for More Flexible and Integratable Force/Motion Sensing Applications

Anotidaishe Moyo{1}, Muhammad Wakil Shahzad{1}, Jonathan Terry{2}, Yoshio Mita{3}, Yifan Li{1}
{1}Northumbria University, United Kingdom; {2}University of Edinburgh, United Kingdom; {3}University of Tokyo, Japan

2593: GatorByte: A Water-Quality Mapping Buoy for Locating Watershed Pollution Sources

Piyush Agade{2}, Eban Bean{2}, Robert Dean{1}, David Blersch{1}, Jose Vasconscelos{1}, Thorsten Knappenberger{1}, Eve Brantley{1}
{1}Auburn University, United States; {2}University of Florida, United States

2611: HySenSe: A Hyper-Sensitive and High-Fidelity Vision-Based Tactile Sensor

Ozdemir Can Kara{2}, Naruhiko Ikoma{1}, Farshid Alambeigi{2}
{1}MD Anderson Cancer Center, United States; {2}University of Texas at Austin, United States

2642: Toward Distributed Fiber Optic Shape Sensing of Continuum Manipulators: A Cost-Effective and Simple Manufacturing of Sensor Assembly

Nathan Nguyen, Morgan Parker, Ozdemir Can Kara, Farshid Alambeigi
University of Texas at Austin, United States

2657: Thermo-Phototronic Effect for Self-Powered Photodetector Using n-3C-SiC/p-Si Heterostructure

La Thanh Hung Nguyen{4}, Viet Thanh Nguyen{4}, Duy Van Nguyen{4}, Hoang-Phuong Phan{3}, Nam-Trung Nguyen{1}, Dzung Viet Dao{2}, John Bell{4}, Toan Dinh{4}
{1}Griffith University, Australia; {2}Griffith University, Queensland Micro- and Nanotechnology Centre, Australia; {3}University of New South Wales, Australia; {4}University of Southern Queensland, Australia

13:30 – 15:30
Interactive Forum: Data Processing & Robotics
Room: Marsalis A
Session Chair(s): Jose L. Contreras-Vi & Mark Cheng

2114: Development and Evaluation of Chip-Enabled Raised Pavement Markers for Lane Line Detection

Sachin Sharma[2], Ali Riza Ekti[1], Johan Fanas Rojas[2], Nicolas Brown[2], David Pesin[1], Chieh Wang[1], Shean Huff[1], Tim LaClair[1], Zachary Asher[2], Richard Meyer[2]
[1]Oak Ridge National Laboratory, United States; [2]Western Michigan University, United States

2267: Visible Light Positioning Using Arrays of Time-of-Flight Pixels

Zhibin Liu[2], Nobby Stevens[1], Miguel Heredia Conde[2]
[1]Katholieke Universiteit Leuven, Belgium; [2]Universität Siegen, Germany

2286: Indoor Spatial-Environment Measurement Using Ultra-Wideband Positioning System

Mayu Yoshikawa[2], Shinichiro Mito[2], Hiroshi Kanasugi[1]
[1]Locationmind inc., Japan; [2]National Institute of Technology, Tokyo College, Japan

2324: Vicarious Calibration of the TUBIN Infrared Sensor Suite

Julian Bartholomäus[2], Merlin Barschke[1], Philipp Werner[2], Enrico Stoll[2]
[1]Deutsches ElektronenSynchrotron DESY, Germany; [2]Technische Universität Berlin, Germany

2443: Low-Cost Thermal Infrared Aided Drone for Dry Patch Detection in an Intelligent Irrigation System

Harikrishnan Muraleedharan Jalajamony, Midhun Nair, Sunday Ajala, Kiara Chambers, Derricka Jones, Jailyn Battle, Patricia Mead, Renny Fernandez
Norfolk State University, United States

2521: Performance Analysis of a Postural Balance Assessment Mat Prototype Using Inertial Sensor

Maryam Ghahramani[3], Iman Hosseini[1], Damith Herath[2]
[1]Australian National University, Australia; [2]Human Centered Technology University of Canberra, Australia; [3]University of Canberra, Australia

2570: Improved Joint Estimation for Body-Mounted Motion Capture Sensors Using Human Kinematics Prior Knowledge

Shaun Stevens[2], Paulo Garcia[3], Hyong Kim[1]
[1]Carnegie Mellon University, United States; [2]Carnegie Mellon University, CMKL University, Thailand; [3]CMKL University, Thailand

2614: 3D Printed Soft Robotic Actuator with Embedded Strain Sensing for Position Estimation

Gerjan Wolterink, Stijn Kolkman, Gijs Krijnen
University of Twente, Netherlands

2562: An Effect of Limb Position in Motor Imagery Training Paradigm in Immersive Virtual Environment

Suktipol Kiatthaveephong[3], Suvichak Santiwongkarn[1], Rattanaphon Chaisaen[3], Chutimon Rungsilp[3], Tohru Yagi[2], Theerawit Wilaiprasitporn[3]
[1]Sirindhorn International Institute of Technology, Thailand; [2]Tokyo Institute of Technology, Japan; [3]Vidyasirimedhi Institute of Science and Technology, Thailand

2513: A Distributed Policy Gradient Algorithm for Optimal Coordination of Mobile Sensor Networks
Jing Wang{2}, Khanh Pham{1}
{1}Air Force Research Laboratory, United States; {2}Bradley University, United States

13:30 – 15:30
Interactive Forum: Sensor Signals, Processing & Applications
Room: Marsalis A
Session Chair(s): Sinisa Djurovic & Smitha Rao

2049: A Study on the Appropriateness of Visual-Related EEG Electrodes for Cybersickness Measurement
Seula Kye, Cho-I Moon, Jiwon Lee, Onseok Lee
Soonchunhyang University, Korea

2107: Sensor Fusion of 3D Time-of-Flight and Thermal Infrared Camera for Presence Detection of Living Beings
Moritz Oppliger, Jonas Gutknecht, Roman Gubler, Matthias Ludwig, Teddy Loeliger
ZHAW Zurich University of Applied Sciences, Switzerland

2146: IMU-Based Real Time Four Type Gait Analysis and Classification and Circuit Implementation
Che Wei Chang{1}, Jiun-Lin Yan{3}, Chen-Nen Chang{3}, Kuei-Ann Wen{2}
{1}Institute of Electronics National, Yang Ming Chiao Tung University, Taiwan; {2}Institute of Electronics, National Yang Ming Chiao Tung University, Taiwan; {3}Keelung Chang Gung Memorial Hospital, Taiwan

2147: The Assessments of Jumping Movement Quality and Control by Using IMU and its Clinical Applications
Yu-Jie Huang{1}, Jiun-Lin Yan{2}, Chen-Nen Chang{2}, Pao-Min Chu{1}, Kuei-Ann Wen{1}
{1}Institute of Electronics, National Yang Ming Chiao Tung University, Taiwan; {2}Keelung Chang Gung Memorial Hospital, Taiwan

2188: Comparative Study on Electromagnetic Tracking and Fiber Bragg Grating-Based Catheter Shape Sensing
Xuan Thao Ha{1}, Izadyar Tamadon{2}, Mouloud Ourak{1}, Gianni Borghesan{1}, Arianna Menciassi{2}, Emmanuel Vander Poorten{1}
{1}Katholieke Universiteit Leuven, Belgium; {2}Scuola Superiore Sant'Anna, Italy

2309: Data Resolution Optimisation to Address Wireless Connectivity in Infrasound Measurement Systems
Samir-Sharif El Rhaz{2}, Antoine Courtay{2}, Anthony Hue{1}, Olivier Berder{2}
{1}SeismoWave, France; {2}Université de Rennes 1, CNRS, France

2329: Construction of an Electronic Nose for Disinfectant Concentration Detection in Cold Chain Environment
Guishuai Zhang{2}, Guangfen Wei{2}, Ru Yin{2}, Nannan Shen{2}, Zhilin Zhu{2}, Jun Yu{1}
{1}Dalian University of Technology, China; {2}Shandong Technology and Business University, China

2340: Predicting Visual Stimuli from Cortical Response Recorded with Widefield Imaging in a Mouse

Daniela De Luca{1}, Sara Moccia{3}, Leonardo Lupori{2}, Raffaele Mazziotti{4}, Tommaso Pizzorusso{2}, Silvestro Micera{3}
{1}Sant'Anna School of Advanced Studies, Italy; {2}Scuola Normale Superiore, Italy; {3}Scuola Superiore Sant'Anna, Italy; {4}University of Florence, Italy

2377: Low-Power Level-Crossing Rate-Based Diver Detection System

Fran Penić{2}, Marko Gazivoda{1}, Nikola Mišković{2}, Vedran Bilas{2}
{1}INTIS d.o.o., Croatia; {2}University of Zagreb, Croatia

2490: Differential Phase Shift Detection System for High Sensitivity High Resolution Optical Sensing of Nanostructured Plasmonic Thin-Films

Guido Di Patrizio Stanchieri{1}, Andrea De Marcellis{1}, Marco Faccio{1}, Elia Palange{1}, Annalisa Scroccarello{2}, Flavio Della Pelle{2}, Dario Compagnone{2}
{1}University of L'Aquila, Italy; {2}University of Teramo, Italy

2518: A Highly Linear Current Steering DAC for Neural Stimulation of an Artificial Retinal Prostheses

Mohamed Taha, Khaled M. Morsi, Ahmed Naguib
Military Technical College, Egypt

2543: Preliminary Results on Sensing Pillow to Monitor Head Movement Using Strain Sensing Threads

Minghan Liu, Ruben Del-Rio-Ruiz, Atul Sharma, Cihan Asci, Rachel E. Owyeung, Sameer Sonkusale
Tufts University, United States

13:30 – 15:30
Interactive Forum: Wearables IV
Room: Marsalis A
Session Chair(s): John Ho & Theerawit Wilaiprasitporn

2051: Voice Processing by Wideband Accelerometers with Immunity to Environmental Acoustic Noise

Enrico Rosario Alessi, Ivana Guarneri, Fabio Passaniti, Michele Dellutri
STMicroelectronics, Italy

2061: Heartbeat Waveform Measurement Results of Several Persons Using a Small Card-Sized VHF-Band Hearbeat Sensor Module

Saki Wada{2}, Kengo Nishimoto{2}, Yoshio Inasawa{2}, Shintaro Izumi{1}
{1}Kobe University, Japan; {2}Mitsubishi Electric Corporation, Japan

2075: Near-Infrared Photodetectors Based on a Liquid Crystalline Organic Semiconductor for Photoplethysmography Applications

Shahriar Kabir, Yukiko Takayashiki, Jun-Ichi Hanna, Hiroaki Iino
Tokyo Institute of Technology, Japan

2077: vMic: A Surface Vibration Microphone

Chun-Ming Huang, Fu-Cheng Cheng, Jin-Ju Chue, Wei-Lin Lai, Yi-Jie Hsieh, Chih-Chyau Yang, Chien-Ming Wu
Taiwan Semiconductor Research Institute, Taiwan

2100: Wearable Pressure Sensor Suit for Real-Time Detection of Incorrect Exercise Techniques

Ivin Kuriakose, Shirley Chauhan, Anis Fatema, Aftab Hussain
International Institute of Information Technology, Hyderabad, India

2110: Radiooculogram (ROG) for Eye Movement Sensing with Eyes Closed

Zijing Zhang, Edwin Kan
Cornell University, United States

2138: Highly Sensitivity and Resolution Pseudocapacitive Iontronic Sensor Within Wide Working Range for Underwater Disturbance Detection

Chengxiu Yang, Shaowei Wu, Jiafei Hu, Mengchun Pan, Weicheng Qiu, Peisen Li, Junping Peng, Qi Zhang
National University of Defense Technology, China

2201: Effects of Sensor Design on the Performance of Wearable Sweat Monitors

Zixin Wang{2}, Aula Alwattar{2}, Peter Quayle{2}, John Batchelor{1}, Alexander Casson{2}
{1}University of Kent, United Kingdom; {2}University of Manchester, United Kingdom

2210: A Sensorized High Heel Footwear for Gait Analysis

Francesca Giannetti, Lucia Arcarisi, Carlotta Marinai, Francesco Di Rienzo, Carlo Vallati, Nicola Carbonaro, Alessandro Tognetti
University of Pisa, Italy

2230: A Synthetic Seismocardiogram and Electrocardiogram Generator Phantom

Mohammad Nikbakht, David J. Lin, Asim H. Gazi, Omer T. Inan
Georgia Institute of Technology, United States

2233: Gait Monitoring Using an Ankle-Worn Stereo Camera System

Jiangang Chen{1}, Jianwei Ke{2}, Francis Lu{2}, Jayer Fernandes{2}, Barbara King{2}, Yu Hen Hu{2}, Hongrui Jiang{2}
{1}University of Wisconsin-Madison, United States; {2}University of Wisconsin–Madison, United States

2279: A 3D-Printed Wearable Ring Sensor for Long-Term Accurate Monitoring of Human Cardiovascular Condition

Brendon Young{2}, Weijie Luo{1}, Darrin Young{1}
{1}University of Utah, United States; {2}West High School, United States

13:30 - 15:30
Interactive Forum: Wearables V
Room: Marsalis A
Session Chair(s): Hung Cao & Shawana Tabassum

2306: Capacitive Tactile Sensor with Stacked Structure and Hybrid Fabrication for Multiaxial Force Decoupling

Jie-Ying Wu{2}, Padmanabh Pancham{2}, Tzu-Yi Hsu{2}, Anupam Mukherjee{1}, Cheng-Yao Lo{2}
{1}General Silicones, Taiwan; {2}National Tsing Hua University, Taiwan

2330: A New Type of Respiration Sensing System for Continuous Monitoring
Mahdi Shaban, Daniel Spencer, Neil White
University of Southampton, United Kingdom

2364: Comparison of Electrode Configurations for Impedance Plethysmography Based Heart Rate Estimation at the Forearm
Kardelen Yilmaz{2}, Akinlabi Adeyemi{2}, Christoph Hoog Antink{3}, Antti Vehkaoja{1}
{1}Tampere Univeersity, Finland; {2}Tampere University, Finland; {3}Technische Universität Darmstadt, Germany

2438: Porous Silicon-Based Microspectral Unit for Real-Time Moisture Detection in a Battery-Less Smart Mask
Harikrishnan Muraleedharan Jalajamony, Renny Fernandez
Norfolk State University, United States

2451: Visualization of Body Supporting Force Field of the Elderly in Everyday Environment
Ayano Nomura, Yoshifumi Nishida
Tokyo Institute of Technology, Japan

2487: Effects of Geometry on Performances of Optically Unobtrusive Zeolite-Based Electrodes
Venkata Deepa Kota{2}, Salvatore Andrea Pullano{1}, Antonino S. Fiorillo{1}, Ifana Mahbub{2}
{1}University "Magna Graecia" of Catanzaro, Italy; {2}University of North Texas, United States

2567: A Step Towards Design and Validation of a Wearable Multi-Sensory Smart-Textile System for Respiration Monitoring
Dhaval Solanki, Gozde Cay, Md Abdullah Al Rumon, Vignesh Ravichandran, Kunal Mankodiya
University of Rhode Island, United States

2599: Subcutaneous Remote Auto-Injector for Smartwatch Monitored Anaphylaxis
Youssef Kotb, Dina Khattab, Omar Ibrahim, Amir Haroun, Fares Fawzi, Mohamed Serry
American University in Cairo, Egypt

2623: Fruit-FIT: Drone Interfaced Multiplexed Sensor Suite to Determine the Fruit Ripeness
Nafize Ishtiaque Hossain, Shawana Tabassum
University of Texas at Tyler, United States

2654: Wearable Perspiration Volume Sensor Using Dual-Frequency Impedance Measurement
Ryo Takamatsu{1}, Shogo Amano{2}, Shintaro Izumi{1}, Hiroshi Ohta{2}, Toshikazu Nezu{2}, Yuki Noda{2}, Teppei Araki{2}, Takafumi Uemura{2}, Tsuyoshi Sekitani{2}, Hiroshi Kawaguchi{1}
{1}Kobe University, Japan; {2}Osaka University, Japan

13:30 – 15:30
Live Demonstration of Sensors & Sensing Technologies
Room: Marsalis A
Session Chair(s): Calogero Oddo & Tao Li

2066: Live Demonstration: A Trimodal Time-of-Flight Camera with Enhanced Material Imaging
Miguel Heredia Conde, Rajababu Udainarayan Singh
Universität Siegen, Germany

2156: Live Demonstration: An AI-Assisted e-Tongue for Fast and Portable Fingerprinting of Liquids
Michal Muszynski{1}, Gianmarco Gabrieli{1}, Lukas Zimmerli{1}, Yuksel Temiz{1}, Ralph Heller{1}, Aaron Cox{3}, Keiji Matsumoto{2}, Kitahiro Kaneda{4}, Patrick Ruch{1}
{1}IBM Research Europe, Switzerland; {2}IBM Research Tokyo, Japan; {3}IBM T.J. Watson Research Center, United States; {4}NAGASE & CO., LTD., Japan

2171: Live Demonstration: Mixed Reality 3D In-Air Ultrasound Applications
Dennis Laurijssen, Wouter Jansen, Jan Steckel
Cosys-Lab, University of Antwerp, Belgium

2179: Live Demonstration: VLC-Enabled Passive 3D Time-of-Flight Imaging
Faisal Ahmed{3}, Miguel Heredia Conde{3}, Paula López Martínez{1}, Thomas Kerstein{2}, Bernd Buxbaum{2}
{1}CiTIUS, University of Santiago de Compostela, Spain; {2}pmdtechnologies AG, Germany; {3}Universität Siegen, Germany

2217: Live Demonstration: KAUSTat – A Compact Reconfigurable Electrochemical Station
Jose Ilton De Oliveira Filho, Khaled Nabil Salama
King Abdullah University of Science and Technology, Saudi Arabia

2224: Live Demonstration: Hammering Test on a Wall Using Ai
Jingyuan Yang{1}, Yuma Ito{1}, Masafumi Koike{3}, Katsuhiko Hibino{2}, Atsushi Ito{1}
{1}Chuo University, Japan; {2}PORT DENSHI Corporation, Japan; {3}Utsunomiya University, Japan

2305: Live Demonstration: Novel Infrared Sensors for Self-Sustaining Contextual Intelligence
Tiago Salzmann
ETH Zürich, Switzerland

2408: Live Demonstration: Tensegrity State Estimation
Xiaonan Huang, William Johnson III, Joran Booth, Rebecca Kramer-Bottiglio
Yale University, United States

INVITED: 2503: Live Demonstration: Saliva-Based SARS-CoV-2 Self-Testing with RT-LAMP in a Mobile Device
Zifan Tang, Jiarui Cui, Aneesh Kshirsagar, Tianyi Liu, Weihua Guan
Pennsylvania State University, United States

2609: Live Demonstration: FBG-Based Artificial Skin for Touch Sensing in Collaborative Robotics
Mariangela Filosa, Valeria Facchetti, Domenico Camboni, Calogero Maria Oddo
Scuola Superiore Sant'Anna, Italy

15:30 – 16:00
Coffee Break
Room: Marsalis A

16:00 – 17:30
Acoustic & Ultrasonic Sensors
Room: Cumberland B
Session Chair(s): Haifeng Zhang & Massood Atashbar

16:00
2261: Orthogonal Surface Acoustic Wave (SAW) Sensor for Cancer Biomarker Detection with Accelerated Binding Kinetics
Yuqi Huang[2], Maëlys Boucher[1], Theresa Evans-Nguyen[2], Venkat Bhethanabotla[2]
[1]Nantes University, France; [2]University of South Florida, United States

16:15
2336: Love Wave Acoustic Sensor Response in High Turbidity Liquid Environment
Asawari Choudhari[2], Maxence Rube[2], Idris Sadli[2], Martine Sebeloue[2], Ollivier Tamarin[2], Corinne Dejous[1]
[1]University of Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; [2] University of Guyane, France

16:30
2508: Ultrasound Sensor for Process and Fouling Monitoring in Emulsion Polymerization Processes
Marco Osenberg[2], Jan Förster[1], Sören Rust[3], Thomas Fritsch[1], Jan Tebrügge[1], Werner Pauer[3], Thomas Musch[2]
[1]KROHNE Innovation GmbH, Germany; [2]Ruhr-Universität Bochum, Germany; [3]Universität Hamburg, Germany

16:45
2641: PM2.5 Particles Detection by Using a LiNbO -Based Highly Sensitive SAW Sensor
Mitali Desai, Muhammad Zubair Aslam, Shuai Ju, Haifeng Zhang
University of North Texas, United States

17:00
2386: A Re-Configurable ADC for Acoustic Phased Arrays
Waseem Hassan, Morten Jørgensen, Sven Nylund
Nortek AS, Norway

17:15
2016: A Feasibility Study on Relative Humidity Sensing Using Silicon-on-Nothing pMUTs
Mantalena Sarafianou, David Sze Wai Choong, Yul Koh
IME, Agency for Science, Technology and Research, Singapore

16:00 - 17:30
Microfluidics & Biosensors II
Room: Cumberland F
Session Chair(s): Chirasree RoyChaudhuri & Arum Han

16:00
2522: Multi-Modal, Implantable Colon Activity Sensor
Steve Majerus[1], Dario Cabal[1], Yaneev Hacohen[1], Brett Hanzlicek[3], Aref Smiley[2], Yushan Wang[4], Wentai Liu[4], Muriel Larauche[4], Mulugeta Million[4], Margot Damaser[2], Dennis Bourbeau[3]
[1]Case Western Reserve University, United States; [2]Cleveland Clinic Foundation, United States; [3]Cleveland VA Medical Center, United States; [4]University of California, Los Angeles, United States

16:15
2311: An RFID-Based Sensor for Vascular Flow Monitoring
Yaneev Hacohen, Steve Majerus
Case Western Reserve University, United States

16:30
2569: A Study of Bone Formation Subsequent to Intramedullary Fluid Pressure Fluctuations in Young and Old Rats
Muhammad Luqman Haider[2], Danyah Nashawi[1], Ziyu Chen[2], Muhammad Parvez[2], Amanda Sanchez[1], Teresa Le[1], Rhonda Prisby[1], Jeong Bong Lee[2]
[1]University of Texas at Arlington, United States; [2]University of Texas at Dallas, United States

16:45
2533: Implantable and Bioresorbable Nanostructured Fluorescence Sensor for In Vivo pH Monitoring
Martina Corsi[3], Alessandro Paghi[3], Stefano Mariani[3], Giulia Golinelli[4], Aline Debrassi[1], Gabriella Egri[1], Giuseppina Leo[2], Eleonora Vandini[2], Antonietta Vilella[2], Lars Dahne[1], Daniela Giuliani[2], Giuseppe Barillaro[3]
[1]Surflay Nanotec, Germany; [2]University of Modena and Reggio Emilia, Italy; [3]University of Pisa, Italy; [4]University-Hospital of Modena and Reggio Emilia, Italy

17:00
2650: Miniaturized Passive Bio-Mechanical Valve for Hydrocephalus Treatment
Yuna Jung, Daniel Gulick, Jennifer Blain Christen
Arizona State University, United States

17:15
2596: A Catheter-Free Bladder Pressure-Volume Sensor
Steve Majerus[1], Brett Hanzlicek[3], Yaneev Hacohen[1], Dario Cabal[1], Dennis Bourbeau[3], Margot Damaser[2]
[1]Case Western Reserve University, United States; [2]Cleveland Clinic Foundation, United States; [3]Cleveland VA Medical Center, United States

16:00 – 17:30
Force & Pressure Sensors
Room: Cumberland G
Session Chair(s): Siavash Pourkamali & Matteo Rinaldi

16:00
2247: Free Standing Stress Amplification Structure for Ultrasensitive 3C-SiC/Si Pressure Sensor
Braiden Tong{1}, Hong-Quan Nguyen{2}, Tuan-Hung Nguyen{2}, Tuan-Khoa Nguyen{2}, Viet Thanh Nguyen{3}, Toan Dinh{3}, Trung-Hieu Vu{2}, Van Thanh Dau{1}, Dzung Viet Dao{2}
{1}Griffith University, Australia; {2}Griffith University, Queensland Micro- and Nanotechnology Centre, Australia; {3}University of Southern Queensland, Australia

16:15
2080: Stretchable Multi-Mode Sensor with Yarn Structure
Hyeongjin Jo, Yonghyeon Bae, Yujun Song, Ji-Hyeon Song
Dankook University, Korea

16:30
2299: Measurement System for Human Lateral Mandibular Forces
Sven Suppelt{2}, Romol Chadda{2}, Thomas Büchner{2}, Niklas Schäfer{2}, Robert Sader{1}, Mario Kupnik{2}
{1}Goethe University Frankfurt, Germany; {2}Technische Universität Darmstadt, Germany

16:45
2323: Multi-Axis Force Sensor for Sensor-Integrating Bolts
Felix Herbst{2}, Romol Chadda{2}, Claas Hartmann{2}, Julian Peters{1}, David Riehl{2}, Thomas Gwosch{1}, Klaus Hofmann{2}, Sven Matthiesen{1}, Mario Kupnik{2}
{1}Karlsruher Insitute of Technology, Germany; {2}Technische Universität Darmstadt, Germany

17:00
2416: Miniaturized Wet-Wet Differential Pressure Sensor
Andrew Holmes{2}, Samuel Yang{2}, Michail Kiziroglou{2}, David Boyle{2}, David Lincoln{1}, Jim McCabe{1}, Paul Szasz{1}, Daryl Williams{2}, Eric Yeatman{2}
{1}ABB Ltd, United Kingdom; {1}ABB Ltd, Germany; {2}Imperial College London, United Kingdom

17:15
2209: Laser-Based Signal-Injection Attack on Piezoresistive MEMS Pressure Sensors
Tatsuki Tanaka, Takeshi Sugawara
University of Electro-Communications, Japan

16:00 – 17:30
Emerging Sensor Applications
Room: Cumberland H
Session Chair(s): Mark Cheng & Massood Tabib-Azar

16:00
2598: SAW Coupled Diamond NV- Spin Oscillators and Quantum Sensors
Massood Tabib-Azar
University of Utah, United States

16:15
2621: Fabrication and Characterization of Cellulose-Based Materials for Biodegradable Soil Moisture Sensors
Gokulanand Iyer, Anne-Marie Zaccarin, Roy Olsson III, Kevin Turner
University of Pennsylvania, United States

16:30
2618: Non-Invasive Calorimetric Sensor for Waterflow Event Detection in Premise Plumbing Systems
Chandrashekhar Choudhary, Gagan Batra, Steven Buchberger, Tao Li
University of Cincinnati, United States

16:45
2037: Electric-Leakage Detection System Based on Non-Contact Electric-Field Sensor for Remote Street Fixture Monitoring
Ryotaro Kawahara, Takashi Kawamoto
Hitachi, Ltd., Japan

17:00
2133: Real-Time Monitoring of Plant Stalk Growth Using a Flexible Printed Circuit Board Sensor
Jack Twiddy, Matthew Taggart, James Reynolds, Chris Sharkey, Thomas Rufty, Edgar Lobaton, Alper Bozkurt, Michael Daniele
North Carolina State University, United States

17:15
2246: Realtime Hand-Gesture Recognition Based on Novel Charge Variation Sensor and IMU
Elio Reinschmidt, Christian Vogt, Michele Magno
ETH Zürich, Switzerland

16:00 – 17:30
Biomedical Sensor Systems & Signal Processing
Room: Cumberland J
Session Chair(s): Preethi Preethichandra & Brent Lunceford

16:00
2673: INVITED: Hanging by a Thread: Unconventional Platform for Flexible Bioelectronics
Sameer Sonkusale
Tufts University, United States

16:30
2624: Detection of Left Ventricular Ejection Fraction Abnormality Using Fusion of Acoustic and Biopotential Characteristics of Precordium
Arash Shokouhmand{5}, Haoran Wen{4}, Samiha Khan{2}, Joseph A. Puma{3}, Amisha Patel{3}, Philip Green{3}, Farrokh Ayazi{1}, Negar Tavassolian{5}
{1}Georgia Institute of Technology, StethX Microsystems Inc., United States; {2}New York Institute of Technology College of Osteopathic Medicine, United States; {3}Sorin Medical P.C., United States; {4}StethX Microsystems Inc., United States; {5}Stevens I

16:45
2027: Eulerian Phase-Based Motion Magnification for High-Fidelity Vital Sign Estimation with Radar in Clinical Settings
Md Farhan Tasnim Oshim{3}, Toral Surti{5}, Charlotte Goldfine{2}, Stephanie Carreiro{4}, Deepak Ganesan{3}, Suren Jayasuriya{1}, Tauhidur Rahman{3}
{1}Arizona State University, United States; {2}Brigham and Women's Hospital, United States; {3}University of Massachusetts Amherst, United States; {4}University of Massachusetts Medical School, United States; {5}Yale University, United States

17:00
2042: Energy and Accuracy Characterization of a Burst-Mode Range Sensing Approach for Smart Contact Lenses
Sakthidasan Kalidasan, Chayanjit Ghosh, Adwait Deshpande, Carlos Mastrangelo, Ross Walker
University of Utah, United States

17:15
2121: VelGmat : Low Cost Gait Mat for Stance Phase Calculation
Mohammad Waqas Wani, Y Pawankumar Gururaj, Vivek Pareek, Sai Anirudh Karre, Raghu Reddy, Syed Azeemuddin
International Institute of Information Technology, Hyderabad, India

16:00 - 17:30
Journal Presentations - Smart System & AI
Room: Cumberland K
Session Chair(s): Paul C.-P. Chao

16:00
2697: The Machine Learnings Leading the Cuffless PPG Blood Pressure Sensors Into the Next Stage
Paul C.-P. Chao{2}, Chih-Cheng Wu{1}, Duc Huy Nguyen{2}, Ba-Sy Nguyen{2}, Pin-Chia Huang{2}, Van-Hung Le{2}
{1}National Taiwan University Hospital, Taiwan; {2}National Yang Ming Chiao Tung University, Taiwan

16:15
2696: Sensor-Driven Achieving of Smart Living: a Review
Theerawit Wilaiprasitporn{5}, Pitshaporn Leelaarporn{5}, Patcharapol Wachiraphan{5}, Thitikorn Kaewlee{5}, Tinnakit Udsa{5}, Rattanaphon Chaisaen{5}, Tanut Choksatchawathi{5}, Rawipreeya Laosirirat{3}, Payongkit Lakhan{5}, Phantharach Natnithikarat{4}, Ka
{1}Fudan University, China; {2}Macquarie University, Australia; {3}Ministry of Public Health, Nakhon Si Thammarat, Thailand; {4}Ruamrudee International School Bangkok, Thailand; {5}Vidyasirimedhi Institute of Science and Technology, Thailand

16:30
2706: DeepDFML-NILM: a New CNN-Based Architecture for Detection, Feature Extraction and Multi-Label Classification in NILM Signals
Lucas Nolasco{3}, André E. Lazzaretti{2}, Bruna Machado Mulinari{1}
{1}DATAPLAI, Brazil; {2}Federal University of Technology – Paraná, Brazil; {3} Federal University of Technology–Paraná, Brazil

16:45
2713: Extracting Walking Trajectories at Home from a Capacitive Proximity Sensing Floor
Stefan Janaqi{3}, Mélodie Sannier{2}, Vinicius Raducanu{1}, Valeriya Barysheva{1}, Hassan Ait Haddou{1}, Simon Pla{2}, Gérard Dray{2}, Benoît G. Bardy{2}
{1}LIFAM, National Superior School of Architecture of Montpellier, France; {2} University of Montpellier, France; {3}University of Montpellier, IMT Mines Alès, France

17:00
2778: Multispectral Biometrics System Framework: Application to Presentation Attack Detection
Mohamed Hussein{1}, Leonidas Spinoulas{5}, David Geissbühler{2}, Joe Mathai{5}, Oswin G. Almeida{4}, Guillaume Clivaz{3}, Sébastien Marcel{2}, Wael Abdalmageed{5}
{1}Alexandria University, Egypt; {2}Idiap Research Institute, Switzerland; {3}Idiap Research Institute,Martigny, Switzerland; {4}University of Southern California, United States; {5}USC Information Sciences Institute, United States

17:15
2693: Blockchain-Federated-Learning and Deep Learning Models for COVID-19 Detection Using CT Imaging
Jay Kumar{3}, Abdullah Aman Khan{2}, Jay Kumar{3}, Zakria Zakria{3}, Noorbakhsh Amiri Golilarz{3}, Simin Zhang{4}, Yang Ting{3}, Chengyu Zheng{1}, Wenyong Wang{3}
{1}Ohio State University, United States; {2}Sichuan Artificial Intelligence Research Institute, China; {3}University of Electronic Science and Technology of China, China; {4}West China Hospital of Sichuan University, China

16:00 – 17:30
Journal Presentations - Radar Sensing
Room: Cumberland L
Session Chair(s): Changzhi Li

16:00
2708: Experimental Demonstration of Accurate Noncontact Measurement of Arterial Pulse Wave Displacements Using 79-GHz Array Radar
Takuya Sakamoto, Yuji Oyamada, Takehito Koshisaka
Kyoto University, Japan

16:15
2735: A Novel Signal Processing Scheme for Static Person Localization Using M-Sequence UWB Radars
Michal Švingál{1}, Dušan Kocur{3}, Tamás Porteleky{2}, Mária Švecová{3}, Jana Fortes{3}
{1}Ilmsens GmbH, Slovakia; {2}K-Mlab Organizational Unit of Ilmsens GmbH, Slovakia; {3}Technical University of Košice, Slovakia

16:30
2730: Human Activity Classification Based on Point Clouds Measured by Millimeter Wave MIMO Radar with Deep Recurrent Neural Networks
Youngwook Kim{1}, Ibrahim Alnujaim{1}, Daegun Oh{2}
{1}California State University, Fresno, United States; {2}Daegu Gyeongbuk Institute of Science and Technology, Korea

16:45
2737: Multiradar Data Fusion for Respiratory Measurement of Multiple People
Shunsuke Iwata, Takato Koda, Takuya Sakamoto
Kyoto University, Japan

17:00
2738: Real-Time Short-Range Human Posture Estimation Using mmWave Radars and Neural Networks
Naim Dahnoun, Han Cui
University of Bristol, United Kingdom

17:15
2732: Robust Cardiac Rate Estimation of an Individual
In-Oh Choi{1}, Min Kim{2}, Jae-Ho Choi{2}, Jeongki Park{2}, Sang-Hong Park{3}, Kyung-Tae Kim{2}
{1}Korea Maritime & Ocean University, Korea; {2}Pohang University of Science and Technology, Korea; {3}Pukyong National University, Korea

17:30 – 19:00
YP Reception/Poster Session
Room: Pegasus B

TECHNICAL PROGRAM: TUESDAY, 1 NOVEMBER 2022

8:00 – 9:00
Registration
Room: Reunion Foyer

9:00 – 10:00
KEYNOTE: Smart Sensing: Mixed Signal Active Sensing for Precision and Energy Efficiency
Baher Haroun
Room: Reunion Ballroom
Session Chair(s): J.-C. Chiao & Zeynep Celik

10:00 – 10:30
Coffee Break
Room: Marsalis A

10:30 – 12:00
Industry Session
Room: Moreno AB
Session Chair(s): Srikanth Chandrasekaran

10:30
Enabling Wi-Fi devices to act as sensors
Claudi da Silva

10:52
Clinical Internet of Things and TIPPSS - Trust, Identity, Privacy, Protection, Safety and Security
Florence Hudson

11:14
Employing Photonics/Optics Based System Architectures on Next-Gen Platforms
Scott Swanson

11:36
Panel Discussion
Claudio da Silva, Florence Hudson, Scott Swanson

10:30 - 12:00
Sensor Materials, Fabrication & Packaging II
Room: Cumberland F
Session Chair(s): Jun Zou

10:30
2594: Forming Tip Electrodes on 3D Neural Probe Arrays Using Electroplated Photoresist
Behnoush Rostami, Khalil Najafi
University of Michigan, United States

10:45
2270: How to Maintain Accuracy of Open Cavity Polymer Based Relative Humidity Sensors
Christy She, Josh Wyatt, Rujuta Munje, Pavani Tenneti, Alex Thompson
Texas Instruments, United States

11:00
2542: Humidity Sensor Based on Multi-Layer Graphene (MLG) Integrated Onto a Micro-Hotplate (MHP)
Leandro Sacco, Hanxing Meng, Sten Vollebregt
Delft University of Technology, Netherlands

11:15
2559: Online Cure Monitoring of Carbon Nanotube/Polyimide Films
Marco Antonio Cen-Puc{2}, Minerva Gabriela Vargas Gleason{2}, Andreas Schander{2}, Walter Lang{1}
{1}IMSAS, University of Bremen, Germany; {2}Universität Bremen, Germany

11:30
2406: Sensor Tendons for Soft Robot Shape Estimation
William Johnson III, Anjali Agrawala, Xiaonan Huang, Joran Booth, Rebecca Kramer-Bottiglio
Yale University, United States

11:45
2134: Eutectogel Electrodes for Long-Term Biosignal Monitoring
Rachel E. Owyeung, Wenxin Zeng, Sameer Sonkusale
Tufts University, United States

10:30 – 12:00
Microfluidics & Biosensors III
Room: Cumberland G
Session Chair(s): Joost Lotters & Hyejin Moon

10:30
2056: Digital Ligation-Enabled Fluorescence-Coding PCR (dLiNC PCR) for High-Dimensional Multiplexed Nucleic Acid Detection
Joon Soo Park, Liben Chen, Tza-Huei Wang
Johns Hopkins University, United States

10:45
2103: DNA-Origami Enabled Distance-Dependent Sensing
Jeanne Elisabeth van Dongen, Jan Cornelis Titus Eijkel, Loes Irene Segerink
University of Twente, Netherlands

11:00
2274: Digital CRISPR-Based Quantification of HIV-1
Reza Nouri, Yuqian Jiang, Anthony Politza, Xiaojun Lance Lian, Weihua Guan
Pennsylvania State University, United States

11:15
2115: Development of PVC Membrane-Based Label-Free K+ Image Sensor and Imaging Extracellular K+ Dynamics in Brain Tissue
Hideo Doi{1}, Tomoko Horio{1}, Bijay Parajuli{2}, Eiji Shigetomi{2}, Youichi Shinozaki{2}, Yong Joon Choi{1}, Toshiaki Hattori{1}, Kazuhiro Takahashi{1}, Toshihiko Noda{1}, Schuichi Koizumi{2}, Kazuaki Sawada{1}
{1}Toyohashi University of Technology, Japan; {2}University of Yamanashi, Japan

11:30
2168: Fabrication of Multimodal Image Sensor Capable of Simultaneous Measurement of Pressure and pH
Mizuki Odaira{2}, Yukihiro Tatsumi{2}, Kensuke Murakami{2}, Ken Ogasahara{1}, Satoshi Shimizu{1}, Yong Joon Choi{2}, Kazuhiro Takahashi{2}, Toshihiko Noda{2}, Kazuaki Sawada{2}
{1}TOHO KASEI Co., Ltd., Japan; {2}Toyohashi University of Technology, Japan

11:45
2180: Mouse Oocyte Characterization by Electrical Impedance Spectroscopy
Yuan Cao{1}, Julia Floehr{2}, Danyil Azarkh{1}, Uwe Schnakenberg{1}
{1}RWTH Aachen University, Germany; {2}Uniklinik RWTH Aachen University, Germany

10:30 - 12:00
Pressure & Temperature Sensors
Room: Cumberland H
Session Chair(s): Dong-Weon Lee & Siavash Pourkamali

10:30
2105: Ultrathin and Flexible Sensors for Pressure and Temperature Monitoring Inside Battery Cells
Vincent Dreher{1}, Daniel Joch{1}, Harald Kren{3}, Jannik Schwarberg{2}, Michael Jank{1}
{1}Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany; {2}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; {3}VARTA Innovation GmbH, Austria

10:45
2458: Flexible Auxetic Structure as Substrates for Resistive Pressure Sensors
Hugo Oliveira, Annelot Nijkoops, Manuela Ciocca, Alejandro Carrasco-Peña, Luisa Petti, Giuseppe Cantarella, Niko Münzenrieder
Free University of Bozen-Bolzano, Italy

11:00
2484: Thin Film PZT Multimode Resonant MEMS Temperature Sensor
Wen Sui, Tahmid Kaisar, Haoran Wang, Yihao Wu, Jaesung Lee, Huikai Xie, Philip Feng
University of Florida, United States

11:15
2207: Flexible Thin-Film Temperature Sensors on Upcycled Polyethylene Terephthalate (PET) Substrates for the Circularity of Economy
Alejandro Carrasco-Peña, Federica Catania, Giuseppe Cantarella, Michael Haller, Michael Nippa, Niko Münzenrieder
Free University of Bozen-Bolzano, Italy

11:30
2636: The Breakthrough in Electrical Artificial Skin Through Strain Control in ZnO/Si Films
Cheng-Ming Huang, Shao-Hui Hsu, Chun-Chi Chen, Mei-Yi Li, Yu-Sheng Lai
Taiwan Semiconductor Research Institute, Taiwan

11:45
2348: Flexible Resistive Pressure Sensors with High Sensitivity and Wide Detection Range
Huiyang Yu[1], Zhentao Wang[1], Chuanliang Li[1], Xin Ye[1], Zhe Wu[1], Zefang Chen[1], Jiacheng Tu[1], Yifei Pan[1], Qingying Ren[2], Jianqiu Huang[3], Yifeng Li[1]
[1]Nanjing Tech University, China; [2]Nanjing University of Posts and Telecommunications, China; [3]Southeast University, China

10:30 – 12:00
Contactless Sensor Applications
Room: Cumberland J
Session Chair(s): Darrin Young & Theerawit Wilaiprasitporn

10:30
2383: Ultra-Wideband Automatic Anchor's Localization for Indoor Path Tracking
Ahmed Mahmoud, Pedro Coser, Hamza Sadruddin, Mohamed Atia
Carleton University, Canada

10:45
2568: Wireless Loose Bolt Detection with Multiple Battery-Free Backscatter Sensors
Tomoya Iwasaki, Osamu Tokumasu, Jin Mitsugi
Keio University, Japan

11:00
2288: A Low Power Infrared Sensor for Direction, Speed, Distance Finding for Contextual Intelligence
Tiago Salzmann, Michele Magno
ETH Zürich, Switzerland

11:15
2250: Passive 3D Time-of-Flight Imaging Leveraging VLC Infrastructure
Faisal Ahmed[3], Miguel Heredia Conde[3], Paula López Martínez[1], Thomas Kerstein[2], Bernd Buxbaum[2]
[1]CiTIUS, University of Santiago de Compostela, Spain; [2]pmdtechnologies AG, Germany; [3]Universität Siegen, Germany

11:30
2505: Deep Learned Ground Penetrating Radar Subsurface Features for Robot Localization
Sathira Wickramanayake, Karthick Thiyagarajan, Sarath Kodagoda
University of Technology Sydney, Australia

11:45
2541: Milliwear – A Short Range InSAR Approach for Surface Wear Inspection Using mm-Wave Radar
Amit Swain, Anwesha Khasnobish, Smriti Rani, Chirabrata Bhaumik, Tapas Chakravarty
Tata Consultancy Services Limited TCS Research, India

10:30 – 12:00
Wearables II
Room: Cumberland K
Session Chair(s): Omer Inan & Souvik Dubey

10:30
2675: INVITED: Digital Health for Medicine in the Wild
Roozbeh Jafari
Texas A&M University, United States

11:00
2342: Initial Validation of Multi-Frequency Patch-Based Impedance Pneumography in Hospital Settings
Jesus Antonio Sanchez-Perez{2}, Samer Mabrouk{2}, John Berkebile{2}, Annette Esper{1}, Philip Yang{1}, Rishikesan Kamaleswaran{1}, Omer T. Inan{2}
{1}Emory University, United States; {2}Georgia Institute of Technology, United States

11:15
2561: Kirigami-Patterned IoT-Enabled Smart Anklet to Aid Physiotherapy of Patients with Foot Injury
Tanzila Noushin, Shawana Tabassum
University of Texas at Tyler, United States

11:30
2255: Wearable Active Vibration Sensing for Mid-Activity Knee Health Assessment
Goktug Cihan Ozmen, Christopher Nichols, Lan Lan, Emily Moise, Christopher Sugino, Alper Erturk, Omer T. Inan
Georgia Institute of Technology, United States

11:45
2152: Wearable Scratching-Sound Sensing Device for Animal Healthcare
Shun Muramatsu, Emi Hira, Yasuyuki Momoi, Michitaka Yamamoto, Seiichi Takamatsu, Toshihiro Itoh
University of Tokyo, Japan

10:30 – 12:00
Journal Presentations - New Devices & Systems
Room: Cumberland L
Session Chair(s): Sinisa Djurovic

10:30
2702: Portable Sensing Devices for Detection of COVID-19: a Review
Deniz Sadighbayan, Ebrahim Ghafar-Zadeh
York University, Canada

10:45
2709: Application of Physiological Sensors for Personalization in Semi-Autonomous Driving: a Review
Edric John Cruz Nacpil{1}, Zheng Wang{2}, Kimihiko Nakano{2}
{1}Corpy & Co. Inc., Japan; {2}University of Tokyo, Japan

11:00
2763: Low-Cost, High-Performance Piezoelectric Nanocomposite for Mechanical Energy Harvesting
Nadeem Tariq Beigh, Dhiman Mallick
Indian Institute of Technology Delhi, India

11:15
2779: Development of a Fiber Bragg Grating-Enabled Clamping Force Sensor Integrated on a Grasper for Laparoscopic Surgery
Chaoyang Shi{3}, Kai Sun{3}, Ming Li{3}, Shuxin Wang{2}, Guokai Zhang{1}, Hongbin Liu{1}
{1}King's College London, United Kingdom; {2}Tianjin Key Laboratory of Molecular Optoelectronic Sciences, Tianjin University, China; {3}Tianjin University, China

11:30
2780: Direct on Chip Thermal Measurement in IGBT Modules Using FBG Technology - Sensing Head Interfacing
Siniša Djurović{2}, Shiying Chen{2}, Damian Vilchis-Rodriguez{2}, Mike Barnes{2}, Paul McKeever{1}, Chunjiang Jia{1}
{1}Offshore Renewable Energy, United Kingdom; {2}University of Manchester, United Kingdom

11:45
2692: Wide-Range Flexible Capacitive Pressure Sensors Based on Origami Structure
Huiyang Yu{1}, Xueyang Liu{1}, Chuanliang Li{1}, Zhentao Wang{1}, Yifeng Li{1}, Jianqiu Huang{2}
{1}Nanjing Tech University, China; {2}Southeast University, China

10:30 - 12:00
Journal Presentations - Modeling & Phenomenology
Room: Cumberland B
  Session Chair(s): Shawana Tabassum
10:30
2747: Subsurface Flow Path Modeling from Inertial Measurement Unit Sensor Data Using Infinite Hidden Markov Models
Laura Piho, Maarja Kruusmaa
Tallinn University of Technology, Estonia

10:45
2773: Lightweight Extended Kalman Filter for MARG Sensors Attitude Estimation
Zeyang Dai, Lei Jing
University of Aizu, Japan

11:00
2750: Modeling and Simulation of Ultrahigh Sensitive AlGaN/AlN/GaN HEMT-Based Hydrogen Gas Detector with Low Detection Limit
Arathy Varghese, Abdalla Eblabla, Khaled Elgaid
Cardiff University, United Kingdom

11:15
2783: AlGaN/GaN HEMT Ph Sensor Simulation Model and its Maximum Transconductance Considerations for Improved Sensitivity
Chitrakant Sahu, Aasif Mohammad Bhat, Nawaz Shafi, Chinnamuthan Periasamy
Malaviya National Institute of Technology, India

11:30
2777: Modeling Cameras for Autonomous Vehicle and Robot Simulation: an Overview
Asher Elmquist, Dan Negrut
University of Wisconsin-Madison, United States

11:45
2761: Simulation of High-Efficiency Resonant-Cavity-Enhanced GeSn Single-Photon Avalanche Photodiodes for Sensing and Optical Quantum Applications
Qimiao Chen, Shaoteng Wu, Lin Zhang, Weijun Fan, Chuan Seng Tan
Nanyang Technological University, Singapore

12:00 – 13:30
Lunch
Room: Marsalis B

13:30 - 15:30
WiSe-YP Big Idea Pitch Competition
Room: Cumberland A
Session Chair(s): Shawana Tabassum & Ifana Mahbub

13:30 - 15:30
Sensor Phenomenology, Modeling & Evaluation I
Room: Cumberland F
Session Chair(s): Azeemuddin Syed & Mustafa Beyaz

13:30
2421: Real-Time Qualitative and Quantitative Analysis of Saccharides Using CSRR Based RF Sensor
Kunal Wadhwani{1}, Sheena Hussaini{2}, Azeemuddin Syed{1}
{1}International Institute of Information Technology, Hyderabad, India; {2}Nokia of America Corporation, United States

13:45
2454: Multiphysics Finite-Element Modeling of the Neuron/Electrode Electrodiffusive Interaction
Federico Leva{2}, Claudio Verardo{1}, Julian Mele{1}, Pierpaolo Palestri{1}, Luca Selmi{2}
{1}Università degli Studi di Udine, Italy; {2}University of Modena and Reggio Emilia, Italy

14:00
2441: Transfer-Learning-Aided Optimization for a Low-Frequency Wideband MEMS Energy Harvester
Aylar Abouzarkhanifard, Hamidreza Ehsani Chimeh, Mohammad Al Janaideh, Ting Zou, Lihong Zhang
Memorial University of Newfoundland, Canada

14:15
2167: Dual-Band Metasurface Cross-Polarization Converter for Cancer Detection in Terahertz Band
Anirban Chaudhuri, Parama Pal, Beena Rai
Tata Consultancy Services Limited TCS Research, India

14:30
2368: Modeling the Anchor Effect for Estimating Performance Metrics of a MEMS Pirani Gauge
Manu Garg[1], Sushil Kumar[1], Dhairya Singh Arya[1], Mujeeb Yousuf[1], Yi Chiu[2], Pushpapraj Singh[1]
[1]Indian Institute of Technology Delhi, India; [2]National Yang Ming Chiao Tung University, Taiwan

14:45
2226: Design Optimization of CMOS-MEMS Staggered Vertical Comb Based Micro Scanners
Wenhao Chen[1], Mingzheng Duan[1], Hadi Tavakkoli[1], Huahuang Luo[1], Bin Zhao[1], Wibool Piyawattanametha[2], Yi-Kuen Lee[1]
[1]Hong Kong University of Science and Technology, Hong Kong; [2]King Mongkut's Institute of Technology Ladkrabang, Thailand

15:00
2160: Dual-Band Tunable Terahertz Electromagnetic Stealth Metamaterial Based on Patterned Graphene
Jingyu Chen, Rui You, Xiaomeng Bian, Lianqing Zhu, Hong Wang
Beijing Information Science and Technology University, China

15:15
2449: Vanadium Dioxide-Based High Sensitivity Dual-Heater Calorimetric Microfluidic Sensor
Yushan Zhou[1], Xiaowei Wang[1], Dibo Hou[1], Hongjian Zhang[1], Nelson Sepúlveda[2], Yunqi Cao[1]
[1]Control Science and Engineering, Zhejiang University, China; [2]Electrical and Computer Engineering, Michigan State University, United States

13:30 - 15:30
Chemical, Electrochemical & Gas Sensors I
Room: Cumberland G
Session Chair(s): Hamida Hallil & Xiaosan Zhu

13:30
2671: INVITED: Water and Air Quality Monitoring with Multi-Parameter Chemical Sensors: Managing Non-Idealities from Lab to Field

Bérengère Lebental{1}, Stephane Bila{4}, Eric Cloutet{2}, Corinne Dejous{3}, Hamida Hallil{3}, Stéphane Laporte{1}, Bernard Bobby Ngoune{3}, Guillaume Perrin{1}, Yan Ulanowski{1}
{1}COSYS-IMSE, Université Gustave Eiffel, France; {2}Université de Bordeaux, LCPO, UMR 5629, ENSCBP, IPB, France; {3}University of Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; {4}University of Limoges, CNRS, XLIM UMR 7252, France

14:00
2220: Chemical Sensor Using Dielectrophoretically Assembled Carbon Nanotube on Micro-Trenches

Daniel Sim{2}, Steve Kim{1}
{1}Air Force Research Laboratory, United States; {2}Air Force Research Laboratory / UES, Inc., United States

14:15
2488: Extracting Selectivity from the Transient Responses of a Single Coated Gas Sensor to Analyte Mixtures Using Multivariate Analysis-Based Signal Processing

Sakin Satter{1}, Nicholas Post{1}, Florian Bender{1}, Fabien Josse{1}, Antonio J Ricco{2}
{1}Marquette University, United States; {2}Stanford University, United States

14:30
2462: Investigation of pH Sensing in Viscous Salt-Added Solution by Iridium Oxide Film

Khengdauliu Chawang, Sen Bing, Jungchih Chiao
Southern Methodist University, United States

14:45
2405: Encapsulation of Gas Sensors to Operate in the Gastrointestinal Tract for Continuous Monitoring

Hen-Wei Huang{1}, David de Gruijl{1}, Philip Fritz{1}, Abhijay Kemkar{1}, Ian Ballinger{1}, George Selsing{2}, Peter Chai{1}, Giovanni Traverso{2}
{1}Harvard Medical School, United States; {2}Massachusetts Institute of Technology, United States

15:00
2402: Highly Compact Multi-Spectral Non-Dispersive Infrared Gas Sensor for Large-Scale Deployment

Stephan Schröder, Benoit Wastine, Maksym Bryzgalov, Christine Hummelgård, Henrik Rödjegård, Hans Martin
SenseAir AB, Sweden

15:15
2427: Fast Vapor Detection by a Micropillar Array-Integrated Colorimetric Sensor

Timothy Palinski{1}, Bin Guan{2}, Bronwyn Bradshaw-Hajek{2}, Michael Lienhard{1}, Craig Priest{2}, Félix Miranda{1}
{1}NASA Glenn Research Center, United States; {2}University of South Australia, Australia

13:30 – 15:30

IoT & Wireless Sensor Networks
Room: Cumberland H
Session Chair(s): Elena Gaura

13:30
2669: INVITED: Edge AI-in-a-Box Framework That Bridges the Signal-to-Insight Gap
Daniel Wu
Dell Technologies, United States

14:00
2492: IoT-Based Meat Quality Monitoring System Using Computer Vision and Air Quality Sensor
Dong-Eon Kim, Ngoc-Dau Mai, Wan-Young Chung
Pukyong National University, Korea

14:15
2517: Energy Neutral Urban Noise Monitoring and Classification with LoRaWAN Based IoT
Huseyin Erdem{2}, Henry Leung{2}, Nan Xie{1}
{1}City of Calgary, University of Calgary, Canada; {2}University of Calgary, Canada

14:30
2651: Battery-Powered Wireless Sensor Network for Non-Invasive Monitoring of Water Usage Events in Premise Plumbing Systems
Chandrashekhar Choudhary, Gagan Batra, Tianshuo Wang, Toritseju Omaghomi, Steven Buchberger, Tao Li
University of Cincinnati, United States

14:45
2656: Frequency Compensated Crystal-Free 802.15.4 Wireless Radio
Alex Moreno, Kristofer Pister
University of California, Berkeley, United States

15:00
2096: Leakage Detection Using Low-Cost, Wireless Sensor Networks
Gabriel Rodriguez Gutierrez{1}, Leif Vogel{2}, Alvaro Ortiz Perez{1}, Stefan Palzer{1}
{1}Technische Universität Dortmund, Germany; {2}WoePal GmbH, Germany

15:15
2523: A 5.8 GHz Array Antenna Based on 4×4 Butler Matrix for Beamforming in 5G Network
Maryam Eshaghi, Rashid Rashidzadeh
University of Windsor, Canada

13:30 – 15:30

Energy Harvesters & Actuators Session
Room: Cumberland J
Session Chair(s): Shahrzad Towfighian & Smitha Rao

13:30
2259: INVITED: Toward CMOS-Compatible Triboelectric Generator to Operate MEMS
Mohammad Alzgool{1}, Mohammad Mousavi{1}, Benyamin Davaji{2}, Shahrzad Towfighian{1}
{1}Binghamton University, United States; {2}Northeastern University, United States

14:00
2597: An Asymmetric Adaptive Approach to Enhance Output Power in Kinetic-Based Microgenerators
Masoud Roudneshin{1}, Kamran Sayrafian{2}, Amir G. Aghdam{1}
{1}Concordia University, Canada; {2}National Institute of Standards & Technology, United States

14:15
2111: Wireless Power Transfer Closed-Loop Control for Low-Power Active Implantable Medical Devices
Fabiana Del Bono{2}, Andrea Bontempi{2}, Nicola Di Trani{1}, Danilo Demarchi{2}, Alessandro Grattoni{1}, Paolo Motto Ros{2}
{1}Houston Methodist, United States; {2}Politecnico di Torino, Italy

14:30
2577: 3D Architectures of a Thick Graphite Anode Enabled by Laser Patterning Process to Improve Capacity Density and Cycling Performance of Libs
Soma Ahmadi, Dinesh Maddipatla, Valliammai Palaniappan, Himanaga Rama Krishn Emani, Sajjad Hajian, Qingliu Wu, Massood Atashbar
Western Michigan University, United States

14:45
2214: Simultaneous Step Counting and Energy Harvesting from Piezoelectric Discs Embedded in a Shoe
Niharika Gogoi, Yuanjia Zhu, Jens Kirchner, Georg Fischer
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

15:00
2591: Theoretical Modeling and Experimental Validation of Reverse Electrowetting on Dielectric (REWOD) Through Flexible Electrodes for Self-Powered Sensor Applications
Karthik Kakaraparty{1}, Gretchen Hyer{2}, Erik Pineda{1}, Russel Reid{2}, Ifana Mahbub{1}
{1}University of North Texas, United States; {2}Utah Tech University, United States

15:15
2483: Vertical Electrostatic MEMS Aligner with Integrated Silicon Nitride Optical Waveguides
Seyedfakhreddin Nabavi, Michaël Ménard, Frederic Nabki
École de technologie supérieure, Canada

13:30 – 15:30
Sensor Systems & Applications
Room: Cumberland K
Session Chair(s): Weidong Zhou & Massood Atashbar

13:30
2616: A Gas Sensor Based on Electrically Coupled Quartz Crystal Microbalances Coated with ZIF-8
Bernardo Madeira{2}, Benzheng Xia{2}, Yuan Wang{1}, Rob Ameloot{2}, Michael Kraft{2}, Chen Wang{2}
{1}Huazhong University of Science and Technology, China; {2}Katholieke Universiteit Leuven, Belgium

13:45
2318: Identifying Benign and Malignant Breast Tumor Using Vibro-Acoustic Tactile Imaging Sensor
Nazia Rahman, Chang-Hee Won
Temple University, United States

14:00
2239: Measurement of Magnetic Particle Concentrations in Wildfire Ash via Compact NMR
Jacob Martin, Austin Downey, Mohammed Baalousha, Sang Hee Won
University of South Carolina, United States

14:15
2379: Machine Learning In-Sensors: Computation-Enabled Intelligent Sensors for Next Generation of IoT
Andrea Ronco, Lukas Schulthess, David Zehnder, Michele Magno
ETH Zürich, Switzerland

14:30
2245: A Scalable, Low-Maintenance, Smart Water Quality Monitoring System
Anastasios Malissovas{1}, Nitin Narayan{2}, Thijl Boonen{1}, Shrishail Patki{1}
{1}Imec, Holst Centre, Netherlands; {2}Imec, OnePlanet Research Center, Netherlands

14:45
2333: Phaseless FMCW Multistatic Radar
Aditi K{2}, Achanna Anil Kumar{2}, Angshul Majumdar{1}, Rokkam Krishna Kanth{2}, Tapas Chakravarty{2}, Kriti Kumar{2}, Arpan Pal{2}
{1}Indraprastha Institute of Information Technology, Delhi, India; {2}Tata Consultancy Services Limited TCS Research, India

15:00
2463: Real Time Light-Independent Slope-Failure Monitoring Using LiDAR and 2D-3D Semantic Segmentation
Yi Zhao{1}, Shaocong Wang{1}, Shiyi Liu{1}, Jiacheng Yang{2}
{1}Chang'An University, China; {2}Southeast University, China

15:15
2223: Direct Digital Frequency Synthesizer Modeling with a Re-Configurable DAC Evaluation for Electrochemical Impedance Spectroscopy
Amr Farouk{1}, Ahmed Naguib{2}, Islam Mostafa{3}, Mohamed Dessouky{1}
{1}Ain Shams University, Egypt; {2}Military Technical College, Egypt; {3}Technische Universität München, Germany

13:30 – 15:30
Focused Session: Microwave & Hot Carrier Based Sensors I
Room: Cumberland L
Session Chair(s): Mohammad Zarifi

13:30
2667: INVITED: Record Enhancement in LiDAR SNR Using Non-Classical Light
Han Liu, Phillip Blakey, Amr S Helmy
University of Toronto, Canada

14:00
2013: Nitrogen Dioxide Detection by the Utilization of MoO3-Based Gas Sensing Layer and Eight-Port Reflectometer in the Microwave Frequency Range
Dominik Grochala, Anna Paleczek, Kamil Staszek, Slawomir Gruszczynski, Artur Rydosz
AGH University of Science and Technology, Poland

14:15
2033: Spoof Plasmon Sensing for NDE Applications
William Wilson{2}, Katelyn Brinker{1}
{1}Iowa State University, United States; {2}NASA Langley Research Center, United States

14:30
2254: Phase Variation Microfluidic Permittivity Sensor Using a Dispersive Transmission Line
Amir Ebrahimi{2}, Jonathan Muñoz-Enano{1}, Paris Vélez{1}, James Scott{2}, Kamran Ghorbani{2}, Ferran Martín{1}
{1}GEMMA/CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}Royal Melbourne Institute of Technology, Australia

14:45
2277: Non-Visual and Contactless Wellness Monitoring for Long Term Care Facilities Using mm-Wave Radar Sensors
Hajar Abedi{2}, Ahmad Ansariyan{2}, Christopher Lehman{1}, Plinio Morita{2}, Jennifer Boger{2}, Alexander Wong{2}, George Shaker{2}
{1}GoldSentintel Inc, Canada; {2}University of Waterloo, Canada

15:00
2419: Raman Thermometry for Sensing of Hot Carriers in Gold Nanoparticle-Based Bimetallic Photocatalysts
Harshitha Rajashekhar, Navneet Kumar, Ajay Manuel, Mustafa Supur, Richard McCreery, Karthik Shankar
University of Alberta, Canada

15:15
2281: Bacteria Sensing Based on Multi-Mode Resonance at Microwave Regime
Hee-Jo Lee, Sun Chul Kang
Daegu University, Korea

13:30 - 15:30
Journal Presentations - Chemical & Gas Sensors
Room: Cumberland B
Session Chair(s): Tao Li

13:30
2781: Magneto-Semiconductor Resistor for Hydrogen Detection
Thomas Daniel{2}, S. Raveesh{1}, Koushik Saikia{1}, Roy P. Paily{1}
{1}Indian Institute of Technology Guwahati, India; {2}K-fab Tech Private Limited, India

13:45
2712: Cytochrome P450 2B6 Amperometric Biosensor for Continuous Monitoring of Propofol
David Ferrier, Janice Kiely, Richard Luxton
University of the West of England, United Kingdom

14:00
2749: Fabrication of a Molecular Imprinted Polyacrylonitrile Engraved Graphite Electrode for Detection of Formalin in Food Extracts
Shreya Nag, Susmita Pradhan, Debangana Das, Bipan Tudu, Rajib Bandyopadhyay, Runu Banerjee Roy
Jadavpur University, India

14:15
2755: Copper Complex-Coated Nanopatterned Fiber-Tip Guided Mode Resonance Device for Selective Detection of Ethylene
Ratnesh Kumar{1}, Shawana Tabassum{2}, Divyesh P. Kumar{1}
{1}Iowa State University, United States; {2}University of Texas at Tyler, United States

14:30
2776: Non-Enzymatic Urea Sensing Based on MWCNT Nanocomposite
Nirmal Roy, Shirsendu Mitra, Harshal B. Nemade, Tapas K. Mandal
Indian Institute of Technology Guwahati, India

14:45
2698: MEMS Gas Sensors: a Review
Mohamed Sultan Mohamed Ali, Muhammad Izzudin Ahmad Asri, Mohammed Nazibul Hasan, Mariatul Rawdhah Ahmad Fuaad, Yusri Md Yunos
Universiti Teknologi Malaysia, Malaysia

15:00
2701: Non-Dispersive Infrared Gas Sensing Technology: a Review
Ravindra Jha
Indian Institute of Technology Guwahati, India

15:15
2700: Ammonia Sensing Performance of RGO-Based Chemiresistive Gas Sensor Decorated with Exfoliated MoSe2 Nanosheets
Ravindra Jha{2}, Aman Nanda{1}, Navakanta Bhat{1}
{1}CeNSE, Indian Institute of Science, Bangalore, India; {2}Indian Institute of Technology Guwahati, India

15:30 – 16:00
Coffee Break
Room: Marsalis A

16:00 – 17:30
Industry Session
Room: Moreno AB
Session Chair(s): Srikanth Chandrasekaran

16:00
mm-Wave > sub-THz > THz sensing/monolithic systems commercialization: Paths and Promise
Swaminathan Sankaran

16:18
Sensors-Data Interoperability for Smart Agriculture
Jack Marck

16:36
Sensors enabling the future
Sara Pellegrini

16:54
IEEE ICAP Certification Program – Need for critical standards and certification in the areas of Sensor Interoperability and Cybersecurity
Ravi Subramanian

17:12
Panel Discussion
Swaminathan Sankaran, Jack Marck, Sara Pellegrini,
Ravi Subramanian

16:00 – 17:30
Optical Sensors I
Room: Cumberland F
Session Chair(s): Cedric Tubert

16:00
2631: INVITED: Lossy Mode Resonances Based Sensors in Planar Configuration
Ignacio Raúl Matías{1}, Jesús M. Corres{2}, Ignacio del Villar{2}
{1}Public University of Navarre, Spain; {2}Universidad Pública de Navarra, Spain

16:30
2388: A Reconfigurable Sensing Structure for Fast Optical Modulation by Graphene in Critically Coupled Photonic Crystal Cavities
Aaron Liu, Mingsen Pan, Zhonghe Liu, Weidong Zhou
University of Texas at Arlington, United States

16:45
2495: A Compact Active Quenching and Recharge Pixel Circuit for Single Photon Imaging Sensors
Soumya Shatakshi Panda, Bhaskar Choubey
Universität Siegen, Germany

17:00
2390: Non-Uniform Sampling Theory Applied to FM Channel Optical Feedback Interferometry for Displacement Sensors
Olivier Bernal{2}, Han Cheng Seat{2}, Frédéric Surre{1}, Usman Zabit{3}, Clément Deleau{2}, Thierry Bosch{2}
{1}James Watt School of Engineering, University of Glasgow, United Kingdom; {2}LAAS-CNRS, University of Toulouse, Toulouse INP, France; {3}National University of Sciences and Technology, Islamabad, Pakistan

17:15
2218: A Compact-Size and Ultrasensitive Optical Biosensor Using a Double-Spiral Microresonator
Anh Igarashi[1], Yugang Shang[1], Shigeki Kuroiwa[2], Keishi Ohashi[2], Hirohito Yamada[1]
[1]Tohoku University, Japan; [2]Waseda University, Japan

16:00 – 17:30
Sensors in Industrial Practices I
Room: Cumberland G
Session Chair(s): James Brusey & Stephen Bart

16:00
2676: INVITED: A Future Enabled by Sensors: Focus on Gas Sensors
Nishit Goel
TDK InvenSense Inc., United States

16:30
2032: Software-Based Rotation Sensor Using High-Speed Video Analysis
Feiyue Wang[1], Fujian Ding[1], Shaopeng Hu[1], Kohei Shimasaki[2], Idaku Ishii[1]
[1]Hiroshima University, Japan; [2]Hiroshima University Digital Monozukuri (Manufacturing) Education and Research Center, Japan

16:45
2208: An Acoustical Machine Learning Approach to Determine Abrasive Belt Wear of Wide Belt Sanders
Maximilian Bundscherer[2], Thomas Schmitt[2], Sebastian Bayerl[2], Thomas Auerbach[1], Tobias Bocklet[2]
[1]Hans Weber Maschinenfabrik GmbH, Germany; [2]Technische Hoschule Nürnberg Georg Simon Ohm, Germany

17:00
2381: Boosting Stability of Photonic Multi-Gas Sensors
Radislav Potyrailo, Brian Scherer, Joleyn Brewer, Renner Ruffalo
GE Research, United States

17:15
2060: UAS Navigation in the Real World Using Visual Observation
Yuci Han, Jianli Wei, Alper Yilmaz
Ohio State University, United States

16:00 – 17:30
Sensor Data Processing I
Room: Cumberland H
Session Chair(s): Marco Da Silva & Krikor Ozanyan

16:00
2581: INVITED: Exploring a Modular Architecture for Sensor Validation in Digital Twins
Hossein Darvishi[1], Domenico Ciuonzo[2], Pierluigi Salvo Rossi[1]
[1]Norwegian University of Science and Technology, Norway; [2]University of Naples Federico II, Italy

16:30
2163: Explainable AI for Gas Sensors
Sanghamitra Chakraborty{1}, Simon Mittermaier{1}, Cecilia Carbonelli{1}, Lorenzo Servadei{2}
{1}Infineon Technologies AG, Germany; {2}Infineon Technologies AG, Technical University of Munich, Germany

16:45
2183: Deep-Learned Air-Coupled Ultrasonic Sonar Image Enhancement and Object Localization
Stefan Schulte, Gianni Allevato, Christoph Haugwitz, Mario Kupnik
Technische Universität Darmstadt, Germany

17:00
2359: Object Depth Estimation from Line-Scan EMI Data Using Machine Learning
Marko Šimić, Davorin Ambruš, Vedran Bilas
University of Zagreb, Croatia

17:15
2469: DENSE-DEFENSE: Diversity Promoting Ensemble Adversarial Training Towards Effective Defense
Onat Gungor{2}, Tajana Rosing{2}, Baris Aksanli{1}
{1}San Diego State University, United States; {2}University of California, San Diego, United States

16:00 – 17:30
Journal Presentations - Physical Sensing I
Room: Cumberland J
Session Chair(s): Hamida Hallil

16:00
2717: Biomedical Catheters with Integrated Miniature Piezoresistive Pressure Sensors: a Review
Krishna Vasu Meena, A. Ravi Sankar
Vellore Institute of Technology, India

16:15
2726: Design and Optimization of a Joint Torque Sensor for Lightweight Robots
Dai-Dong Nguyen{2}, Chung-Hsien Kuo{1}
{1}National Taiwan University, Taiwan; {2}National Taiwan University of Science and Technology, Taiwan

16:30
2727: Stretchable and Compliant Textile Strain Sensors
Johannes Mersch, Carlos A. Gómez Cuaran, Aleksandr Vasilev, Andreas Nocke, Chokri Cherif, Gerald Gerlach
Technische Universität Dresden, Germany

16:45
2765: Passive Resonant Sensors: Trends and Future Prospects
Hamida Hallil{5}, Corinne Dejous{5}, Sami Hage-Ali{3}, Omar Elmazria{3}, Jerome Rossignol{2}, Didier Stuerga{2}, Abdelkrim Talbi{1}, Aurélien Mazzamurro{1}, Pierre-Yves Joubert{4}, Elie Lefeuvre{4}
{1}Centrale Lille, University Polytechnique Hauts-de-France, UMR 8520,CNRS, IEMN, France; {2}Laboratoire Interdisciplinaire Carnot de Bourgogne, GERM, France; {3}Université de Lorraine, CNRS, IJL, France; {4}Université Paris-Saclay, C2N, CNRS, France; {5}

17:00
2772: Multi-Threshold Inertial Switch for Quantitative Acceleration Measurements
Mohammad I. Younis{2}, Qiu Xu{1}, Fahimullah Khan{1}
{1}King Abdullah University of Science and Technology, Saudi Arabia; {2}King Abdullah University of Science and Technology, and State University of New York, Saudi Arabia

17:15
2768: High Resolution Frequency Measurement Techniques for Relaxation Oscillator Based Capacitive Sensors
Laxmeesha Somappa{1}, Shahid Malik{2}, Shuchin Aeron{4}, Sameer Sonkusale{4}, Maryam Shojaei Baghini{3}
{1}École Polytechnique Fédérale de Lausanne, India; {2}Imperial College London, United Kingdom; {3}Indian Institute of Technology Bombay, India; {4} Tufts University, United States

16:00 – 17:30
Wearables III
Room: Cumberland K
Session Chair(s): Rahim Esfandyarpour & Shawana Tabassum

16:00
2546: Evaluating 3D Printed sEMG Electrodes with Silver Ink Traces Using In-Situ Impedance Measurements
Martijn Schouten, Philip van de Maat, Kostas Nizamis, Gijs Krijnen
University of Twente, Netherlands

16:15
2497: A Radio-Frequency Planar Resonant Loop for Noninvasive Monitoring of Water Content
Sen Bing, Khengdauliu Chawang, Jungchih Chiao
Southern Methodist University, United States

16:30
2629: Atomized Liquid Metal Droplet-Enabled Enhancement of Sensing Range and Stability for Ultrasensitive Crack-Based Sensor
Jinwon Jeong, Arkadeep Mitra, Jeong Bong Lee
University of Texas at Dallas, United States

16:45
2055: Proof-of-Principle Validation of a Novel Intraluminal Optical Sensor for Dynamic Monitoring of Intestinal Anastomosis: An In Vivo Animal Model Case Study
Karthik Budidha[1], Mohamed Thaha[3], Matthew Eschbach[2], Elisa Mejía-Mejía[1], Panicos Kyriacou[1]
[1]City, University of London, United Kingdom; [2]Medtronic PLC, United States; [3]Queen Mary University of London, United Kingdom

17:00
2351: Design of a Hands-Free Braille Display Using a Pneumatically Controlled Wristband
Gonzalo Tello, Kanghoon Choi, Jungkyu Kim, Haohan Zhang
University of Utah, United States

17:15
2338: SLAM-ING: A Wearable SLAM Inertial Navigation System
Renjie Wu[2], Matthew Pike[2], Xiaoqing Chai[2], Boon Giin Lee[2], Xian Wu[1]
[1]Tianjin Fire Science and Technology Research Institute of MEM, China; [2]University of Nottingham Ningbo China, China

16:00 - 17:30
Journal Presentations - Wireless & Networking
Room: Cumberland L
Session Chair(s): Ifana Mahbub

16:00
2720: Machine Learning for Anomaly Assessment in Sensor Networks for NDT in Aerospace
Ivan Kraljevski[2], Frank Duckhorn[2], Constanze Tschöpe[2], Matthias Wolff[1]
[1]Brandenburg University of Technology Cottbus–Senftenberg, Germany; [2]Fraunhofer Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany

16:15
2740: DEKCS: a Dynamic Clustering Protocol to Prolong Underwater Sensor Networks
Kenechi Omeke[3], Michael S. Mollel[2], Metin Ozturk[1], Shuja Ansari[3], Lei Zhang[3], Qammer H. Abbasi[3], Muhammad Ali Imran[3]
[1]Ankara Yıldırım Beyazıt University, Turkey; [2]Nelson Mandela African Institution of Science and Technology, South Africa; [3]University of Glasgow, United Kingdom

16:30
2745: Data-Driven Sparse Sensor Selection Based on A-Optimal Design of Experiment with ADMM
Takayuki Nagata[1], Taku Nonomura[1], Kumi Nakai[1], Keigo Yamada[1], Yuji Saito[1], Shunsuke Ono[2]
[1]Tohoku University, Japan; [2]Tokyo Institute of Technology, Japan

16:45
2767: Medical Sensors and Their Integration in Wireless Body Area Networks for Pervasive Healthcare Delivery: a Review
Hamza Fahim{1}, Shumaila Javaid{1}, Sherali Zeadally{2}, Bin He{1}
{1}Tongji University, China; {2}University of Kentucky, United States

17:00
2786: Dual-Attention Generative Adversarial Networks for Fault Diagnosis Under the Class-Imbalanced Conditions
Weihua Li{3}, Rugen Wang{2}, Zhuyun Chen{2}, Shaohui Zhang{1}
{1}Dongguan University of Technology, China; {2}South China University of Technology, China; {3}South China University of Technology Pazhou Lab, China

17:15
2728: A TDMA-Based Data Gathering Protocol for Molecular Communication via Diffusion-Based Nano-Sensor Networks
Ethungshan Shitiri, Ho-Shin Cho
Kyungpook National University, Korea

16:00 - 17:30
Journal Presentations - Wireless & Noninvasive Sensing
Room: Cumberland B
Session Chair(s): Chonggang Wang

16:00
2764: Wireless Ice Detection and Monitoring Using Flexible UHF RFID Tags
Mahmoud Wagih{1}, Junjie Shi{2}
{1}University of Glasgow, United Kingdom; {2}University of Southampton, United Kingdom

16:15
2756: An Automatic Lane Marking Detection Method with Low-Density Roadside Lidar Data
Jason Dayong Wu{2}, Ciyun Lin{1}, Yingzhi Guo{1}, Wenjun Li{1}, Hui Liu{1}
{1}Jilin University, China; {2}Texas A&M University, United States

16:30
2729: AgriSegNet: Deep Aerial Semantic Segmentation Framework for IoT-Assisted Precision Agriculture
Tanmay Anand{2}, Soumendu Sinha{3}, Murari Mandal{4}, Vinay Chamola{1}, F. Richard Yu{5}
{1}ARTPARK, India; {2}Birla Institute of Technology and Science, India; {3}CSIR-Central Electronics Engineering Research Institute, India; {4}Indian Institute of Information Technology Kota, India; {5}Shenzhen University, China

16:45
2766: Distance Estimation in Thermal Cameras Using Multi-Task Cascaded Convolutional Neural Network
Wansu Lim{1}, Ej Miguel Francisco Caliwag{3}, Angela C. Caliwag{3}, Bong-Ki Baek{2}, Yongrae Jo{2}, Hae Chung{3}
{1}FCSL, Kumoh National Institute of Technology, Korea; {2}i3system Inc., Korea; {3}Kumoh National Institute of Technology, Korea

17:00
2746: Genetic Algorithm for Path Loss Model Selection in Signal Strength-Based Indoor Localization
Byeong-Ho Lee{3}, Doyoung Ham{3}, Jeongsik Choi{2}, Seong-Cheol Kim{3}, Yong-Hwa Kim{1}
{1}Korea National University of Transportation, Korea; {2}Kyungpook National University, Korea; {3}Seoul National University, Korea

17:15
2743: Missing Data Imputation on IoT Sensor Networks: Implications for on-Site Sensor Calibration
Nwamaka Okafor, Declan T. Delaney
University College Dublin, Ireland

18:30 – 21:00
Gala Dinner
Room: Reunion Ballroom

TECHNICAL PROGRAM: WEDNESDAY, 2 NOVEMBER 2022

8:00 – 9:00
Registration
Room: Reunion Foyer

9:00 - 10:00
KEYNOTE: Microwaving Cells for Molecular, Cellular and Tissue Sensing: Which Status, Challenges and Prospects for Health and Medicine
Katia Grenier
Room: Reunion Ballroom
Session Chair(s): J.-C. Chiao & Zeynep Celik

10:00 – 10:30
Coffee Break
Room: Marsalis A

10:30 – 12:00
Journal Presentations - Silicon & CMOS
Room: Cumberland K
Session Chair(s): Christoforos Panteli

10:30
2694: An All-Silicon Process Platform for Wafer-Level Vacuum Packaged MEMS Devices
Mustafa Mert Torunbalci{1}, Hasan Dogan Gavcar{2}, Ferhat Yesil{2}, Said Emre Alper{2}, Tayfun Akin{1}
{1}Middle East Technical University, Turkey; {2}MikroSistemler, Turkey

10:45
2707: CMOS-Based Tactile Force Sensor: a Review
Meng-Lin Hsieh, Sheng-Kai Yeh, Weileun Fang
National Tsing Hua University, Taiwan

11:00
2736: Reduced Drift of CMOS ISFET Ph Sensors Using Graphene Sheets
Christoforos Panteli, Pantelis Georgiou, Kristel Fobelets
Imperial College London, United Kingdom

11:15
2751: CMOS Compatible MEMS Air Velocity Sensor with Improved Sensitivity and Linearity for Human Thermal Comfort Sensing Applications
Izhar Izhar{2}, Wei Xu{3}, Lung-Jieh Yang{4}, Yi-Kuen Lee{1}
{1}Hong Kong University of Science and Technology, Hong Kong; {2}Hong Kong University of Science and Technology / University of Pennsylvania, Hong Kong; {3}Huazhong University of Science and Technology, China; {4}Tamkang University, Taiwan

11:30
2722: Sensing Characteristic Enhancement of CMOS-Based ISFETs with Three-Dimensional Extended- Gate Architecture
Chih-Ting Lin, Nan-Yuan Teng, Yi-Ting Wu, Rui-Xing Wang
National Taiwan University, Taiwan

11:45
2733: An Ultra Low Current Measurement Mixed-Signal ASIC for Radiation Monitoring Using Ionisation Chambers
Sarath Kundumattathil Mohanan{1}, Hamza Boukabache{1}, Vassili Cruchet{1}, Daniel Perrin{1}, Stefan Roesler{1}, Ullrich R. Pfeiffer{2}
{1}CERN Radiation Protection, Switzerland; {2}University of Wuppertal, Germany

10:30 – 12:00
Chemical, Electrochemical & Gas Sensors II
Room: Cumberland F
Session Chair(s): Preethi Preethichandra & Bérengère Lebental

10:30
2385: Boosting Stability of Electronic Multi-Gas Sensors
 Radislav Potyrailo, Richard St-Pierre, Janell Crowder, Brian Scherer, Baokai Cheng
GE Research, United States

10:45
2325: Selective Gas Detection Using Conductivity-Based MEMS Resonator and Machine Learning
Wagner Barth Lenz{1}, Usman Yaqoob{1}, Rodrigo Tumolin Rocha{1}, Mohammad I. Younis{2}
{1}King Abdullah University of Science and Technology, Saudi Arabia; {2}King Abdullah University of Science and Technology, and State University of New York, Saudi Arabia

11:00
2389: Humidity Monitoring Using a Flexible Polymer-Based Microwave Sensor and Machine Learning
Bernard Bobby Ngoune{3}, Hamida Hallil{3}, Julien George{4}, Corinne Dejous{3}, Eric Cloutet{2}, Benoit Bondu{1}, Stephane Bila{4}, Dominique Baillargeat{4}
{1}ISORG, France; {2}Université de Bordeaux, LCPO, UMR 5629, ENSCBP, IPB, France; {3}University of Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; {4}University of Limoges, CNRS, XLIM UMR 7252, France

11:15
2227: A 20 ppb Resolution Readout Circuit Dedicated to Optomechanical Mass Sensors
Houssein Elmi Dawale, Sebastien Regord, Thomas Furcatte, Marc Sansa, Patrick Villard, Guillaume Jourdan, Franck Badets
CEA-Leti, France

11:30
2219: ATR Microreactor: A Tool for In-Situ and Spatial Reaction Monitoring
Ketki Srivastava{2}, Nicole Boyle{1}, Koen Jorissen{2}, Ian Burgess{1}, Ward van der Stam{3}, Albert van Den Berg{2}, Mathieu Odijk{2}
{1}University of Saskatchewan, Canada; {2}University of Twente, Netherlands; {3}University of Utrecht, Netherlands

11:45
2050: Oxygen and Humidity Sensing Property of a Limiting Current-Type Thin-Film YSZ-Based Sensor on a Micro-Hotplate
Shunsuke Akasaka{2}, Isaku Kanno{1}
{1}Kobe university, Japan; {2}Rohm Co. Ltd, Japan

10:30 – 12:00
Sensor Data Processing II
Room: Cumberland G
Session Chair(s): Pierluigi Salvo Rossi

10:30
2249: Perception System Based on Cooperative Fusion of Lidar and Cameras
Martin Dimitrievski, David Van Hamme, Wilfried Philips
Ghent University, imec-IPI, Belgium

10:45
2085: Feature Importance Methods Unveiling the Cross-Sensitive Response of an Integrated Sensor Array to Quantify Major Cations in Drinking Water
Gianmarco Gabrieli, Michal Muszynski, Patrick Ruch
IBM Research Europe, Switzerland

11:00
2501: Incipient Slip Detection for Rectilinear Movements Using the PapillArray Tactile Sensor
Pablo Martinez Ulloa{1}, David Cordova Bulens{1}, Stephen Redmond{2}
{1}University College Dublin, Ireland; {2}University of New South Wales, Ireland

11:15
2198: A Study for Laser Additive Manufacturing Quality and Material Classification Using Machine Learning
Ralph Rudi Schmidt{1}, Jörg Hildebrand{2}, Ivan Kraljevski{1}, Frank Duckhorn{1}, Constanze Tschöpe{1}
{1}Fraunhofer Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany; {2}Technische Universität Ilmenau, Germany

11:30
2625: Fall Event Detection Using Vision Transformer
Ankita Dey{1}, Sreeraman Rajan{1}, George Xiao{2}, Jianping Lu{2}
{1}Carleton University, Canada; {2}National Reseach Council of Canada, Canada

11:45
2195: A Joint Perception Scheme for Connected Vehicles
Ahmed N. Ahmed{3}, Ian Ravijts{1}, Jens de Hoog{3}, Ali Anwar{3}, Siegfried Mercelis{2}, Peter Hellinckx{3}
{1}AP University of Applied Sciences, Belgium; {2}Cosys-Lab, University of Antwerp, Belgium; {3}IDLab, University of Antwerp, imec, Belgium

10:30 – 12:00
Journal Presentations - Wearable Sensing
Room: Cumberland L
Session Chair(s): Sue Gong

10:30

2710: A Nanometer Resolution Wearable Wireless Medical Device for Non Invasive Intracranial Pressure Monitoring

Rodrigo Andrade{1}, Helder Eiki Oshiro{1}, Caio Kioshi Miyazaki{1}, Cintya Yukie Hayashi{1}, Marcos Antonio de Morais{1}, Rodrigo Brunelli{1}, João Paulo Carmo{2}

{1}Braincare Desenvolvimento e Inovacao Tecnologica S.A., Brazil; {2}University of São Paulo, Brazil

10:45

2725: Influence of Armband Form Factors on Wearable ECG Monitoring Performance

Braden Li{3}, Amanda C. Mills{3}, Tashana J. Flewwellin{3}, Jacklyn L. Herzberg{2}, Azin Saberi Bosari{1}, Michael Lim{3}, Yaoyao Jia{4}, Jesse S. Jur{3}

{1}Athens Drive Magnet High School, United States; {2}Holly Springs High School, United States; {3}North Carolina State University, United States; {4}University of Texas at Austin, United States

11:00

2739: Fusion of Multi-Sensor-Based Biomechanical Gait Analysis Using Vision and Wearable Sensor

Vishwanath Bijalwan{2}, Vijay Bhaskar Semwal{3}, Tapas K. Mandal{1}

{1}Indian Institute of Technology Guwahati, India; {2}Institute of Technology Gopeshwar, India; {3}Maulana Azad National Institute of Technology, India

11:15

2753: Fully-Conformable Porous Polyethylene Nanofilm Sweat Sensor for Sports Fatigue

Andreas Kenny Oktavius{1}, Qiao Gu{2}, Nathaniel Wihardjo{1}, Olivia Winata{1}, Stefanus William Sunanto{1}, Jin Li{1}, Ping Gao{1}

{1}Hong Kong University of Science and Technology, Hong Kong; {2}University of Toronto, Canada

11:30

2770: PPG-Based Smart Wearable Device with Energy-Efficient Computing for Mobile Health-Care Applications

Eugene Lee{1}, Chen-Yi Lee{2}

{1}National Chiao Tung University, Taiwan; {2}National Yang Ming Chiao Tung University, Taiwan

10:30 – 12:00

Journal Presentations - Device Technologies I
Room: Cumberland B
Session Chair(s): Ferran Martin

10:30

2721: Phase-Variation Microwave Sensor for Permittivity Measurements Based on a High-Impedance Half-Wavelength Transmission Line

Ferran Martín{1}, Lijuan Su{1}, Jonathan Muñoz-Enano{1}, Paris Vélez{1}, Pau Casacuberta{1}, Marta Gil{2}

{1}GEMMA/CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}Universidad Politécnica de Madrid, Spain

10:45

2719: Plasmonic Fiberoptic Absorbance Biosensor (P-FAB) for Rapid Detection of SARS-CoV-2 Nucleocapsid Protein

Himanshu Bhatia[2], M. Divagar[1], R. Gayathri[1], J. Kuzhandai Shamlee[1], Himanshu Bhatia[2], Jitendra Satija[3], V. V. R. Sai[1]

{1}Indian Institute of Technology Madras, India; {2}Ricovr Healthcare Inc., United States; {3}Vellore Institute of Technology, India

11:00

2784: Single-Frequency Amplitude-Modulation Sensor for Dielectric Characterization of Solids and Microfluidics

Ferran Martín[2], Paris Vélez[2], Jonathan Muñoz-Enano[2], Amir Ebrahimi[3], Cristian Herrojo[1], Ferran Paredes[1], James Scott[3], Kamran Ghorbani[3]

{1}CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}GEMMA/CIMITEC, Universitat Autònoma de Barcelona, Spain; {3}Royal Melbourne Institute of Technology, Australia

11:15

2754: A Novel Noninvasive Hemoglobin Sensing Device for Anemia Screening

S. Guruprasad[3], R. Dinesh Kumar[1], Krity Kansara[2], K. N. Raghavendra Rao[2], Murali Mohan[2], Manjunath Ramakrishna Reddy[2], Uday Haleangadi Prabhu[2], P. Prakash[2], Sushovan Chakraborty[2], Sreetama Das[2], K. N. Madhusoodanan[1]

{1}Cochin University of Science and Technology, India; {2}Robert Bosch, India; {3}Robert Bosch RBEI, Germany

11:30

2703: Nonanal Sensor Fabrication Using Aldol Condensation Reaction Inside Alkali-Resistant Porous Glass

Masato Tsujiguchi[1], Takashi Aitoku[1], Hironori Takase[1], Yasuko Yamada Maruo[2]

{1}Nippon Electric Glass Company Ltd., Japan; {2}Tohoku Institute of Technology, Japan

11:45

2782: Effect of Oxygen on the Electrical Conductivity of Pt-Contacted α-Ga$_2$O$_3$/$\varepsilon(\kappa)$-Ga$_2$O$_3$ MSM Structures on Patterned Sapphire Substrates

Nikita Yakovlev[1], Vladimir I. Nikolaev[2], Sergey I. Stepanov[2], Aleksei V. Almaev[1], Aleksei I. Pechnikov[2], Evgeny V. Chernikov[1], Bogdan O. Kushnarev[1]

{1}National Research Tomsk State University, Russia; {2}Perfect Crystals LLC, Russia

10:30 – 12:00

Journal Presentations - Smart & Bio-Inspired Systems
Room: Cumberland J
Session Chair(s): Theerawit Wilaiprasitporn

10:30

2752: An Autonomous Environmental Logging Microsystem (ELM) for Harsh Environments

Yu Sui, Alexander C. Benken, Yushu Ma, Andrew Trickey-Glassman, Tao Li, Yogesh B. Gianchandani

University of Michigan, United States

10:45
2704: Tutorial: a Versatile Bio-Inspired System for Processing and Transmission of Muscular Information
Fabio Rossi, Andrea Mongardi, Paolo Motto Ros, Massimo Ruo Roch, Maurizio Martina, Danilo Demarchi
Politecnico di Torino, Italy

11:00
2759: Towards Development of an ISFET-Based Smart Ph Sensor: Enabling Machine Learning for Drift Compensation in IoT Applications
Nishad Sahu{1}, Rishabh Bhardwaj{3}, Het Shah{1}, Ravindra Mukhiya{2}, Rishi Sharma{2}, Soumendu Sinha{2}
{1}Birla Institute of Technology and Science, India; {2}CSIR-Central Electronics Engineering Research Institute, India; {3}Singapore University of Technology and Design, Singapore

11:15
2744: Revealing Preference in Popular Music Through Familiarity and Brain Response
Theerawit Wilaiprasitporn{4}, Soravitt Sangnark{4}, Phairot Autthasan{4}, Puntawat Ponglertnapakorn{4}, Phudit Chalekarn{4}, Thapanun Sudhawiyangkul{4}, Manatsanan Trakulruangroj{2}, Sarita Songsermsawad{4}, Rawin Assabumrungrat{3}, Supalak Amplod{4}, Kaj
{1}King Mongkut's University of Technology Thonburi, Thailand; {2}Thammasat University, Thailand; {3}Tohoku University, Japan; {4}Vidyasirimedhi Institute of Science and Technology, Thailand

11:30
2711: False-Alarm-Controllable Radar Detection for Marine Target Based on Multi Features Fusion via CNNs
Xiaolong Chen, Ningyuan Su, Yong Huang, Jian Guan
Naval Aviation University, China

10:30 – 12:00
Journal Presentations - Physical Sensing II
Room: Cumberland H
Session Chair(s): Brent Lunceford

10:30
2760: A MEMS Pressure Sensor Using Electrostatic Levitation
Mohammad Mousavi, Mohammad Alzgool, Shahrzad Towfighian
Binghamton University, United States

10:45
2716: Textile-Based Pressure Sensors for Monitoring Prosthetic-Socket Interfaces
Jordan Tabor{2}, Talha Agcayazi{2}, Aaron Fleming{2}, Brendan Thompson{2}, Ashish Kapoor{2}, Ming Liu{2}, Michael Y. Lee{1}, He Helen Huang{2}, Alper Bozkurt{2}, Tushar K. Ghosh{2}
{1}Baylor College of Medicine, United States; {2}North Carolina State University, United States

11:00
2731: Highly Stretchable Strain Sensor with Spiral Fiber for Curvature Sensing of a Soft Pneumatic Gripper
Chaoyang Shi{3}, Rui Liu{1}, Shuxin Wang{2}, Hui Yang{2}
{1}Key Laboratory of Mechanism Theory and Equipment Design, Tianjin University, China; {2}Tianjin Key Laboratory of Molecular Optoelectronic Sciences, Tianjin University, China; {3}Tianjin University, China

11:15
2734: A Novel Trapezoidal ScAlN/AlN-Based MEMS Piezoelectric Accelerometer
Wenjuan Liu, Bohao Hu, Yan Liu, Binghui Lin, Guoqiang Wu, Chengliang Sun
Wuhan University, China

11:30
2758: In-Run Mode-Matching of MEMS Gyroscopes Based on Power Symmetry of Readout Signal in Sense Mode
Xukai Ding{2}, Zhihu Ruan{2}, Jia Jia{1}, Libin Huang{2}, Hongsheng Li{2}, Liye Zhao{2}
{1}Jiangsu University of Science and Technology, China; {2}Southeast University, China

11:45
2774: A Micromachined Resonant Micro-Pressure Sensor
Yu Zheng{2}, Sen Zhang{1}, Yulan Lu{1}, Bo Xie{1}, Deyong Chen{1}, Junbo Wang{1}, Jian Chen{1}
{1}Aerospace Information Research Institute, Chinese Academy of Sciences, China; {2}Chinese Academy of Sciences, China

12:00 – 13:30
Lunch
Marsalis B

13:30 – 15:00
Editors Forum
Room: Cumberland A
Session Chair(s): Zeynep Celik & Krikor Ozanyan
Presenter(s): Srinivas Tadigadapa, Sandro Carrara, Honggang Wang, Ravinder Dahiya

13:30 – 15:00
Interactive Forum: Sensor Phenomenology, Modeling & Evaluation II
Room: Marsalis A
Session Chair(s): Azeemuddin Syed

2159: Reflective-Mode Phase-Variation Permittivity Sensors Based on Coupled Resonators
Pau Casacuberta{1}, Paris Vélez{1}, Jonathan Muñoz-Enano{1}, Lijuan Su{1}, Marta Gil{2}, Ferran Martín{1}
{1}GEMMA/CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}Universidad Politécnica de Madrid, Spain

2192: MEMS Microphone for Acoustic Sensing on Overhead Power Lines: Analysis of Electric and Magnetic Field Interference
Jeremias Sattlegger, Markus Neumayer, Thomas Bretterklieber
Graz University of Technology, Austria

2229: Genetic Algorithm Application to Enlarge Travel Range for Multi-Electrode MEMS Resonators
Yu Tian, Ronald Miles, Shahrzad Towfighian
Binghamton University, United States

2248: Multivariate Analysis of Optoelectronic Detection Units for the Maximization of Photon Interaction with Implanted Sensing Material
Briley James, Amir Zavareh, Michael McShane
Texas A&M University, United States

2280: Silicon Electrothermal Microactuators as Zero Standby Power Local Temperature Switches
Han Xuan Wong, Yul Koh, Duan Jian Goh, Jaibir Sharma, Srinivas Merugu, Joshua En-Yuan Lee
IME, Agency for Science, Technology and Research, Singapore

2404: A Resistor Network Optimization Algorithm Enabling Synthetic Bioimpedance Generation for Validating Wearable Sensing Systems
Harrison Crane, Samer Mabrouk, Omer T. Inan
Georgia Institute of Technology, United States

2466: An Implantable Sensor for Arterial Pressure Monitoring with Minimal Loading: Design and Finite Element Validation
Mustafa Beyaz
Antalya Bilim University, Turkey

2481: Estimating the Angular Error of Magnetic Positions Sensors Under the Influence of External Stray Fields
Phil Meier, Kris Rohrmann, Marvin Sandner, Marcus Prochaska
Ostfalia University of Applied Sciences, Germany

2504: Magnetic Signature Sensor Model for Accurate Short-Distance Localization
Steffen Kastner[1], Markus Ebner[1], Markus Bullmann[1], Toni Fetzer[1], Frank Deinzer[1], Marcin Grzegorzek[2]
[1]University of Applied Sciences Würzburg-Schweinfurt, Germany; [2]University of Lübeck, Germany

13:30 - 15:00
Interactive Forum: Chemical, Electrochemical & Gas Sensors III
Room: Marsalis A
Session Chair(s): Hamida Hallil & Xiaosan Zhu

2031: Cleaning Procedure for the Screen-Printed RuO2 pH Electrodes
Maryna Lazouskaya[3], Iuliia Vetik[3], Kiranmai Uppuluri[2], Nasrin Razmi[1], Ott Scheler[3]
[1]Linkoping University, Sweden; [2]Łukasiewicz Research Network–Institute of Microelectronics and Photonics, Poland; [3]Tallinn University of Technology, Estonia

2063: Facile Use of In-Situ Doped Onion-Like Carbon Nanoparticles for Detecting Toluene at Room Temperature

Manoko Maubane-Nkadimeng{3}, Thomas Mongwe{3}, Themba Ntuli{3}, Ludwe Sikeyi{3}, Neil Coville{3}, Jose Serbena{1}, Messai Mamo{2}

{1}Universidade Federal do Paraná, Brazil; {2}University of Johannesburg, South Africa; {3}University of the Witwatersrand, South Africa

2122: Work Function Modification of Borophene by Barium Decoration Towards Room Temperature NO2 Gas Sensor

Naveen Kumar Arkoti, Kaushik Pal
Indian Institute of Technology Roorkee, India

2143: Ingestible pH Sensing Capsule with Thread-Based Electrochemical Sensors

Cihan Asci, Ruben Del-Rio-Ruiz, Atul Sharma, Sameer Sonkusale
Tufts University, United States

2154: Rapid SARS-CoV-2 S-Protein Detection Using Nanostructured Electrochemical Biosensor

Špela Trafela, Anja Korent, Kristina Žagar Soderžnik, Kristina Žužek, Sašo Šturm
Jožef Stefan Institute, Slovenia

2190: A Hydrophilic Fe3O4/CNTs Nanoenzyme Sensor for Ultra-Low Concentration H2O2 Sensing

Zhiqiang Zhai, Xiaosong Du, Rui Liao, Yang Wang, Yin Long
University of Electronic Science and Technology of China, China

2276: Odor Recorder Based on an Array of QCM Sensors Using Frequency Shifts and Resistance Changes of Multiple Harmonics

Nanxin Gong, Manuel Aleixandre, Takamichi Nakamoto
Tokyo Institute of Technology, Japan

2400: RFID Gas Sensor for In-Field Detection of Chemical Threats: Evaluation of Batteryless Discontinuous Operation

Ailyn Estevez{1}, Noemi Perez{1}, Juan Casanova-Chafer{2}, Eduard Llobet{2}, Andoni Beriain{1}

{1}TECNUN, Universidad Pública de Navarra, Spain; {2}Universitat Rovira i Virgili, Spain

2445: Engineering Plasmonic Nanostructures for Label-Free SERS Detection of Neurotoxic Gases

Kissia Batista, Marta Lafuente, Sergio G Rodrigo, Reyes Mallada, Maria Pilar Pina
Universidad de Zaragoza, Spain

2457: Development of a Micro Gas Sensor with a Suspended Micro Heater for Hydrogen Sulfide Gas Detection

Chia-Hsu Hsieh{2}, Chuan-Chun Liu{3}, An-Ting Li{3}, Chun-Hsun Lin{1}, Wei-Chieh Sun{3}, Yao-Ching Fang{3}, I-Yu Huang{3}

{1}China Steel Corporation, Taiwan; {2}Metal Industries Research & Development Centre, Taiwan; {3}National Sun Yat-sen University, Taiwan

2551: Novel Gate Electrode Design for Flexible Planar Electrolyte-Gated Field-Effect Transistor-Based Sensors for Real-Time Ammonium Detection

Mattia Petrelli{1}, Bajramshahe Shkodra{1}, Martina Aurora Costa Angeli{1}, Alessandra Scarton{2}, Silvia Pogliaghi{3}, Roberto Biasi{2}, Paolo Lugli{1}, Luisa Petti{1}
{1}Free University of Bozen-Bolzano, Italy; {2}Microgate Srl, Italy; {3}University of Verona, Italy

2068: EC Sensor to Improve Sea Turtle Nesting Research

Rebecca Dean, Robert Dean
Auburn University, United States

2093: Fano Resonance-Based Terahertz Metamaterial Uric Acid Sensor with Asymmetric Design

Yuke Han, Xiaomeng Bian, Rui You, Tianshu Li, Lianqing Zhu, Fei Luo
Beijing Information Science and Technology University, China

2199: Chronoamperometric Detection of Heavy Metal Ions for Multi-Analyte Water Analysis with Microsensors

Besnik Uka, Jochen Kieninger, Stefan Rupitsch, Gerald Urban, Andreas Weltin
IMTEK, Albert-Ludwigs-Universität Freiburg, Germany

2315: Triple Oleylamine Capped WS Sensor Array for Room Temperature Discrimination of Chemical Vapours

Siziwe Gqoba{2}, Tshegofatso Mabilane{2}, Mildred Airo{2}, Lerato Machogo-Phao{2}, Rudo Sithole{2}, Nosipho Moloto{2}, Rafael Rodrigues{1}, Ivo Hümmelgen{1}
{1}Universidade Federal do Paraná, Brazil; {2}University of the Witwatersrand, South Africa

13:30 - 15:00

Interactive Forum: Optical Sensors III
Room: Marsalis A
Session Chair(s): Iganacio R. Matias

2072: An Optical Grasping Force Sensor for Minimally Invasive Surgical Robotic Forceps

Kazutaka Sato, Shuichi Morizane, Atsushi Takenaka, Masaru Ueki, Tadao Matsunaga, Sang-Seok Lee
Tottori University, Japan

2089: Environmental Monitoring of Methane Utilizing Multispectral NDIR Gas Sensing for Compensation of Spectral Impact from Water Vapor in Air

Bakhram Gaynullin{3}, Christine Hummelgård{2}, Henrik Rödjegård{2}, Claes Mattsson{1}, Goran Thungström{1}
{1}Mid Sweden University, Sweden; {2}SenseAir AB, Sweden; {3}SenseAir AB, Mid Sweden University, Sweden

2123: Novelty Sensor Using Integrated Fluorescence and Dielectric Spectroscopy to Improve Food Quality Identification

Euclides Chuma, Yuzo Iano
Universidade Estadual de Campinas, Brazil

2178: Alfalfa Quality Detection by Means of VIS-NIR Optical Fiber Reflection Spectroscopy

Carlos Ruiz Zamarreño{1}, Ander Gracia-Moises{2}, Ignacio Vitoria{1}, José Javier Imas{1}, Lorena Castaño{1}, Amaia Avedillo{1}, Ignacio Raúl Matías{1}
{1}Public University of Navarre, Spain; {2}Pyroistech S.L., Spain

2289: Low-Cost Colorimetric Alternative of qPCR for DNA Sensing Based on Intercalation with Methylene Blue

Ruchira Nandeshwar, Avani Kulkarni, Shruti Ahuja, M.Santhosh Kumar, Kiran Kondabagil, Siddharth Tallur
Indian Institute of Technology Bombay, India

2394: Towards Integrated Optical Feedback FM-to-Am Conversion in Silicon Nitride for Displacement Sensing Applications

Clément Deleau{3}, Thidsanu Apiphatnaphakul{3}, Han Cheng Seat{3}, Frédéric Surre{1}, Usman Zabit{4}, Franck Carcenac{2}, Pierre-François Calmon{2}, Thierry Bosch{3}, Olivier Bernal{3}
{1}James Watt School of Engineering, University of Glasgow, United Kingdom; {2}LAAS-CNRS, France; {3}LAAS-CNRS, University of Toulouse, Toulouse INP, France; {4}National University of Sciences and Technology, Islamabad, Pakistan

2039: Design of Optical Inclinometer Composed of a Ball Lens and Viscosity Fluid to Improve Focusing

Iwao Matsuya, Osamu Furuya
Tokyo Denki University, Japan

2174: Physical LiDAR Simulation in Real-Time Engine

Wouter Jansen, Nico Huebel, Jan Steckel
Cosys-Lab, University of Antwerp, Belgium

13:30 – 15:00
Interactive Forum: Sensor Networks & IOT
Room: Marsalis A
Session Chair(s): Elena Gaura & Yacine Ghamri-Doudane

2047: Federated Learning for Masked Psoriasis Severity Classification

Cho-I Moon{2}, Jiwon Lee{2}, Seula Kye{2}, Yoo Sang Baek{1}, Onseok Lee{2}
{1}Korea University College of Medicine, Korea; {2}Soonchunhyang University, Korea

2078: Design and Evaluation of a Mobile Sensing Platform for Water Conductivity

Chamod Weerasinghe{2}, Lokesh Padhye{2}, Suranga Nanayakkara{1}
{1}National University of Singapore, Singapore; {2}University of Auckland, New Zealand

2117: Multi-Modal Sensor Selection with Genetic Algorithms

Sergei Chuprov{1}, Leon Reznik{1}, Igor Khokhlov{2}, Karan Manghi{1}
{1}Rochester Institute of Technology, United States; {2}Sacred Heart University, United States

2127: An Open-Source IoT Remote Monitoring System for High-Hazard Dams

Corinne Smith{2}, John McCain{1}, Austin Downey{2}, Jasim Imran{2}
{1}South Carolina Department of Health and Environmental Control, United States; {2}University of South Carolina, United States

2130: Cryptographic Data Security for IoT Healthcare in 5G and Beyond Networks

Sabrina Ahmed, Zareen Subah, Mohammed Zamshed Ali
University of Texas at Dallas, United States

2145: Electro-Mechanical Design of Sensor-Hub for Indoor Smart Irrigation

Jagan P, Sasirekha Gvk, Madhav Rao, Jyotsna Bapat, Debabrata Das
International Institute of Information Technology, Bangalore, India

2272: An Indirect Method of Brushing Force Detection with Five Force Sensors and RF Algorithm

Haicui Li, Lei Jing
University of Aizu, Japan

2291: A LoRaWAN-Based Smart Sensor Tag for Cow Behavior Monitoring

Thai-Ha Dang{1}, Ngoc-Hai Dang{1}, Viet-Thang Tran{2}, Wan-Young Chung{1}
{1}Pukyong National University, Korea; {2}Vietnam Research Institute of Electronics, Informatics and Automation, Vietnam

2370: High-Accuracy and Long-Range Energy Harvesting Beat Sensor with LoRa

Tuan Anh Tran, Koichiro Ishibashi
University of Electro-Communications, Japan

2560: A Photodetector-Based Automated Light Intensity Controlling System Using IoT

Pranjali Shrivastava, Manpreet Singh, Vandana Chalka, Nikhil Vadera, Saakshi Dhanekar, Kamaljit Rangra
Indian Institute of Technology Jodhpur, India

13:30 - 15:00
Interactive Forum: Actuators & Powering Sensors
Room: Marsalis A
Session Chair(s): Djilali Kourtiche & Souvik Dubey

2141: Twisted and Coiled Carbon Nanotube Yarn Muscle Embedding Ferritin

Jong Woo Park, Dong Yeop Lee, Seon Jeong Kim
Hanyang University, Korea

2263: Thermally Driven Phase Transition for Reversible Diving/Surfacing Hydrogel Devices

Jung Gi Choi{1}, Jae Sang Hyeon{1}, Seon Jeong Kim{2}
{1}Center for Self-Powered Actuation, Hanyang University, Korea; {2}Hanyang University, Korea

2285: Non Intrusive Current and Power Factor Sensor with Energy Harvesting for Maintenance-Free Operation

Takaya Yoshitake{2}, Akashi Satoh{2}, Shinichiro Mito{1}
{1}National Institute of Technology, Tokyo College, Japan; {2}University of Electro-Communications, Japan

2527: Self-Sensing Piezoelectric Micro-Lens Actuator
Syed Mamun R Rasid, Aron Michael, Hemanshu Roy Pota, Ssu-Han Chen
University of New South Wales, Australia

2544: Non-Intrusive Water Flow Rate Measurement: A TEG-Powered Ultrasonic Sensing Approach
Domenico Balsamo{1}, Oktay Cetinkaya{2}, Sergey Mileiko{1}
{1}Newcastle University, United Kingdom; {2}University of Oxford, United Kingdom

2595: Investigating the Impact of Thickness and Porosity on Energy Density of Screen Printed Graphite/NMC LIBs with 3D Structures Under Fast Charging Condition
Soma Ahmadi, Dinesh Maddipatla, Qingliu Wu, Massood Atashbar
Western Michigan University, United States

2601: Capillary Suspension Based Ink Formulation for Stable Graphite Anode in Lithium-Ion Batteries
Valliammai Palaniappan, Dinesh Maddipatla, Soma Ahmadi, Himanaga Rama Krishn Emani, Binu Narakathu, Bradley Bazuin, Qingliu Wu, Massood Atashbar
Western Michigan University, United States

2647: State of the Art Supercapacitor Families for Environmental Friendly Battery-Less Energy Storage for Environmental Sensor Networks
Dulsha Kularatna-Abeywardana{1}, Nihal Kularatna{2}
{1}University of Auckland, New Zealand; {2}University of Waikato, New Zealand

2515: Novel Laser Patterned MXene Based Anodes for High Capacity Fast Charging Li-Ion Batteries
Himanaga Rama Krishn Emani, Valliammai Palaniappan, Dinesh Maddipatla, Bradley Bazuin, Qingliu Wu, Massood Atashbar
Western Michigan University, United States

2574: Energy-Efficient Adhesion Controlled Microelectromechanical Volatile Memory (MVM)
Khanjan Joshi, Manu Garg, Dhairya Singh Arya, Sushil Kumar, Mujeeb Yousuf, Pushpapraj Singh
Indian Institute of Technology Delhi, India

13:30 - 15:00
Interactive Forum: Sensor Data Processing V
Room: Marsalis A
Session Chair(s): Marco Da Silva

2059: Encoded Image-Based Time Series Classification for Improving Colorimetric Detection of Hydrogen Sulfide (H2S)
Chang-Hyun Kim{1}, Junyeop Lee{1}, Junkyu Park{1}, Seung-Hwan Choi{1}, Daewoong Jung{1}, Chang-Woo Nam{1}, Yuntae Ha{1}, Kwan Woo Kim{1}, Sang Hyeok Park{1}, Su Ji Choi{1}, Sanghun Choi{2}, Suwoong Lee{1}
{1}Korea Institute of Industrial Technology, Korea; {2}Kyungpook National University, Korea

2140: Detection of Antibodies for COVID-19 from Reflectance Spectrum Using Supervised Machine Learning
Ciao-Ming Tsai{2}, Chitsung Hong{3}, Wei-Yi Kong{1}, Wei-Huai Chiu{1}, Cheng-Hao Ko{1}, Weileun Fang{2}
{1}National Taiwan University of Science and Technology, Taiwan; {2}National Tsing Hua University, Taiwan; {3}Spectrochip Inc., Taiwan

2238: A Stray Field Compensation Method for Stacked Angular Sensors Based on a Neuronal Network
Phil Meier, Kris Rohrmann, Marvin Sandner, Marcus Prochaska
Ostfalia University of Applied Sciences, Germany

2240: Time-Series Forecasting: Extreme Gradient Boosting Implementation in Smartphone Photoplethysmography Signals for Biometric Authentication Processes
Bengie L. Ortiz, Evan Miller, Tim Dallas, Jo Woon Chong
Texas Tech University, United States

2331: A Distance Based Freshness Evaluation Method for Oyster Monitoring by Electronic Nose
Ru Yin{2}, Guangfen Wei{2}, Guishuai Zhang{2}, Zhiqiang Zou{2}, Zhilin Zhu{2}, Jun Yu{1}
{1}Dalian University of Technology, China; {2}Shandong Technology and Business University, China

2414: SVM-Based Motion Classification Using Foot-Mounted IMU for ZUPT-Aided Ins
Eudald Sangenis, Chi-Shih Jao, Andrei Shkel
University of California, Irvine, United States

2653: Machine Learning-Based Severity Classification of Spinal Cord Injury Patients Using Straight Leg Raising Test
Ryoto Yoshikura, Shintaro Izumi, Tatsuya Sugimoto, Hiroshi Kawaguchi
Kobe University, Japan

13:30 – 15:00
Interactive Forum: Sensor Data Processing IV
Room: Marsalis A
Session Chair(s): Carlos Ruiz

2054: Robust Time-of-Flight-Based Material Imaging Using Three-Dimensional Deep Neural Networks on Spatial Neighborhoods of Pixels
Rajababu Udainarayan Singh, Miguel Heredia Conde
Universität Siegen, Germany

2090: Machine Learning Based Optimization of a Ceramic Bushing Manufacturing Process
Thomas Schmitt{2}, Maximilian Bundscherer{2}, Ralf Drechsel{1}, Tobias Bocklet{2}
{1}Paul Rauschert Steinbach GmbH, Germany; {2}Technische Hoschule Nürnberg Georg Simon Ohm, Germany

2116: Performance Evaluation of Spatial Modulation Patterns in Compressive Sensing Terahertz Imaging

Adolphe Ndagijimana[1], Miguel Heredia Conde[2], Iñigo Ederra Urzainqui[1]
[1]Public University of Navarre, Spain; [2]Universität Siegen, Germany

2118: Integrating Security with Accuracy Evaluation in Sensors Fusion

Igor Khokhlov[2], Sergei Chuprov[1], Leon Reznik[1]
[1]Rochester Institute of Technology, United States; [2]Sacred Heart University, United States

2411: Fault Size Estimation of Ball Bearings: A Machine Learning Approach for Noisy Data

Matthias Kahr, Gabor Kovács, Hubert Brückl
University for Continuing Education Krems, Austria

2017: A GIS Aided Approach for Geolocalizing an Unmanned Aerial System Using Deep Learning

Jianli Wei[2], Deniz Karakay[1], Alper Yilmaz[2]
[1]Middle East Technical University, Turkey; [2]Ohio State University, United States

2557: A 3D CNN Based People Counting System Using Auto-Correlation Functions from Frequency Modulated Continuous Wave Radar Signals

Yura Seo, Miseon Han, Jeongtae Kim
Ewha Womans University, Korea

2034: Texture Classification Model Based on Temporal Changes in Vibration Using Wavelet Transform

Momoko Sagara, Kenjiro Takemura
Keio University, Japan

13:30 - 15:00
Interactive Forum: Sensors in Industrial Practices II
Room: Marsalis A
Session Chair(s): Stephen Bart & James Brusey

2094: Vibration Anomaly Detection Using Deep Autoencoders for Smart Factory

Mark Waters[1], Pawel Waszczuk[1], Rodney Ayre[2], Alain Dreze[2], Don McGlinchey[1], Babakalli Alkali[1], Gordon Morison[1]
[1]Glasgow Caledonian University, United Kingdom; [2]Mitsubishi Electric Air-Conditioning Systems Europe LTD, United Kingdom

2112: Photoluminescence Imaging for Industrial Quality Control During Manufacturing of Thin-Film Solar Cells

Johanna Zikulnig[1], Wolfgang Mühleisen[1], Marcel Simor[2], Veronique Gevaerts[2], Martin De Biasio[1]
[1]Silicon Austria Labs GmbH, Austria; [2]TNO, Netherlands

2514: An Approach for Smart and Cost-Efficient Automated E-Waste Recycling for Small to Medium-Sized Devices Using Multi-Sensors

Nermeen Abou Baker, Uwe Handmann
Ruhr West University of Applied Sciences, Germany

2607: Template Matching Technique for Unobstrusive Leak Event Detection in Oil and Gas Pipelines
Raj Rakshit, Supriya Gain, Arijit Sinharay, Chirabrata Bhaumik, Tapas Chakravarty, Arpan Pal
Tata Consultancy Services Limited TCS Research, India

13:30 – 15:00
Interactive Forum: Focused Session: Microwave & Hot Carrier Based Sensors II
Room: Marsalis A
Session Chair(s): Karthik Shankar

2494: Identifying Plasmon-Exciton Coupling in Au Nanoislands Coated with Thin Films of J-Aggregates
John Garcia, Ethan Wilson, Dipesh Aggarwal, Harshitha Rajashekhar, Navneet Kumar, Karthik Shankar
University of Alberta, Canada

13:30 – 15:00
Interactive Forum: Focused Session: Nanomaterials Based Sensors II
Room: Marsalis A
Session Chair(s): Shideh Ameri & Sameer Sonkusale

2409: Low-Modulus, Low-Motion-Artifact Sensor for Biological Signal Recording
Anan Zhang, Shideh Kabiri Ameri
Queen's University, Canada

15:00 – 16:00
Optical Sensors II
Room: Cumberland F
Session Chair(s): Ignacio Matías

15:00
2158: Integration of Carboxymethyl Cellulose Waveguides for Smart Textile Optical Sensors
Sofía Guridi{1}, Ari Hokkanen{3}, Aayush Jaiswal{3}, Nonappa Nonappa{2}, Pirjo Kääriäinen{1}
{1}Aalto University, Finland; {2}Tampere University, Finland; {3}VTT Technical Research Centre of Finland, Finland

15:15
2044: 1.4kDots Consumer LiDAR Up to 10m Based on Indirect Time-of-Flight Sensor
Cedric Tubert, Pascal Mellot, Jose Sanches, Jeremie Teyssier, Valentin Rebière, Thibault Augey, Thomas Bouchet, Valerie Pena-Laroche, Adrien Bonnat, Marc Sanchez, Franck Hingant, Jean-Raphael Bezal, Patrick Laurent, Maxime Mellier, Jeannie Chinal, Matteo
STMicroelectronics, United States; STMicroelectronics, China; STMicroelectronics, France; STMicroelectronics, United Kingdom

15:30
2234: Optomechanical Holographic Sensors – COMSOL Modelling & Experimental Studies
Faolan Radford McGovern, Catherine Grogan, George Amarendei, Izabela Naydenova
Technological University Dublin, Ireland

15:45
2387: Gas Sensor Based on Silicon Nitride Integrated Long Period Grating
Clément Deleau[3], Han Cheng Seat[3], Frédéric Surre[1], Franck Carcenac[2],
Pierre-François Calmon[2], Olivier Bernal[3]
[1]James Watt School of Engineering, University of Glasgow, United Kingdom;
[2]LAAS-CNRS, France; [3]LAAS-CNRS, University of Toulouse, Toulouse INP,
France

15:00 – 16:00
Sensor Network Applications
Room: Cumberland G
Session Chair(s): Yacine Ghamri-Doudane

15:00
2081: Leakage Sensor Placement Optimization Using Acoustic Attenuation
Features in Water Mains
Akihiro Koyama[2], Yusuke Sugita[2], Atsushi Isobe[2], Yudai Kamada[1],
Munenori Degawa[2], Toshiyuki Mine[2], Takashi Kawamoto[2]
[1]Hitachi America, Ltd., United States; [2]Hitachi, Ltd., Japan

15:15
2135: The Gecko Sensor: An Ultra-Compact, Low-Cost, Solar-Powered
Environment Monitoring Device
Hongwei Li, Mingde Zheng, Michael Eggleston
Nokia Bell Labs, United Kingdom; Nokia Bell Labs, United States

15:30
2182: An Innovative Sensor for the Simultaneous Measurement of
Photosynthetic Active Radiation (PAR) and Leaf Area Index (LAI)
Laura Maria Comella[1], Frank Goldschmidtboeing[2], Johannes Klüppel[1], Eiko
Hager[1], Peter Woias[2]
[1]IMTEK, Albert-Ludwigs-Universität Freiburg, Germany; [2]Laboratory for
Design of Microsystems, IMTEK, Albert-Ludwigs-Universität Freiburg, Germany

15:45
2429: Structured Isosurface Mapping of 3D Scalar Fields with Mobile Sensor
Networks
Robert Lee, Christopher Kitts, Michael Neumann
Santa Clara University, United States

15:00 – 16:00
Sensor Data Processing III
Room: Cumberland H
Session Chair(s): Vedran Bilas & Marco Da Silva

15:00
2630: Commercial MAV Velocity Estimation Using Gaussian Process Regression
for Drift Reduction
Kenny Anderson Queiroz Caldas[2], Roberto Santos Inoue[1], Marco Henrique
Terra[2]
[1]Federal University of São Carlos, Brazil; [2]University of São Paulo, Brazil

15:15
2536: Digital Dose Rate Equivalent Meter for Neutron-Gamma Mixed Field
Jiří Čulen{3}, Jan Král{1}, Aleš Jančář{3}, Zdeněk Kopecký{3}, Filip Mravec{3}, Zdeněk Matěj{2}
{1}Brno University of Technology, Czech Rep.; {2}Masaryk University, Czech Rep.; {3}VF, a.s., Czech Rep.

15:30
2399: FootsNet: A Convolutional Neural Network for Footstep-Based Person Identification
Sahil Anchal, Bodhibrata Mukhopadhyay, Subrat Kar
Indian Institute of Technology Delhi, India

15:45
2350: Sensor Management Based on Convex Optimization via PCRLB and Joint Interception Probability
Yue Liu, Lin Zhou, Qian Wei, Benhui Zhao
Henan University, China

15:00 – 16:00
Focused Session: Nanomaterials Based Sensors I
Room: Cumberland J
Session Chair(s): Shideh Ameri & Sameer Sonkusale

15:00
2062: INVITED: Skin-Interfaced Wearable Sweat Biosensors
Wei Gao
California Institute of Technology, United States

15:30
2602: Nanoplasmonic Sensing Technologies for Molecular Analysis of Extracellular Vesicles
Hyungsoon Im, Mi Ho Jeong, Taehwang Son, Jouha Min, Ralph Weissleder, Hakho Lee
Massachusetts General Hospital, United States

15:45
2637: Photonic Crystal Enhanced Quantum Dot Biosensor for Cancer-Associated miRNA Detection
Yanyu Xiong{3}, Qinglan Huang{3}, Taylor D. Canady{3}, Priyash Barya{3}, Shengyan Liu{3}, Opeyemi Arogundade{4}, Caitlin M. Race{3}, Congnyu Che{3}, Xiaojing Wang{3}, Lifeng Zhou{3}, Anh Igarashi{2}, Xing Wang{3}, Manish Kohli{1}, Andrew Smith{3}, Brian C
{1}Huntsman Cancer Institute, United States; {2}Tohoku University / University of Illinois at Urbana-Champaign, Japan; {3}University of Illinois at Urbana-Champaign, United States; {4}University of Illinois Urbana-Champaign, United States

15:00 – 16:00
Focused Session: Bio-Remote Sensing & Integrated Artificail Intelligence Systems
Room: Cumberland K
Session Chair(s): Kianoush Rassels & Paddy French

15:00
2398: INVITED: Cost-Effective Solution of Remote Photoplethysmography Capable of Real-Time, Multi-Subject Monitoring with Social Distancing
Hen-Wei Huang{1}, Philip Rupp{1}, Jack Chen{1}, Abhijay Kemkar{1}, Naitik Khandelwal{1}, Ian Ballinger{1}, Peter Chai{1}, Giovanni Traverso{2}
{1}Harvard Medical School, United States; {2}Massachusetts Institute of Technology, United States

15:30
2613: Non-Contact Atrial Fibrillation Detection Using a 24-GHz Microwave Doppler Radar
Shintaro Izumi{1}, Sho Murase{2}, Itsumi Fukuda{3}, Kenta Taki{3}, Kazunori Toyama{3}, Tadashi Inuzuka{3}, Hideki Mochizuki{2}, Hiroshi Kawaguchi{1}
{1}Kobe University, Japan; {2}Osaka University, Japan; {3}Toyota Systems Corporation, Japan

15:45
2633: Motor Imagery Brain Activity Recognition Through Data Augmentation Using DC-GANs and Mu-Sigma
Abhishek Khoyani{1}, Harshdeep Kaur{1}, Marzieh Amini{1}, Hamidreza Sadreazami{2}
{1}Carleton University, Canada; {2}McGill University, Canada

15:00 – 16:00
Journal Presentations - Device Technologies II
Room: Cumberland L
Session Chair(s): Danling Wang

15:00
2742: Development of MEMS Sensor for Detection of Creatinine Using MIP Based Approach - a Tutorial Paper
Sumedha Nitin Prabhu{2}, Chinthaka Pasan Chinthaka Pasan{1}, Subhas Chandra Mukhopadhyay{2}
{1}EXPEC Advanced Research Center, Saudi Arabia; {2}Macquarie University, Australia

15:15
2741: Enhanced Graphene Sensors via Multi-Lasing Fabrication
Altynay Kaidarova{1}, Mani Teja Vijjapu{1}, Kuat Telegenov{1}, Alexander Przybysz{1}, Khaled Nabil Salama{1}, Jürgen Kosel{2}
{1}King Abdullah University of Science and Technology, Saudi Arabia; {2}Silicon Austria Labs GmbH, Austria

15:30
2769: Reduced Graphene Oxide Based Electronic Sensors for Rapid and Label-Free Detection of CEA and CYFRA 21-1
Sowmya Joshi, Gorthala Guruprasad, Saraswati Kulkarni, Ruma Ghosh
Indian Institute of Technology Dharwad, India

15:45
2714: Recent Advances in Electrochemical Sensors for Wearable Sweat Monitoring: a Review
Zhaoli Gao{1}, Kan Kan Yeung{1}, Ting Huang{1}, Yunzhi Hua{4}, Kai Zhang{2}, Matthew M. F. Yuen{3}
{1}Chinese University of Hong Kong, Hong Kong; {2}Guangdong University of Technology, China; {3}Hong Kong University of Science and Technology, Hong Kong; {4}Shenzhen Institute of Information Technology, China

16:00 – 17:00
Award Ceremony
Room: Reunion Ballroom

17:00 – 17:30
Closing Ceremoy
Room: Reunion Ballroom

Notes:

Notes:

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