

SENSORS 2021 CONFERENCE PROGRAM

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TABLE OF CONTENTS

IEEE SENSORS 2021 Committee	2
IEEE SENSORS 2021 Track Chairs	3
SENSORS Council	5
Sponsors	9
Presentation Downloads	10
Keynote Speakers	11
Invited Speakers	14
Program Grid – Sunday, October 31	15
Program Grid – Monday, November 1	16
Program Grid – Tuesday, November 2	17
Program Grid – Wednesday, November 3	18
Program Grid – Thursday, November 4	19
Technical Program	23

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IEEE SENSORS 2021 TRACK CHAIRS

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Octavian Postolache, *Instituto de Telecomunicacoes, IT-IUL* Sampo Tuukkanen, *Tampere University, Finland*

Track 2: Sensor Materials, Processing and Fabrication (including Printing)

Mohsen Asadnia, *Macquarie University, Australia* Masato Sone, *Tokio Institute of Technology, Japan*

Track 3: Chemical, Electrochemical and Gas Sensors

Preethi Preethichandra, *Central Queensland University, Australia* Marios Sophocleous, *University of Cyprus, Cyprus*

Track 4: Microfluidics and Biosensors

Chirasree RoyChowdhury, Indian Institute of Engineering Science and Technology, India Loes Segerink, University of Twente, The Netherlands

Track 5: Optical Sensors

Wan-Young Chun, *Kyungpook National University, South Korea* Hengky Chandrahalim, *US Air Force Institute of Technology, USA* Minghong Yang, *Wuhan University of Technology, China*

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

Kunihisa Tashiro, *Shinshu University, Japan* Giacomo Langfelder, *Politecnico di Milano, Italy*

Track 7: Acoustic and Ultrasonic Sensors

Bernhard Jakoby, *Johannes Kepler University Linz, Austria* Sheng-Shian Li, *National Tsing Hua University, Taiwan* Krishnan Balasubramaniam, *Indian Institute of Technology Madras, India*

Track 8: Sensor Packaging (including on Flexible Materials)

Alex Mason, Norwegian University of Life Sciences, Norway Eric MacDonald, *Youngstown State University, USA*

Track 9: Sensor Networks (including IoT and Related Areas)

Henry Leung, University of Calgary, Canada Binbin Chen, Singapore University of Technology and Design, Singapore

Track 10: Emerging Sensor Applications

Theerawit Wilaiprasitporn, Vidyasirimedhi Institute of Science & Technology, Thailand Volker Nock, University of Canterbury, New Zealand

Track 11: Sensor Systems: Signals, Processing and Interfaces

Boby George, Indian Institute of Technology Madras, India Michael Daniele, NC State University, USA



Track 12: Actuators and Sensor Power Systems Djilali Kourtiche, *Institut Jean Lamour, France* Andrew Holmes, *Imperial University, UK*

Track 13: Sensors data processing including soft computing, data fusion, estimation and classification

Valérie Renaudin, *University Gustave Eiffel GEOLOC Laboratory, France* Marco Jose Da Silva, *Federal University of Technology - Paraná, Brazil*

Track 14: Sensors in Industrial Practices

James Brusey, *Coventry University, UK* Stoyan Nihitianov, *Technical University Delft, Netherlands*

Track 15: Demos

Zhi Liu, Shandong University, China Tao Li, University of Cincinnati, USA

Track 16: Focused Session

Graham Brooker, *University of New South Wales, Australia* Ashwin Seshia, *University of Cambridge, UK*

Focussed Session 16.1: Emerging wearable sensors and systems

Hun Cao, *Southern Methodist University* Mohamed Irfan, *University of Twente* Bert-Jan van Beijnum

Focussed Session 16.2: Microwave sensors

Karthik Shankar, *University of Alberta* Mohammad Zarifi, *Fondazione Bruno Kessler*

Focussed Session 16.3: Emerging Sensors and Sensing Systems for Underground Infrastructure

Sarath Kodagoda, *University of Technology Sydney, Australia* Karthick Thiyagarajan, *University of Technology Sydney, Australia*

Focussed Session 17: Sensors Letters/Sensors Journal

Focussed Session 18: Late News



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Industry Applications Society Michael Harke, UTC Aerospace Systems, USA



Instrumentation and Measurement Society Nicola Donato, University of Messina, Italy

Magnetics Society Susana Cardoso de Freitas, INESC-MN, Portugal

Microwave Theory and Techniques Society Jung-Chih Chiao, University of Texas at Arlington, USA

Oceanic Engineering Society Christopher Whitt, JASCO Applied Sciences, Canada

Photonics Society Carlos Ruiz Zamarreño, *Universidad Pública de Navarra, Spain*

Power and Energy Society Murat Kuzlu, Old Dominion University, USA

Reliability Society Jeff Voas, NIST, USA

Robotics and Automation Society (Open)

Signal Processing Society Peter Willett, University of Connecticut, USA

Solid State Circuits Society Wai Lee, Texas Instruments, Inc., USA

Ultrasonics, Ferroelectrics, and Frequency Control Society James Spicer, Johns Hopkins University, USA

Vehicular Technology Society Thanuka Wickramarathne, *University of Massachusetts Lowell, USA*

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PRESENTATION DOWNLOADS



Because of the parallel sessions, IEEE SENSORS 2021 participants will probably miss some important presentations they would have liked to see. Therefore, as an extra benefit for conference participants, consented presentations are being captured through the duration of the conference.

You may view these presentations after the conference concludes by visting the IEEE Sensors Council YouTube Channel (bit.ly/SensorsCouncilYouTube). Subscribe to our channel today to stay up to date with all the latest videos!





KEYNOTE SPEAKERS

" 'TINY-BUT-TOUGH' GALLIUM NITRIDE SENSORS FOR EXTREME HARSH ENVIRONMENTS"



Debbie G. Senesky, Associate Professor, Aeronautics and Astronautics, Stanford University

Gallium nitride (GaN) nanoelectronics have operated at temperatures as high as 1000°C making it a viable platform for robust space-grade ("tiny-but-tough") sensors and electronics. In addition, there has been a tremendous amount of research and industrial investment in GaN as it is positioned to replace silicon in the billion-dollar (USD) power electronics industry, as well as the post-Moore microelectronics universe. Furthermore, the 2014 Nobel Prize in physics was awarded for pioneering research in GaN that led to the realization of the energy-efficient blue light-emitting diode (LED). Even with these major technological breakthroughs, we have just begun the "GaN revolution." New communities are adopting this nanoelectronic platform for a multitude of emerging device applications including the following: sensing, energy harvesting, actuation, and communication. In this talk, we will review and discuss the benefits of GaN's two-dimensional electron gas (2DEG) over silicon's p-n junction for space exploration applications (e.g., radiation-hardened, temperature-tolerant Venus instrumentation). In addition, we will discuss recent results that advance this nanoelectronic device platform for extreme-environment Internet-of-things (IoT) sensors for combustion and down-hole monitoring.





"INSECTS BIO-INSPIRED SENSORS "



Jérôme Casas, Professor, University of Tours

The millions of insect species are millions of solutions to a huge variety of problems, many involving sensing and actuation. Equipped with countless types of sensors, most insects are small, smaller than one centimeter. They are hence perfect templates for bioinspired microtechnology. I will start my talk with a broad survey of the technological sensors designed according to biological models, from acoustic to optical flow to IR sensors. Then, I will describe our work on flow sensing hairs and the MEMS we designed, with a special emphasis on the interactions between several sensors. The geometry and multiplicity of sensors is at the heart of the transport phenomena around insect antennae in the context of sensing minutes amounts of pheromones and I shall present this as well. We will then dwell into signal processing and tap into the unique ability of invertebrates to process information in a distributed way in their different neural centers: the latest neuromorphic network inspired from insects shows indeed most promising performances and interpretability, compared to a generic deep learning approach. I end the talk by sharing my decades-long experience of interacting with applied physicists, engineers and mathematicians. The biologist's and engineer's approaches differ a lot; the successful production of bioinspired artefacts demands thus more than a passing interest for interdisciplinarity, and from both parties. Taping into the fast treasure trove of energy sparse, carbon-based sensors of the insect world is certainly worth the effort, given the most serious technological and environmental bottlenecks facing us.



"FROM ULTRASENSITIVE TO SINGLE MOLECULE BIOSENSORS THAT OPERATE IN COMPLEX BIOLOGICAL FLUIDS "



Justin Gooding, University of New South Wales

One major opportunity in biomedical sensors is technology that can selectively detect species at ultra-low levels. This is because many of the existing pathologies, such as early detection of cancer, pathogen detection and assessment of treatment efficacy, are all required to be detected at low levels that existing commercial technologies seldom reach. We have developed a suite of technologies that are amenable to commercialisation that can detect species at femtomolar and lower levels. The suite of technologies all use the same strategy of making magnetic nanoparticle sensors collect the biomarker of interest rather than the normal approach of making the biomarker find the sensing surface. Using this strategy, the first technology will focus on the detection of ultralow levels of microRNA, as a cancer marker, in whole blood with 10 aM detection limits. Next will be discussed taking this strategy down to single molecules using a unique nanopore blockade sensor that we have developed for detecting proteins at femtomolar levels. This will be followed by a dark-field microscopy method for detecting viral RNA that exploits a new concept of performing quantitative analysis by counting many single-molecule events. Taken together, the common thread in all these technologies is the use of nanoparticles to confine the measurement volume to nanolitres, or lower, such that a single molecule in that volume is an appreciable concentration.



INVITED SPEAKERS

Track ID	Track Name	Name	Paper Title
3	Chemical, Electrochemical and Gas Sensors	Thomas Thundat	Chemical Selectivity and Reproducibility Challenges in Nanomechanical Sensors
4	Microfluidics and Biosensors	Roosbeh Jafari	Bio-Impedance Sensing for Precision Medicine: Challenges and Opportunities
5	Optical Sensors	Judith Su	Ultra-Sensitive Microtoroid Optical Sensing Technology for Biomedical Applications
6	Physical Sensors - Temperature, Mechanical, Magnetic and Others	Jae Yoong Cho	High-Q Fused-Silica Micro Birdbath Shell Resonator Gyroscope
8	Sensor Packaging (including on Flexible Materials)	Olga Korostynska	Sensors for Smart Packaging in Healthcare and Food Industry
9	Sensor Networks (including IoT and Related Areas)	Baris Aksanli	Robust Sensor Placement Optimization With Distance Uncertainty
10	Emerging Sensor Applications	Francesco Fioranelli	Radar Sensing for Human Healthcare: Challenges and Results
12	Actuators and Sensor Power Systems	Elie Lefeuvre	Biomechanical Energy Harvesting for Medical Implant Applications
13	Sensors data processing including soft computing, data fusion, estimation and classification	Ashish Pandharipande	Luminaire-Based Environmental Sensing for Comfort Monitoring and Control
16.1	Emerging wearable sensors and systems	Chao-Hsiung Tseng	A Wearable Cuffless Blood Pressure Sensor with Radio-Frequency Technology
16.1	Emerging wearable sensors and systems	Oliver Amft	From Digital Twins to Wearables and Back
16.2	Microwave sensors	Paris Velez	A Microwave Microfluidic Reflective-Mode Phase- Variation Sensor
16.2	Microwave sensors	Michal Cifra	Molecular Understanding of Electromagnetic Field- Biomatter Interaction for Rational Bio/Chemical Sensing Device Design
16.3	Emerging Sensors and Sensing Systems for Underground Infrastructure	Siddharth Tallur	Enig Pcb Electrodes: Low Cost Electrochemical Biosensing Platform for Wastewater Epidemiology
16.3	Emerging Sensors and Sensing Systems for Underground Infrastructure	Kirill V Horoshenkov	Acoustic and Ultrasonic Characterisation of Blockages and Defects in Underground Pipes





PROGRAM GRID – SUNDAY, OCTOBER 31 All times listed in UTC

10:30 – 11:45	Piezoelectric MEMS Resonator Technology Gayathri Pillai, Center for Nano Science and Engineering, Indian Institute of Science (IISc), Bengaluru, India
12:00 – 13:15	Biosensors introduction: From fabrication to application Winnie E. Svendsen, <i>Zurich Instruments</i> Maria Dimaki, <i>Zurich Instruments</i>
13:00 - 14:00	Young Professionals Reception
13:30 – 14:45	Signal Processing for IoT – Decision Fusion in Sensor Networks Pierluigi Salvo Rossi, <i>University of Naples "Federico II", Italy</i> Domenico Ciuonzo, <i>University of Naples, Federico II, Italy</i> Pramod K. Varshney, <i>Director of CASE: Center for Advanced Systems and Engineering, USA</i>
15:00 – 16:30	Sensing using THz radiation Michael Shur, <i>Rensselaer Polytechnic Institute, USA</i>

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PROGRAM GRID – MONDAY, NOVEMBER 1 All times listed in UTC

9:30 - 10:00	Social & Networking								
10:00 - 10:30	Opening & Welcome								
10:30 – 11:30				Keynote 1: Jus	tin Gooding				
11:30 - 12:00		Exhibitor Presentations							
12:00 – 13:30	A1L-01: Microwave Sensors Applied in Medicine & Materials Science	Microwave Sensors Applied in Medicine & MaterialsA1L-02: Chemical, IA1L-03: Acoustic & Ultrasonic TransducersA1L-04: Sensor Packaging (including on Flexible Materials)A1L-05: Sensor Networks (IOT)A1L-06: Power Sources & A1L-07: 							
13:30 - 14:30	Poster Sessions A2P-10 – A2P-15 & Exbibitors								
14:30 – 15:00	Social & Networking								

★ 16 *



PROGRAM GRID – TUESDAY, NOVEMBER 2 All times listed in UTC

10:00 - 11:00	Social & Networking								
11:00 – 12:30	B1L-01: Optical Sensors IB1L-02: Chemical, Electrochemical IIB1L-03: Inertial, Magnetic & Pressure SensorsB1L-04: Sensor Sensor Systems IB1L-05: Emerging Sensor Applications IB1L-06: Sensor Data Processing I (Soft Sensors)B1L-07: Emerging Sensor Systems for Underground Infrastructure								
					ynote Speaker			TIONO	
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12:30 - 14:30			SENSE AN		'Y: WHY DIVER hthy Foley	RSITY MATTE	RS		
	E	INVIRONMENTAL	MONITORING		OXIDES NANC betta Comini	STRUCTURE	S CHEMICAL S	ENSORS	
	SELF-POWERED ELECTRONIC SKIN								
		Haixia Zhang							
14:30 – 15:30	Poster Sessions B2P-10 – B2P-15 & Exbibitors								
15:30 – 16:00	Social & Networking								

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PROGRAM GRID – WEDNESDAY, NOVEMBER 3 All times listed in UTC

10:00 - 11:30	Youn	g Professional (YP)	Technical Ses	ssion	Social & Networking					
11:30 - 12:00		Sensors Council Awards								
12:00 – 13:30	C1L-01: Microwave Sensors for Industrial & Commercial Applications	Microwave Sensors for Industrial & CommercialC1L-02: Chemical, Electrochemical & Gas SensorsC1L-03: Tactile & Strain SensorsC1L-04: Sensor Systems IIC1L-05: Sensor Networks (IoT) IISensor Materials, 								
13:30 – 14:00		Exbibitor Presentations								
14:00 – 15:00		Poster Sessions C2P-10 – C2P-14 & Exbibitors								
15:00 – 16:00	Keynote 2:: Debby Senesky									
16:00 – 16:30		Social & Networking								

***** 18



PROGRAM GRID – THURSDAY, NOVEMBER 4 All times listed in UTC

10:00 - 10:30	Social & Networking									
10:30 - 11:00	Conference Awards & 2022 Announcement									
11:00 – 12:30	D1L-01: Optical Sensors II	Optical Chemical & Sensors & Others Systems III Emerging Sensor Processing II								
12:30 – 13:30		Keynote 3: Jérôme Casas								
13:30 - 14:00		Networking & Exhibitors								
14:00 – 15:00	Poster Sessions D2P-10 – D2P-15 & Exhibitors									
15:00 – 15:30	Social & Networking									

★ 19



12:00 – 13:30 UTC A1L-01: MICROWAVE SENSORS APPLIED IN MEDICINE & MATERIALS SCIENCE SESSION CHAIRS: Karthik Shankar, University of Alberta & Mohammad Zarifi, University of British Columbia

A1L-01-01

12:00

INVITED: Molecular Understanding of Electromagnetic Field-Biomatter Interaction for Rational Bio/Chemical Sensing Device Design

Michal Cifra

Institute of Photonics and Electronics of the Czech Academy of Sciences, Czech Rep.

A1L-01-02

12:30

Detecting Charge Separation in Optoelectronic Materials and Devices Using Planar Microwave Resonators: An Overview

Md. Masud Rana, Karthik Shankar University of Alberta, Canada

A1L-01-03

12:45

Investigating the Potential of a PEDOT:PSS Organic Microwave Resonator for Gas Sensing Applications

Maryam Moradpour, Mandeep Jain, Nicolas Tanguy, Mohammad Hossein Zarifi University of British Columbia, Canada

A1L-01-04

13:00

Advanced 3D Printed Conductive Polymer Nanocomposites for Electromagnetic Shielding

Milad Kamkar, Majed Amini, Saeed Ghaderi, Ahmadreza Ghaffarkhah, Amir Hosein Ahmadian Hoseini, Mohammad Arjmand University of British Columbia, Canada

A1L-01-05

13:15

Microwave Sensors: Implication of Long-Term Non-Invasive Monitoring for Health Olga Korostynska{2}, Bruno Dzogovic{2}, Alex Mason{1} {1}Norwegian University of Life Sciences, Animalia AS, Norway; {2}Oslo Metropolitan University, Norway

12:00 – 13:30 UTC A1L-02: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS 1 SESSION CHAIRS: Marios Sophocleous, University of Cyprus & Preethi Preethichandra, Central Queensland University

A1L-02-1 12:00 INVITED: Chemical Selectivity and Reproducibility Challenges in Nanomechanical Sensors Yaoli Zhao, Siyu Cui, Thomas Thundat University at Buffalo, United States



MONDAY, NOVEMBER 1

A1L-02-2

12:30

Polyaniline-Atomic Au Modified Platinum Electrode with Ionic Liquid as Configuration for Enhanced Electrochemical Sensing

Parthojit Chakraborty, Hiroki Kawakami, Anifatul Faricha, Tso-Fu Mark Chang, Masato Sone, Takamichi Nakamoto

Tokyo Institute of Technology, Japan

A1L-02-3

12:45

Monitoring Zeolite Formation with Moving Electrode Conductometry

Nikolaus Doppelhammer{1}, Nick Pellens{3}, Bernhard Jakoby{1}, Christine Kirschhock{3}, Erwin Reichel{2}

{1}Institute for Microelectronics and Microsensors, Johannes Kepler Universität Linz, Austria; {2}Johannes Kepler Universität Linz, Austria; {3}Katholieke Universiteit Leuven, Belgium

A1L-02-4

1:00

Characterization of pH Sensors Based on Iridium Oxide and Gold Encapsulated Polypropylene Membranes

Khengdauliu Chawang{2}, Shih-Cheng Chou{1}, Sen Bing{2}, Pu-Wei Wu{1}, J.-C. Chiao{2} {1}National Yang Ming Chiao Tung University, Taiwan; {2}Southern Methodist University, United States

A1L-02-5

13:15

Pulsed UV-Irradiated Graphene Sensors for Ethanol Detection at Room Temperature *Katarzyna Drozdowska*{3}, *Adil Rehman*{1}, *Pavlo Sai*{1}, *Bartłomiej Stonio*{2}, *Aleksandra Krajewska*{1}, *Grzegorz Cywiński*{1}, *Maciej Haras*{2}, *Sergey Rumyantsev*{1}, *Janusz Smulko*{3}, *Andrzej Kwiatkowski*{3}

12:00 – 13:30 UTC

A1L-03: ACOUSTIC & ULTRASONIC TRANSDUCERS SESSION CHAIRS: Bernhard Jakoby, Johannes Kepler University Linz & Krishnan Balasubrama, Indian Institute of Technology Madras

A1L-03-1

12:00

On the Performance Enhancement of Cantilever Diaphragm Piezoelectric Microphone

Shao-Da Wang{3}, Yu-Chen Chen{2}, Sung-Cheng Lo{3}, Yi-Jia Wang{3}, Mingching Wu{1}, Weileun Fang{3}

{1}Coretronic MEMS Co., LTD., Taiwan; {2}Institute of NanoEngineering and MicroSystem, National Tsing Hua University, Taiwan; {3}National Tsing Hua University, Taiwan

A1L-03-2 12:15 Bandwidth Extension Technique of Piezoelectric Micromachined Ultrasonic Transducers for Air Coupled Applications

Tingzhong Xu, Lixiang Wu, Mohssen Moridi Silicon Austria Labs GmbH, Austria



A1L-03-3

12:30

Quality Control of Ultrasound Transducers Using Distribution-Free Overlapping Coefficients

Martin Angerer{1}, Michael Zapf{1}, Martin Koch{2}, Nicole V. Ruiter{1} {1}Karlsruhe Institute of Technology, Germany; {2}Technische Universität Dresden, Germany

A1L-03-4

12:45

Single Microcontroller Air-Coupled Waveguided Ultrasonic Sonar System

Tim Maier, Gianni Allevato, Matthias Rutsch, Mario Kupnik Technische Universität Darmstadt, Germany

A1L-03-5

13:00

Why Lasers Inject Perceived Sound Into MEMS Microphones: Indications and Contraindications of Photoacoustic and Photoelectric Effects

Benjamin Cyr{2}, Takeshi Sugawara{1}, Kevin Fu{2} {1}University of Electro-Communications, Japan; {2}University of Michigan, United States

A1L-03-6

13:15

Lamb Waves Sensor in Liquid Media Utilizing Higher-Order Quasi-Longitudinal S5 and S6 Modes Muhammad Hamidullah, Nassim Rezzag, Céline Élie-Caille, Thérèse Leblois FEMTO-ST Institute, University Bourgogne Franche-Comté, France

12:00 – 13:30 UTC A1L-04: SENSOR PACKAGING (INCLUDING ON FLEXIBLE MATERIALS) SESSION CHAIRS: Alex Mason, Norwegian University of Life Sciences & Eric MacDonald, University of Texas in El Paso

A1L-04-1 12:00 INVITED: Sensors for Smart Packaging in Healthcare and Food Industry Olga Korostynska Oslo Metropolitan University, Norway

A1L-04-2

12:30

Evaluation of Low Cost Sealing Methods to Protect Sustainable Printed Temperature Sensors Against Degradation Due to UV Irradiation

Lukas Rauter{3}, Johanna Zikulnig{3}, Muhammad-Hassan Malik{3}, Sherjeel Khan{3}, Lisa-Marie Faller{2}, Hubert Zangl{1}, Jürgen Kosel{3}

{1}Alpe-Adria University Klagenfurt, Austria; {2}Carinthian University of Applied Sciences, Austria; {3}Silicon Austria Labs GmbH, Austria

A1L-04-3

12:45

Evaluation of Environmental Enclosures for Effective Ambient Ozone Sensing in Wrist-Worn Health and Exposure Trackers

Tahmid Latif, James Dieffenderfer, Akhilesh Tanneeru, Bongmook Lee, Veena Misra, Alper Bozkurt North Carolina State University, United States



MONDAY, NOVEMBER 1

A1L-04-4 13:00 Flexible Enzymatic Sensors for Detection of Hydrogen Peroxide Jacopo Giaretta, Haowei Duan, Farshad Oveissi, Syamak Farajikhah, Fariba Dehghani, Sina Naficy University of Sydney, Australia

A1L-04-5

13:15

Integrated Sensing in Robotic Skin Modules

William R. Johnson III, Joran Booth, Rebecca Kramer-Bottiglio Yale University, United States

12:00 – 13:30 UTC A1L-05: SENSOR NETWORKS (IoT) 1 SESSION CHAIRS: Binbin Chen, Singapore University of Technology and Design & Henry Leung, University of Calgary

A1L-05-1

12:00

CAHEROS: Constraint-Aware HEuristic Approach for RObust Sensor Placement Onat Gungor{2}, Tajana Rosing{2}, Baris Aksanli{1} {1}San Diego State University, United States; {2}University of California San Diego, United States

A1L-05-2

12:30

Hybridly Integrated MEMS-IC RF Front-End for IoT with Embedded Filtering and Passive Voltage Amplification

Giuseppe Michetti{2}, Gabriel Giribaldi{2}, Michele Pirro{2}, Ankit Mittal{2}, Tanbir Haque{1}, Patrick Cabrol{1}, Ravikumar Pragada{1}, Hussain Elkotby{1}, Luca Colombo{2}, Aatmesh Shrivastava{2}, Matteo Rinaldi{2}

{1}InterDigital Communications Inc., United States; {2}Northeastern University, United States

A1L-05-3

12:45

Sub-Millisecond Video Synchronization of Multiple Android Smartphones

Azat Akhmetyanov, Anastasiia Kornilova, Marsel Faizullin, David Pozo, Gonzalo Ferrer Skolkovo Institute of Science and Technology, Russia

A1L-05-4

13:00

Spatio-Temporal Analyses of Environmental Monitoring Based on Wireless Sensor Networks *Ryoma Yasutani{1}, Koki Kitazumi{1}, Shusuke Narieda{1}, Takeo Fujii{3}, Kenta Umebayashi{2}, Hiroshi Naruse{1}*

{1}Mie University, Japan; {2}Tokyo University of Agriculture and Technology, Japan; {3}University of Electro-Communications, Japan



A1L-05-5 13:15 Distributed Opportunistic Wireless Mapplicationing System Towards Smart City Service Provision Jesus Villadangos, Francisco Falcone, Antonio Lopez, Jose Javier Astrain, Pablo Sanchis, Ignacio Raúl Matías Maestro

Universidad Pública de Navarra, Spain

12:00 – 13:30 UTC A1L-06: POWER SOURCES & ACTUATORS 1 SESSION CHAIRS: Andrew Holmes, Imperial University London & Djilali Kourtiche, Institut Jean Lamour - Université de Lorraine-CNRS-UMR

A1L-06-1

12:00

INVITED: Biomechanical Energy Harvesting for Medical Implant Applications

Elie Lefeuvre, Marion Woytasik, Xavier Leroux, Fabien Parrain University of Paris-Saclay, CNRS, France

A1L-06-2

12:30

A Micro-Watt Electrolytic Power Scavenger Driven by Eye-Blinking Motion

Erfan Pourshaban, Mohit U. Karkhanis, Adwait Deshpande, Aishwaryadev Banerjee, Hanseup Kim, Carlos H. Mastrangelo University of Utah, United States

A1L-06-3

12:45

Enhanced TENG Performance by Engineering the Compression Modulus of Triboelectric Layers Valliammai Palaniappan, Xingzhe Zhang, Dinesh Maddipatla, Binu Baby Narakathu, Bradley Bazuin, Massood Atashbar

Western Michigan University, United States

A1L-06-4

13:00

Wireless Power Transfer Through Soil Over a Range of Moisture Levels for In-Situ Soil Health Monitoring

Weijie Luo {1}, Aidan Jackson {1}, Jack Sorensen {1}, Archana Dahal {1}, Ramesh Goel {1}, Shad Roundy {1}, Cody Zesiger {2}, Darrin Young {1} {1} University of Utah, United States; {2} Utah State University, United States

A1L-06-5

13:15

Surface Micromachined Out-of-Plane Electrostatic MEMS Actuator Integrated with Displacement Sensor

Seyedfakhreddin Nabavi{1}, Michaël Ménard{2}, Frederic Nabki{1} {1}École de Technologie Supérieure, Canada; {2}Université du Québec à Montréal, Canada



12:00 – 13:30 UTC A1L-07: EMERGING WEARABLE SENSORS & SYSTEMS 1 SESSION CHAIRS: Hung Cao, University of California Irvine & Mohamed Irfan Mohamed Refai, University of Twente

A1L-07-1

12:00

INVITED: A Wearable Cuffless Blood Pressure Sensor with Radio-Frequency Technology

Chao-Hsiung Tseng{2}, Tzu-Jung Tseng{1} {1}National Taiwan University, Taiwan; {2}National Taiwan University of Science and Technology, Taiwan

A1L-07-2

12:30

A Wearable, Multiplexed Sensor for Real-Time and In-Situ Monitoring of Wound Biomarkers *Alina Pereira, Tanzila Noushin, Shawana Tabassum University of Texas at Tyler, United States*

A1L-07-3

12:45

Multifunctional Stretchable Sensor for Detecting Flow, Strain and Temperature

Shiqiang Liu, Yuzhong Zhang, Rong Zhu Tsinghua University, China

A1L-07-4

13:00

Assessing the Role of Textiles in the Performance of Wearable Screen-Printed Strain Sensors for Breathing Rate Monitoring

Martina Aurora Costa Angeli{1}, Mallikarjun Madagalam{1}, Mattia Petrelli{1}, Silvia Pogliaghi{3}, Alessandra Scarton{2}, Pietro Ibba{1}, Enrico Avancini{1}, Federico Gori{2}, Roberto Biasi{2}, Luisa Petti{1}, Paolo Lugli{1}

*{*1*}Free University of Bozen-Bolzano, Italy; {*2*}Microgate Srl, Italy; {*3*}Università degli Studi di Verona, Italy*

A1L-07-5

13:15

Wearable Triboelectric Sensor for Respiration and Coughing Monitoring

David Fernando Vera Anaya, Mehmet Rasit Yuce Monash University, Australia



12:00 – 13:30 UTC A1L-08: MICROFLUIDICS & BIOSENSORS I SESSION CHAIRS: Loes Segerink, University of Twente/BIOS & Chirasree RoyChaudhuri, IIEST

12:00

A1L-08-1

INVITED: Cuffless Blood Pressure Monitoring using Bio-Impedance Circuits and Systems *Roozbeh Jafari, Texas A&M University, USA*

A1L-08-2

12:15

Plasmonic Nanoparticles Based Flexible Micro Stripe Pattern for Cellular Behavior Regulation and Localized pH Detection

Xiaoyu Wu, Wencheng Li, Shan He, Kai Yang, Yanyan Wang Tianjin University, China

A1L-08-3

12:30

An Integrated Flexible Multi-Sensing Device for Daily Urine Analysis at Home

Xiyu Mao, Shiyi Xu, Shanshan Zhang, Xuesong Ye, Bo Liang Zhejiang University, China

A1L-08-4

12:45

A Point of Care Sensor for Milk Adulteration Detection

Subhashis Patari, Pallab Sinha Mahapatra Indian Institute of Technology Madras, India

A1L-08-5

13:00

Single-Chained Fragment Variable (scFv) Recombinant as a Potential Receptor for SARS-CoV-2 Biosensor Based on Surface Plasmon Resonance (SPR)

Isa Anshori{1}, Muhammad Yusuf{3}, Brian Yuliarto{1}, Antonius Eko Nugroho{1}, Taufik Ramdani Tohari{3}, Gilang Gumilar{1}, Lavita Nuraviana{2}, Aminul Solihin{1}, Silmina Prastriyati Sari{3}, Yeni Wahyuni Hartati{3}, Raih Rona Althof{2}, Jessika Jessika{

{1}Institut Teknologi Bandung, Indonesia; {2}Research Center for Nanoscience and Nanotechnology Institut Teknologi Bandung, Indonesia; {3}Research Center of Molecular Biotechnology and Informatics Universitas Padjajaran, Indonesia



13:30 – 14:30 UTC A2P-10: Sensor Systems IV SESSION CHAIR: Michal Janosek, Czech Technical University in Prague

A2P-10-1

A 9 Ps DNL/INL/RMS FPGA-Based Sigma Accumulation TDC with Unlimited Dynamic Range for Time-Based Analog Front End Applications

Masayoshi Todorokihara Seiko Epson Corporation, Japan

A2P-10-2

A Combined Capacitance and Resistance Digital Readout Circuit for Sensory Nodes

Anis Fatema, Abhinav Navnit, Deeksha Devendra, Aftab Hussain International Institute of Information Technology, Hyderabad, India

A2P-10-3

A Two-Step Approach for Pulse RFI Detection in SAR Data

Zongsen Lv, Hengrui Zhang, Ning Li, Zhengwei Guo Henan University, China

A2P-10-4

Low Frequency Noise Investigation of pT-Level Magnetic Sensors by Cross-Spectral Method *Michal Janošek*{1}, *David Novotný*{1}, *Michal Dressler*{1}, *Elda Saunderson*{2} {1}Czech Technical University in Prague, Czech Rep.; {2}South African National Space Agency, South Africa

13:30 – 14:30 UTC A1P-11: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS V SESSION CHAIRS: Aakash Jog, Tel Aviv University & Marios Sophocleous, University of Cyprus

A2P-11-1

Humidity Sensing Characteristics and Transduction Mechanism of Mg2+ Added BaSrTiO3 Perovskites

Hamid Farahani{1}, Rahman Wagiran{2}, Gerald Urban{1} {1}IMTEK, Albert-Ludwigs-Universität Freiburg, Germany; {2}University Putra Malaysia, Malaysia

A2P-11-2

Narrowing of Bandgap with Silver Doping on TiO2 Nanotubes Arrays for Electrochemical Sensing Application

Sarda Sharma, Siddhartha P. N., Karumbaiah Chappanda Birla Institute of Technology and Science, Pilani, India

A2P-11-3

An LC-Type Flexible Wireless Humidity Sensor with Electrospun Isolation Layer Yong Li, Zhenyu Wei, Jianqiu Huang Key Laboratory of MEMS of the Ministry of Education, Southeast University, China



A2P-11-4

A LC Resonator Based Flexible Printed RFID for Wireless Potassium Ion Sensing Tianhang Wu, Sharmistha Bhadra McGill University, Canada

A2P-11-5

Leakage-Waveguide-Type Plastic Optical Fiber Humidity Sensor Using Dye-Doped Swellable Polymers as Cladding

★ 28 🕈

Yuta Shimura, Yutaka Suzuki, Masayuki Morisawa University of Yamanashi, Japan



A2P-11-6

Multiplexed Electrochemical Sensor for Real-Time Monitoring of Inflammatory Biomarkers

Tanzila Noushin, Shawana Tabassum University of Texas at Tyler, United States

A2P-11-7

Flexible Chemiresistive pH Sensor Based on Polyaniline / Carbon Nanotube Nanocomposite for IoT Applications

Homa Emami, Shirin Mahinnezhad, Ahmad Al Shboul, Mohsen Ketabi, Andy Shih, Ricardo Izquierdo École de Technologie Supérieure, Canada

A2P-11-8

Sensor for In-Situ Detection of Bacteria in Urinary Tract Infection

Wei Yi{1}, Jiachen Liu{1}, Tung-Shi Huang{1}, Kenny Brock{2}, Zhongyang Cheng{1} {1}Auburn University, United States; {2}VCOM-Auburn, United States

A2P-11-9

A Differential p-ISFET Based On-Chip pH Sensor with Substrate Based Drift Reset Capability Vaishak Prathap, Albert H Titus

State University of New York at Buffalo, United States

13:30 – 14:30 UTC A2P-12: SENSOR DATA PROCESSING III SESSION CHAIR: Valérie Renaudin, Université Gustav Eiffel

A2P-12-1

Multi-Magnet Tracking Method Using Extended Kalman Filter

Han Ge{1, Shuang Song{1}, Jiaole Wang{1}, Max Q.-H. Meng{2} {1}Harbin Institute of Technology, Shenzhen, China; {2}Southern University of Science and Technology, China

A2P-12-2

An Orbital Angular Momentum Mode Estimation Method with an Unknown Beam Axis Gaofeng Shu, Bingxu Chen, Ning Li

Henan University, China

A2P-12-3

An Adaptive Irregular Convolution U-Net for Reconstructing Ancient Channel of the Yellow River *Zhishun Guo, Jianhui Zhao, Ning Li, Lin Wu Henan University, China*

A2P-12-4

A Preliminary Study on Fast Calibration Method for Magnetic Positioning Sensor Array *Xiaoyang Wu, Shuang Song, Jiaole Wang Harbin Institute of Technology, Shenzhen, China*

A2P-12-5

People Counting Solution Using an FMCW Radar with Knowledge Distillation from Camera Data *Michael Stephan{1}, Souvik Hazra{2}, Avik Santra{2}, Robert Weigel{1}, Georg Fischer{1} {1}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; {2}Infineon Technologies AG, Germany*





A2P-12-6 HAUD: A High-Accuracy Underwater Dataset for Visual-Inertial Odometry Yang Song, Jiuchao Qian, Ruihang Miao, Wuyang Xue, Rendong Ying, Peilin Liu Shanghai Jiao Tong University, China

13:30 – 14:30 UTC A2P-13: EMERGING SENSOR APPLICATIONS III SESSION CHAIRS: Volker Nock & Azadeh Hashemi, University of Canterbury

A2P-13-1

Flying Ant Robot – Aerial Chemical Trail Detection and Localization

Patrick Neumann, Paul Hirschberger, Matthias Bartholmai BAM Bundesanstalt für Materialforschung und -prüfung, Germany

A2P-13-2

INVITED: Piezoelectric MEMS for Microparticles Detection

Francesco Foncellino{3}, Luigi Barretta{4}, Ettore Massera{1}, Alberto Corigliano{2} {1}ENEA CR Portici, Italy; {2}Politecnico di Milano, Italy; {3}STMicroelectronics, Italy; {4}Università degli Studi di Napoli Federico II, Italy

A2P-13-3

Investigation of Meat Classifying and Their Freshness Estimating Performance of a Heater-Temperature-Modulated Metal Oxide Semiconductor Type Gas Sensor

Hyoungkyun Kim, Jangpyo Park, Hee-Jin Park, Yong Won Jeong Samsung Research, Samsung Electronics Co.,Ltd., Korea

A2P-13-4

Noninvasive Current Measurement in Multi-Conductor Cables

Sebastian Böller{1}, Belmin Alić{1}, Andreas Hennig{1}, Anton Grabmaier{2} {1}Fraunhofer Institute for Microelectronic Circuits and Systems, Germany; {2}University of Duisburg-Essen, Germany

A2P-13-5

Wireless Sensor Readout System for Bone Intramedullary Pressure Monitoring Applications *Ziyu Chen, Jeong Bong Lee University of Texas at Dallas, United States*

A2P-13-6

From 0.18µm to 28nm CMOS Down-Scaling for Data Links in Body Dust Applications *Gian Luca Barbruni{1}, Paolo Motto Ros{2}, Danilo Demarchi{2}, Sandro Carrara{1} {1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Politecnico di Torino, Italy*

A2P-13-7

Experimentations and Analysis on Indoor Positioning Through Fusion with Inertial Sensors and Dynamically Calibrated Wi-Fi FTM Ranging

Lu Wang, Xiaodong Cai, Liang Cheng, Ke Han, Hemin Han, Lili Michael Ma Intel Corporation, China





MONDAY, NOVEMBER 1

A2P-13-8 Ionogel Based Material for the Colorimetric Detection of Δ9-Tetrahydrocannabinol

Raquel Catalan-Carrio{2}. Guillermo Moreno-Sanz{1}. Lourdes Basabe-Desmonts{2}. Fernando Benito-Lopez{2}

{1}ABAGUNE, Spain; {2}UPV/EHU, University of the Basque Country, Spain

A2P-13-9

Smart Cushion Based on Pressure Sensor Array for Human Sitting Posture Recognition

Lianggi Yuan, Jia Li Oakland University, United States

A2P-13-10

A Smart Mandibular Device for Intra-Oral Electroencephalogram Monitoring Shibam Debbarma, Sharmistha Bhadra McGill University, Canada

A2P-13-11

Assessing Soil Spatial Heterogeneity Using Proximal Soil Sensing

Hella Ellen Ahrends, Antti Lajunen University of Helsinki, Finland

A2P-13-12

Wearable Bioimpedance Hydration Monitoring System Using Conformable AgNW Electrodes

Tanner Songkakul{1}, Shuang Wu{1}, Parvez Ahmmed{1}, William D. Reynolds Jr.{2}, Yong Zhu{1}, Alper Bozkurt{1} {1}North Carolina State University, United States; {2}Onda Vision Technologies, United States

A2P-13-13

Development of a Flexible and Conformable EEG Sensors Using 3D Printing Process Adam Schuhknecht, Evan Fadanelli, Mohit Patel, Anthony Hanson, Dinesh Maddipatla, Massood Atashbar

Western Michigan University, United States

A2P-13-14

Smart Armband with Graphene Textile Electrodes for EMG-Based Muscle Fatigue Monitoring Ozberk Ozturk{2}, Ata Golparvar{1}, Murat Kaya Yapici{2} {1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Sabancı University, Turkey

A2P-13-15

Where's My Cellphone: Non-Contact Based Hand-Gestures and Ultrasound Haptic Feedback for Secondary Task Interaction While Driving

Ahmed Faroog, Tomi Nukarinen, Antti Sand, Hanna Venesvirta, Oleg Spakov, Veikko Surakka, Roope Raisamo

Tampere University, Finland

A2P-13-16

Pilot Study: A Visuotactile Haptic Primary Colors Sensor

Alexander Abad, Manex Ormazabal, David Reid, Anuradha Ranasinghe Liverpool Hope University, United Kingdom



A2P-13-17 AI-Based Fall Detection Using Contactless Sensing

Ahmad Taha{3}, Mohammad Mahmoud Taha{2}, Basel Barakat{1}, William Taylor{3}, Qammer H. Abbasi{3}, Muhammad Ali Imran{3} {1}Edinburgh Napier University, United Kingdom; {2}Independant Scholar, United States; {3}University of Glasgow, United Kingdom

13:30 – 14:30 UTC A2P-14: DEMOS & IEEE SENSORS JOURNAL/LETTERS SESSION CHAIRS: Tao Li, University of Cincinnati & Zhi Liu, Shandong University

A2P-14-1

Design of a Customised BB8 Robot Companion *Mia Innes, Emanuele Lindo Secco Robotics Laboratory, Liverpool Hope University, United Kingdom*

A2P-14-2

Recent Advances in MEMS Coupled Resonant Sensors *Vinayak Pachkawade*

Self-employed, India

A2P-14-3

Statistical and Machine-Learning Based Recognition of Coughing Events Using Tri-Axial Accelerometer Sensor Data from Multiple Wearable Points

Kruthi Doddabasappla, Rushi Vyas University of Calgary, Canada

A2P-14-4

Live Demonstration: Highly Sensitive Hollow-Core Fiber Optic Sensor Using a Ring Laser for Measuring Material Thermal Expansion

Angie Torres{1}, Silvia Diaz{2}, Omar Fuentes{2}, Jesús Corres{2}, Ignacio Del Villar{2}, Ignacio Raúl Matías Maestro{2} {1}Public University of Navarre, Spain; {2}Universidad Pública de Navarra, Spain

A2P-14-5

Live Demonstration: Double SLERP Gravity-Magnetic Vector (GMV-D) Orientation Correction in a MARG Sensor

Neeranut Ratchatanantakit, Nonnarit O-Larnnithipong, Pontakorn Sonchan, Malek Adjouadi, Armando Barreto

Florida International University, United States

13:30 – 14:30 UTC A2P-15: POWER SOURCES & ACTUATORS II SESSION CHAIR: Andrew Holmes, Imperial University

A2P-15-1

Gold and Silver Oxide Conducting Nanocomposite Cathode for Glucose Biofuel Cell Saikat Banerjee, Mathew Nguyen, Gymama Slaughter

Center for Bioelectrics, Old Dominion University, United States





A2P-15-2 An Untethered Multimodal Haptic Hand Wearable

Alexander Abad, Manex Ormazabal, David Reid, Anuradha Ranasinghe Liverpool Hope University, United Kingdom

A2P-15-3

Enhanced Performance of Triboelectric Nanogenerator Using Custom Fabricated PDMS

Xingzhe Zhang, Duo He, Dinesh Maddipatla, Valliammai Palaniappan, Qiang Yang, Bradley Bazuin, Massood Atashbar

Western Michigan University, United States

A2P-15-4

Cavity Flow Controlled with an Array of Magneto-Mechanical Micro-Valves

Thomas Arnoult{1}, Cécile Ghouila-Houri{1}, Colin Leclercq{3}, Aurélien Mazzamurro{1}, Romain Viard{2}, Eric Garnier{3}, Denis Sipp{3}, Alain Merlen{1}, Abdelkrim Talbi{1}, Philippe Pernod{1} {1}Institute of Electronics, Microelectronics and Nanotechnology, Centrale Lille, France; {2}JMH Conception, France; {3}ONERA, France

A2P-15-5

Enhancing Open-Loop Control of MEMS Using Linear Electrostatic Levitation Actuators *Mohammad Mousavi, Mohammad Alzgool, Shahrzad Towfighian Binghamton University, United States*



11:00 – 12:30 UTC B1L-01: OPTICAL SENSORS I SESSION CHAIRS: Hengky Chandrahalim, The U.S. Air Force Institute of Technology & Minghong Yang, Wuhan University of Technology

B1L-01-1

11:00

INVITED: Ultra-Sensitive microtoroid Optical Sensing Technology for Biomedical Applications Judith Su

University of Arizona, United States

B1L-01-2 11:30 Multi-Modal Sensor and Data Processing for Comprehensive Skin Evaluation Song Wang, Ning Xi University of Hong Kong, Hong Kong

B1L-01-3

11:45

Photoconductivity Enhancement in MoS2 and WSe2 Hybrids Aided by Light-Absorbing Carbon-Based Zero-Dimensional Quantum Dots

Kishan Jayanand, Anupama Kaul University of North Texas, United States

B1L-01-4

12:00 Optical Plasmonic Nanoantenna-MWCNT Diode Energy Harvester for Solar Powered Wireless Sensors

Patrizia Livreri, Fabrizio Beccaccio Università degli Studi di Palermo, Italy

B1L-01-5

12:15

Evaluation of Non-Invasive Swallowing Test Device Using Hetero-Core Fiber Optic Pressure Sensor

Masanori Maeda{3}, Miyuki Kadokura{3}, Ryoko Aoki{3}, Masaru Kawakami{2}, Yuya Koyama{1}, Michiko Nishiyama{3}, Kazuhiro Watanabe{3} {1}Chiba Institute of Technology, Japan; {2}Jichi Medical University, Japan; {3}Soka University, Japan

11:00 – 12:30 UTC B1L-02: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS II SESSION CHAIRS: Preethi Preethichandra, Central Queensland University & Marios Sophocleous, University of Cyprus

B1L-02-1 11:00 Limiting Current-Type MEMS Oxygen Gas Sensor Integrated with Micro-Hotplate Shunsuke Akasaka{2}, Isaku Kanno{1} {1}Kobe University, Japan; {2}Rohm Co. Ltd, Japan



B1L-02-2

11:15

Paper-Based Chemiresistive Gas Sensor Using Molecularly Imprinted Sol-Gels for Volatile Organic Acids Detection

Xiao Ye{1}, Tianshu Jiang{1}, Lingpu Ge{1}, Fumihiro Sassa{1}, Chuanjun Liu{2}, Kenshi Hayashi{1} {1}Kyushu University, Japan; {2}U.S.E. Co., Ltd., Japan

B1L-02-3

11:30

Functional Validation of an Additional Device to the Gas Sensor for Arbitrary Control Sensing Properties

Ryomei Wada{2}, Naho Minowa{2}, Takeru Wada{2}, Manase Mizutani{1}, Yoshihisa Suzuki{1}, Yong-Joon Choi{2}, Kazuhiro Takahashi{2}, Kazuaki Sawada{2}, Toshihiko Noda{2} {1}SINTOKOGIO, LTD., Japan; {2}Toyohashi University of Technology, Japan

B1L-02-4

11:45

Enhanced Gas Sensing Characteristics of Metal Doped WS2 Nanoflowers Aanchal Alagh, Fatima Ezahra Annanouch, Eduard Llobet Universitat Rovira i Virgili, Spain

B1L-02-5

12:00

Estimation of Distributed Concentration of Mixed Gases Using Au/Ag Core-Shell 2D LSPR Gas Sensor

Arata Sawada, Fumihiro Sassa, Kenshi Hayashi Kyushu University, Japan

B1L-02-6

12:15

Carbon Nanotube Ammonia Gas Sensor: A Comparative Analysis Between Impedance Spectroscopy and Resistive Measurements

Ali Douaki, Martina Aurora Costa Angeli, Mukhtar Ahmad, Mattia Petrelli, Bajramshahe Shkodra, Sahira Vasquez, Enrico Avancini, Luisa Petti, Paolo Lugli Free University of Bozen-Bolzano, Italy

11:00 – 12:30 UTC B1L-03: INERTIAL, MAGNETIC & PRESSURE SENSORS SESSION CHAIRS: Giacomo Langfelder, Politecnico di Milano & Kunihisa Tashiro, Shinshu University

B1L-03-1 11:00 INVITED: High-Q Navigation-Grade Fuse-Silica Micro Birdbath Resonator Gyroscope Jae Yoong Cho, Sajal Singh, Tal Nagourney, Jongkwan Woo, Ali Darvishian, Behrouz Shiari, Guohong He, Christopher Boyd, Ester Bentley, Khalil Najafi University of Michigan, United States



B1L-03-2

11:30

A Simplified Analytical Damping Constant Model for Perforated Proof Mass Structure of MEMS Capacitive Accelerometer by Multi-Layer Metal Technology

Kohei Shibata{2}, Akihiro Uchiyama{2}, Akira Onishi{2}, Shin-Ichi lida{1}, Toshifumi Konishi{1}, Noboru Ishihara{2}, Katsuyuki Machida{2}, Kazuya Masu{2}, Hiroyuki Ito{2} {1}NTT Advanced Technology Corporation, Japan; {2}Tokyo Institute of Technology, Japan

B1L-03-3

11:45

Miniaturized Quadruple Mass Gyroscopes: Challenges and Implementation

Matteo Gianollo{1}, *Valentina Mastri*{1}, *Valentina Zega*{1}, *Marco Bestetti*{1}, *Luca Falorni*{2}, *Giacomo Langfelder*{1}

{1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy

B1L-03-4

12:00

Vertical Integration of Pressure/Humidity/Temperature Sensors for CMOS-MEMS Environmental Sensing Hub

Yung-Chian Lin, Ya-Chu Lee, Chia-Hung Yang, Weileun Fang National Tsing Hua University, Taiwan

B1L-03-5

12:15

Orthogonal Fluxgate Sensor Noise Depends on Annealing-Induced Magnetostriction of the Core *Mattia Butta{1}, Alexander Valeriano Inchausti{2}, Michal Dressler{1}, Michal Janošek{1} {1}Czech Technical University in Prague, Czech Rep.; {2}Instituto de Ciencia de Materiales de Madrid, Spain*

11:00 – 12:30 UTC B1L-04: SENSOR SYSTEMS I SESSION CHAIR: Michael Daniele, NC State University

B1L-04-1

11:00

Augmentative and Alternative Communication with Eye-Gaze Technology and Augmented Reality: Reflections from Engineers, People with Cerebral Palsy and Caregivers

Haifeng Zhao{1}, Petra Karlsson{2}, Omid Kavehei{1}, Alistair McEwan{1} {1}University of Sydney, Australia; {2}University of Sydney, Cerebral Palsy Alliance Research Institute, Australia

B1L-04-2

11:15

Front-End Electronics for Beta-Cell Function Monitoring with an Integrated FOPP Detector *Zili Yu{2}, Cor Scherjon{1}, Daniel Brosch{1}, Udo Kraushaar{3}, René von Metzen{3}, Joachim Burghartz{1}*

{1}IMS CHIPS, Germany; {2}Institut für Mikroelektronik Stuttgart IMS CHIPS, Germany; {3}NMI Natural and Medical Sciences Institute at the University of Tübingen, Germany



B1L-04-3

11:30

Development of a 3D Printed Gap Gauge with Embedded Force Sensor for Balancing Unicompartmental Knee Arthroplasty

Dimitrios Kosmas{2}, Hans-Peter van Jonbergen{1}, Martijn Schouten{2}, Momen Abayazid{2}, Gijs Krijnen{2}

{1}Deventer Hospital, Netherlands; {2}University of Twente, Netherlands

B1L-04-4

11:45

Diagnosing Lung and Gastric Cancers Through Exhaled Breath Analysis by Using Electronic Nose Technology Combined with Pattern Recognition Methods

Benachir Bouchikhi{2}, Omar Zaim{2}, Nezha El Bari{2}, Naoual Lagdali{1}, Imane Benelbarhdadi{1}, Fatima Zohra Ajana{1}

{1}Ibn Sina Hospital, Mohammed V University, Morocco; {2}University Moulay Ismail Faculty of Sciences of Meknes, Morocco

B1L-04-5

12:00

"Sugar-Cube" PLT: A Real-Time Pedestrian Localization Testbed Utilizing Foot-Mounted IMU/Barometer/Ultrasonic Sensors

Chi-Shih Jao, Austin Parrish, Andrei Shkel University of California, Irvine, United States

11:00 – 12:30 UTC B1L-05-1: EMERGING SENSOR APPLICATIONS I

SESSION CHAIR: Theerawit Wilaiprasitpor, Vidyasirimedhi Institute of Science & Technology (VISTEC)

B1L-05-1 11:00 Radar Sensing for Human Healthcare: Challenges and Results Francesco Fioranelli{1}, Julien Le Kernec{2} {1}Technische Universiteit Delft, Netherlands; {2}University of Glasgow, United Kingdom

B1L-05-2

11:30

A Quantum-Inspired Biotelemetry System for Robust and Ultrasensitive Wireless Intracranial Pressure Monitoring

Minye Yang, Zhilu Ye, Pai-Yen Chen University of Illinois at Chicago, United States

B1L-05-3 11:45 Rapid Classification of Respiratory Syncytial Virus and Sendai Virus by a Low-Cost and Portable Near-Infrared Spectrometer

Weiran Song{3}, Hui Wang{3}, Enayetur Rahman{3}, Judit Barabas{1}, Jiandong Huang{3}, Ultan Power{1}, Hugh Byrne{2}, James McLaughlin{3}, Chris Nugent{3}, Paul Maguire{3} {1}Queen's University Belfast, United Kingdom; {2}Technological University Dublin, Ireland; {3}Ulster University, United Kingdom



B1L-05-4 12:00 In-Skin Pressure and Curvature Sensors for Soft Robots Tzu-Yun Hsu, Amal El-Ghazaly Cornell University, United States

B1L-05-5

12:15

Classification of Textures Using a Tactile-Enabled Finger in Dynamic Exploration Tasks

Vinicius Prado Da Fonseca{2}, Bruno Monteiro Rocha Lima{3}, Thiago Eustaquio Alves de Oliveira{1} {1}Lakehead University, Canada; {2}Memorial University of Newfoundland, Canada; {3}University of Ottawa, Canada

11:00 – 12:30 UTC B1L-06: SENSOR DATA PROCESSING I (SOFT SENSORS) SESSION CHAIRS: Krikor Ozanyan, University of Manchester & Marco Jose Da Silva, Federal University of Technology Parana

B1L-06-1

11:00

INVITED: Luminaire-Based Environmental Sensing for Comfort Monitoring and Control Ashish Pandharipande, Martijn Lankhorst, Emmanuel Frimout Signify, Netherlands

B1L-06-2

11:30

Automatic Displacement and Vibration Measurement in Laboratory Experiments with a Deep Learning Method

Yongsheng Bai, Ramzi M. Abduallah, Halil Sezen, Alper Yilmaz Ohio State University, United States

B1L-06-3 11:45 Enabling Real-Time Estimation of Borehole Parameters in Deep Drilling Shanti Swaroop Kandala, Roman Shor University of Calgary, Canada

B1L-06-4

12:00 A Graph-Based Method for Interbeat Interval and Heart Rate Variability Estimation Featuring Multi-Channel PPG Signals During Intensive Activity Luffina Huang, Ali Akbari, Roozbeh Jafari

Luffina Huang, Ali Akbari, Roozbeh Jafai Texas A&M University, United States

B1L-06-5 12:15 False Positives Avoidance in Pulse Detection from ECG and PPG Sensor Signals Hans Herrmann, Hartmut Ewald Universität Rostock, Germany



11:00 – 12:30 UTC B1L-07: EMERGING SENSORS & SENSING SYSTEMS FOR UNDERGROUND INFRASTRUCTURE SESSION CHAIRS: Karthick Thiyagarajan & Sarath Kodagoda, University of Technology Sydney

B1L-07-1

11:00

INVITED: Acoustic and Ultrasonic Characterisation of Blockages and Defects in Underground Pipes

Alex Towlson{1}, Yicheng Yu{2}, Gavin Sailor{2}, Kirill Horoshenkov{2}, Anthony Croxford{1}, Bruce Drinkwater{1}

{1}University of Bristol, United Kingdom; {2}University of Sheffield, United Kingdom

B1L-07-2

11:30

INVITED: ENIG PCB Electrodes: Low Cost Electrochemical Biosensing Platform for Wastewater Epidemiology

Siddharth Tallur, Ruchira Nandeshwar, M.S. Kumar, Kiran Kondabagil Indian Institute of Technology Bombay, India

B1L-07-3

12:00

Evaluation of Battery-Free UHF-RFID Sensor Wireless Signals for In-Pipe Robotic Applications *Amal Gunatilake, Karthick Thiyagarajan, Sarath Kodagoda University of Technology Sydney, Australia*

B1L-07-4

12:15

Gaussian Process as a Benchmark for Optimal Sensor Placement Strategy

Nalika Ulapane{1}, Karthick Thiyagarajan{2}, Sarath Kodagoda{2} {1}Swinburne University of Technology, Australia; {2}University of Technology Sydney, Australia

11:00 – 12:30 UTC B1L-08: SENSOR PHENOMENOLOGY I SESSION CHAIRS: Minghong Yang, Wuhan University of Technology & Azadeh Hashemi, University of Canterbury

B1L-08-1

11:00

Radio-Frequency-Based Resonating Sensor for Condition Monitoring on Rotary Equipment *Ali Alshehri{2}, Yip Fun Yeung{2}, Mikio Furokawa{1}, Takayuki Hirano{1}, Kamal Youcef-Toumi{2} {1}Japan Steel Works, LTD., Japan; {2}Massachusetts Institute of Technology, United States*

B1L-08-2 11:15

Design of Optical Waveguide Channels for 3D Distributed Tactile Sensing

Federica De Chiara{2}, Jian Hu{2}, Stephen Wang{1}, Rong Wang{1}, Hongbin Liu{2} {1}Huawei Technologies Research & Development UK Ltd., United Kingdom; {2}King's College London, United Kingdom



B1L-08-3 11:30 Frequency and Quality Factor Matched 2-Axis Dual Mass Resonator Jianlin Chen{2}, Takashiro Tsukamoto{2}, Giacomo Langfelder{1}, Shuji Tanaka{2} {1}Politecnico di Milano, Italy; {2}Tohoku University, Japan

B1L-08-4

11:45

An Integrated Temperature Compensation Method for Thermal Expansion-Based Angular Motion Sensors

Huahuang Luo, Jose Cabot, Mingzheng Duan, Yi-Kuen Lee Hong Kong University of Science and Technology, Hong Kong

B1L-08-5

12:00

Characterization of 3D Printed Sheets Using Multi-Frequency Scanning Impedance Microscopy Martijn Schouten, Gijs Krijnen

University of Twente, Netherlands

14:30 – 15:30 UTC B2P-10: SENSOR SYSTEMS V SESSION CHAIR: Reneé Lerch, Fraunhofer IMS

B2P-10-1

Fraud Detection of Black Pepper Using Metal Oxide Semiconductor Gas Sensors *Hui En Lee*{3}, *Hong Siang Chua*{3}, *Zehnder Jarroop Augustine Mercer*{1}, *Sing Muk Ng*{2}, *Mahnaz Shafiei*{3}

{1}Malaysian Pepper Board, Malaysia; {2}Sarawak Energy Berhad, Malaysia; {3}Swinburne University of Technology, Australia; {3}Swinburne University of Technology, Malaysia

B2P-10-2

Radar-Thermal Sensor Fusion Methods for Deep Learning Hand Gesture Recognition *Sruthy Skaria, Akram Al-Hourani, Da Huang RMIT University, Australia*

B2P-10-3

Classification of PCG Signals Using Fourier-Based Synchrosqueezing Transform and Support Vector Machine

Samit Kumar Ghosh, Rajesh Kumar Tripathy, R N Ponnalagu Birla Institute of Technology and Science, Pilani, India

B2P-10-4

Design of an Artificial Neural Network Circuit for Detecting Atrial Fibrillation in ECG Signals Reneé Lerch{1}, Babak Hosseini{2}, Pierre Gembaczka{1}, Gernot Fink{2}, André Lüdecke{1}, Viktor Brack{2}, Furkan Ercan{1}, Alexander Utz{1}, Karsten Seidl{1} {1}Fraunhofer Institute for Microelectronic Circuits and Systems, Germany; {2}Technische Universität Dortmund, Germany



TUESDAY, NOVEMBER 2

B2P-10-5 A Fully Differential PPG Readout Amplifier with a Reconfigurable Bandwidth for Power Minimization

Zeqi Zhang, Shuang Song, Tian Yang, Mengyu Li, Zheng Gu, Yizhao Zhou, Menglian Zhao Zhejiang University, China

14:30 – 15:30 UTC B2P-11: ENVIRONMENTAL SENSORS (TEMP, PRESSURE, MOISTURE) SESSION CHAIR: Giacomo Langfelder, Politecnico di Milano

B2P-11-1

Pressure Sensor with Novel Electrical Circuit Utilizing Bipolar Junction Transistor *Mikhail Basov*

Federal State Unitary Enterprise Dukhov Automatics Research Institute, Russia

B2P-11-2

Temperature Model Calibration for a Resonant Pipe Viscosity and Density Sensor

Stefan Clara{2}, Friedrich Feichtinger{2}, Thomas Voglhuber-Brunnmaier{2}, Andreas Tröls{2}, Bernhard Jakoby{1}

{1}Institute for Microelectronics and Microsensors, Johannes Kepler Universität Linz, Austria; {2}Johannes Kepler Universität Linz, Austria

B2P-11-3

Fluid Independent Thermal Flow Sensor Using Constant-Temperature Anemometry and the 3ω -Method

Ralf Emanuel Bernhardsgrütter{1}, Christoph Hepp{1}, Katrin Schmitt{2}, Jürgen Wöllenstein{2} {1}Innovative Sensor Technology IST AG, Switzerland; {2}IPM, Albert-Ludwigs-Universität Freiburg, Germany

B2P-11-4

Capacitive Pressure Sensing Unit for Racket Sports

Ye-Jin Zheng, Wei-Cheng Wang, Rongshun Chen, Wen-Hsin Chiu, Yi-Yang Chen, Cheng-Yao Lo National Tsing Hua University, Taiwan

B2P-11-5

Diamond-Like Carbon Based Micro-Pressure Sensor with Ultra-Thin Sensitive Membrane

Xin Ma{2}, Qi Zhang{2}, Peng Guo{1}, Yulong Zhao{2}, Aiying Wang{1} {1}Ningbo Institute of Materials Technology and Engineering, China; {2}Xi'an Jiaotong University, China

B2P-11-6

Pushing the Limits of LiNbO3-Based High Temperature SAW Sensors

Jordan Maufay{2}, Ulrich Youbi{2}, Thierry Aubert{2}, Ninel Kokanyan{2}, Sami Hage-Ali{1}, Michel Vilasi{1}, Omar Elmazria{1}

{1}Jean Lamour Institute, Université de Lorraine, CNRS, France; {2}LMOPS, Université de Lorraine CentraleSupélec, France



TUESDAY, NOVEMBER 2

B2P-11-7

Seebeck Coefficient in SiC/Si Heterojunction for Self-Powered Thermal Sensor

Pablo Guzman{1}, Toan Dinh{2}, Thanh Nguyen{1}, Van Thanh Dau{1}, Abu Riduan Md Foisal{1}, Hung Nguyen{1}, Trung Hieu Vu{1}, Tuan-Khoa Nguyen{1}, Hoang-Phuong Phan{1}, Huaizong Li{1}, Nam-Trung Nguyen{1}, Dzung Viet Dao{1}

{1}Griffith University, Australia; {2}University of Southern Queensland, Australia

B2P-11-8

Resistive and CTAT Temperature Sensors in a Silicon Carbide CMOS Technology

Joost Romijn{1}, Luke Middelburg{1}, Sten Vollebregt{1}, Brahim El Mansouri{1}, Henk van Zeijl{1}, Alexander May{2}, Tobias Erlbacher{2}, Guoqi Zhang{1}, Pasqualina Sarro{1} {1}Delft University of Technology, Netherlands; {2}Fraunhofer Institute for Integrated Systems and Devices Technology, Germany

B2P-11-9

Design and Characterization of a Low-Power Moisture Sensor from Commercially Available Electronics

John Sanchez{1}, Archana Dahal{1}, Cody Zesiger{2}, Ramesh Goel{1}, Darrin Young{1}, Shad Roundy{1}

{1}University of Utah, United States; {2}Utah State University, United States

B2P-11-10

Molybdenum Disulfide Membrane-Based Ultrasensitive Temperature Sensor

Nishta Arora, Akshay Naik Indian Institute of Science, Bengaluru, India

14:30 – 15:30 UTC B2P-12: OPTICAL SENSORS III SESSION CHAIR: Hengky Chandrahalim, The U.S. Air Force Institute of Technology

B2P-12-1

Plasmonic Refractive Index Sensor Based on a Multiple D-Shaped Au/Fe3O4 Nanowire *Riadh A. Kadhim{1}, Nawar AL-Hemeary{2}, Jiang Wu{1} {1}IFFS, University of Electronic Science and Technology of China, China; {2}Pazmany Peter Catholic University, Hungary*

B2P-12-2

A Fiber Bragg Grating Accelerometer Based on Novel Biaxial Arc Hinge Jianyu Yang, Haokun Mi, Lei Liang, Xiaoling Tong Wuhan University of Technology, China

B2P-12-3

Accuracy Evaluation of a CDM-WDM Interrogator for Quasi-Distributed FBG Sensing Marek Götten{4}, Steffen Lochmann{3}, Andreas Ahrens{3}, Eric Lindner{2}, Johan Vlekken{1}, Jan Van Roosbroeck{1} {1}EBGS International NV, Belgium: {2}EBGS Technologies GmbH, Germany; {3}Hochschule Wismar

{1}FBGS International NV, Belgium; {2}FBGS Technologies GmbH, Germany; {3}Hochschule Wismar, Germany; {4}Hochschule Wismar / University of Applied Sciences Wismar, Germany





TUESDAY, NOVEMBER 2

B2P-12-4

Multi-Layer ToF: Comparison of Different Multipath Resolve Methods for Indirect 3D Time-of-Flight

Jonas Gutknecht, Teddy Loeliger ZHAW School of Engineering, Switzerland

B2P-12-5

Two-Dimensional Close-Packed Arrays of Polystyrene Microspheres Bragg Grating for Refractive Index Sensing

Lingxi Xiong, Donglai Guo, Minghong Yang Wuhan University of Technology, China

B2P-12-6

Effects of Sensor Cover Damages on Point Clouds of Automotive Lidar

Birgit Schlager{2}, Thomas Goelles{1}, Daniel Watzenig{2} {1}Virtual Vehicle Research GmbH, Austria; {2}Virtual Vehicle Research GmbH, Graz University of Technology, Austria

14:30 – 15:30 UTC B2P-13: ACOUSTIC & ULTRASONIC SENSORS SESSION CHAIR: Sheng-Shian Li, National Tsing Hua University

B2P-13-1

Biomimetic Multi–Band Directionality Using a Microchip Level Microphone Array for Sound Controlled Robot Orientation

Ashiqur Rahaman, Byungki Kim Korea University of Technology and Education, Korea

B2P-13-2

Towards a Bio-Inspired Acoustic Sensor: Achroia Grisella's Ear

Lara Díaz-García, Andrew Reid, Joseph Jackson, James F. C. Windmill University of Strathclyde, United Kingdom

B2P-13-3

Biosensor for Rapid Detection of SARS-CoV-2 in Real-World Samples

Michala Forinová{4}, Alina Pilipenco{4}, Ivana Víšová{4}, Jakub Kunčák{4}, N. Scott Lynn{4}, Petr Yudin{4}, Jakub Dostálek{3}, Václav Hönig{2}, Martin Palus{2}, Hana Mašková{5}, Filip Dyčka{5}, Jan Štěrba{5}, Markéta Vrabcová{4}, Judita Arnoštová{4}, Moni

{1}Academia Sinica, Taiwan; {2}Biology Centre CAS, Veterinary Research Institute, Czech Rep.; {3}Institute of Physics of the CAS, Austrian Institute of Technology GmbH, Austria; {4}Institute of Physics of the Chinese Academy of Sciences, Czech Rep.; {5}Un

B2P-13-4

Numerical and Experimental Study of a Phononic-Fluidic Sensor Using a Cubic Unit Cell with Spherical Void

Yauheni Belahurau, Jacob Søndergaard Jensen, Frieder Lucklum Danmarks Tekniske Universitet, Denmark



B2P-13-5

Passive Ultrasonic Temperature Measurement Through a Metal Wall *Bibhu Kar, Thomas Schaechtle, Stefan Rupitsch, Ulrike Wallrabe*

IMTEK, Albert-Ludwigs-Universität Freiburg, Germany

B2P-13-6

An Implantable Umbo Microphone for Fully-Implantable Assistive Hearing Devices

Benjamin Cary{4}, John Zhang{4}, Christopher McHugh{3}, Ioannis John Kymissis{1}, Elizabeth Olson{1}, Heidi Nakajima{2}, Jeffrey Lang{4} {1}Columbia University, United States; {2}Harvard Medical School, United States; {3}Massachusetts Eye and Ear, United States; {4}Massachusetts Institute of Technology, United States

B2P-13-7

Passive Acoustic Transducer as a Fluid Flow Sensor Samuel Yang, Michail Kiziroglou, Eric Yeatman, Andrew Holmes Imperial College London, United Kingdom

14:30 – 15:30 UTC B1P-09: MICROWAVE SENSORS FOR WIRELESS TECHNOLOGIES SESSION CHAIRS: Rashid Mirzavand & Karthik Shankar, University of Alberta

B2P-14-1

Alive Monitoring Sensor System with 2.45-GHz Wireless Power Transfer for Self-Powered Wireless Sensor

Fumiya Nishimura{2}, Yuichiro Hirai{2}, Ayano Kamitani{2}, Ami Tanaka{2}, Fumiyasu Utsunomiya{1}, Hisashi Nishikawa{2}, Takakuni Douseki{2} {1}ABLIC Inc., Japan; {2}Ritsumeikan University, Japan

B2P-14-2

Electromagnetic Wave Sensor for Proximity Target Detection Under Radio and Radar Coexistence at 2.4-GHz ISM Band

Dae Young Koh{1}, Timothy S. Han{2}, Joseph Zubah{2} {1}Applied Matrix Systems LLC, United States; {2}Lockheed Martin, United States

B2P-14-3

Epoxy/CNT-Zn0.5Ni0.5Fe2O4 Multilayer Polymeric Nanocomposites for Electromagnetic Wave Absorption

Majed Amini, Milad Kamkar, Ahmadreza Ghaffarkhah, Saeed Ghaderi, Mohammad Arjmand University of British Columbia, Canada

B2P-14-4

3D Printing of Transparent pH-Mediated High-Water-Content Hydrogels for Electromagnetic Interference (EMI) Shielding

Saeed Ghaderi, Milad Kamkar, Ahmadreza Ghaffarkhah, Majed Amini, Amir Hosein Ahmadian Hoseini, Mohammad Arjmand University of British Columbia, Canada

B2P-14-5

Exploring the Potential of Cellulose Nanofibrils for Humidity Sensing Using an Organic Microwave Resonator

Nicolas Tanguy{1}, Maryam Moradpour{1}, Mandeep Jain{1}, Ning Yan{2}, Mohammad Hossein Zarifi{1} {1}University of British Columbia, Canada; {2}University of Toronto, Canada



14:30 – 15:30 UTC B2P-15: SENSOR PHENOMENOLOGY II

SESSION CHAIRS: Hung Cao, University of California Irvine & Theerawit Wilaiprasitporn, Vidyasirimedhi Institute of Science & Technology (VISTEC)

B2P-15-1

Dual-Mass Resonator with Dynamically Balanced Structure for Roll/Pitch Rate Integrating Gyroscope

Shihe Wang{2}, Muhammad Salman Al Farisi{1}, Jianlin Chen{2}, Takashiro Tsukamoto{2}, Shuji Tanaka{2}

{1}Hiroshima City University, Japan; {2}Tohoku University, Japan

B2P-15-2

A Methodology for Analyzing the Impact of Crosstalk on LIDAR Measurements

Lara Briñón-Arranz{2}, Tiana Rakotovao{2}, Thierry Creuzet{2}, Cem Karaoguz{1}, Oussama El-Hamzaoui{1}

{1}Transdev Autonomous Transport Systems, France; {2}Université Grenoble Alpes and CEA, France

B2P-15-3

Modeling of the Transient Behavior of a Nuclear Magnetic Resonance Gyroscope

Riccardo Cipolletti{3}, Janine Riedrich-Moeller{3}, Tino Fuchs{2}, Arne Wickenbrock{1}, Dmitry Budker{1}

{1}GSI Helmholtzzentrum für Schwerionenforschung, Johannes Gutenberg University Mainz, Germany; {2}Robert Bosch GmbH, Germany; {3}Robert Bosch GmbH and Johannes Gutenberg University Mainz, Germany

B2P-15-4

A Behavior-Descriptive Model of Love Wave Sensor in Liquid Medium for Circuit-Design and Analysis with QucsStudio

Maxence Rube{2}, Ollivier Tamarin{2}, Simon Hemour{1}, Martine Sebeloue{2}, Asawari Choudhari{2}, Idris Sadli{2}, Laurent Linguet{2}, Dominique Rebiere{1}, Corinne Dejous{1} {1}Université de Bordeaux, France; {2}University of French Guiana, France

B2P-15-5

Analysis of the Impact of the Processing Time-Delay on the Stability of a Digital GMI Magnetometer

Papa Silly Traoré{1}, Serge Konan{2}, Aktham Asfour{2}, Jean Paul Yonnet{2} {1}École Supérieure Polytechnique - Université Cheikh Anta Diop de Dakar, Senegal; {2}Grenoble Electrical Engineering Laboratory, Université Grenoble Alpes, France

B2P-15-6

Estimation of a Magnetization Curve of a Fluxgate Wire Core Using an Inverse Technique

Mehran Mirzaei, Pavel Ripka, Václav Grim Czech Technical University in Prague, Czech Rep.

B2P-15-7

A Thermal Expansion-Based Angular Motion Sensor with Detection Limit Towards Sub-Degree Per Second

Huahuang Luo, Mingzheng Duan, Hadi Tavakkoli, Jose Cabot, Yi-Kuen Lee Hong Kong University of Science and Technology, Hong Kong



B2P-15-8

Optimizing Fringing Field Sensor Performance with Non-Spherical Particles *Robert Dean, Moriah Reed, Elizabeth Guertal Auburn University, United States*

B2P-15-9

Towards Continuous Plant Bioimpedance Fitting and Parameter Estimation

Devon Martin, James Reynolds, Michael Daniele, Edgar Lobaton, Alper Bozkurt North Carolina State University, United States



12:00 – 13:30 UTC C1L-01: MICROWAVE SENSORS FOR INDUSTRIAL & COMMERCIAL APPLICATIONS SESSION CHAIRS: Mohammad Zarifi, University of British Columbia & Karthik Shankar, University of Alberta

C1L-01-1

12:00

INVITED: A Microwave Microfluidic Reflective-Mode Phase-Variation Sensor

Paris Vélez{1}, Cristian Herrojo{4}, Xavi Illa{2}, Rosa Villa{2}, Jonathan Muñoz-Enano{4}, Lijuan Su{4}, Pau Casacuberta{4}, Marta Gil{3}, Ferran Martín{4}

{1}CIMITEC, Universitat Autònoma de Barcelona, Spain; {2}Institute of Microelectronics of Barcelona (IMB-CNM-CSIC), Spain; {3}Universidad Politécnica de Madrid, Spain; {4}Universitat Autònoma de Barcelona, Spain

C1L-01-2

12:30

Detection of Organoleptic Faults in Wine by Microwave Sensor Coupled with Molecularly Imprinted Silica

Jerome Rossignol{2}, Elias Bou Maroun{1}, Didier Stuerga{2}, Alexis Lasserre{2}, Regis Gougeon{1}, Philippe Cayot{1}, Etienne Kayser{3}, Elisabeth Closier{3}

{1}Agrosup, PAM UMRA 02.102, University Bourgogne Franche-Comté, France; {2}ICB UMR CNRS 6303, Université Bourgogne Franche-Comté, France; {3}SATT SAYENS, France

C1L-01-3

12:45

Smart Knife for Robotic Meat Cutting

Alex Mason{2}, Dmytro Romanov{1}, Luis Eduardo Cordova-Lopez{1}, Olga Korostynska{3} {1}Norwegian University of Life Sciences, Norway; {2}Norwegian University of Life Sciences, Animalia AS, Norway; {3}Oslo Metropolitan University, Norway

C1L-01-4

13:00

Durable Ice Sensors Utilizing Microwave SRRs Coated with Protective Epoxy for De-Icing Control

Ryan Kozak, Mandeep Jain, Jack McClelland, Aaryaman Shah, Mohammad Hossein Zarifi University of British Columbia, Canada

C1L-01-5

13:15

Flexible EGaIn Liquid Metal Microstrip Patch Antenna Based Pressure Sensor

Sheikh Dobir Hossain, Annatoma Arif, Bhushan Lohani, Robert C. Roberts University of Texas at El Paso, United States



12:00 – 13:30 UTC C1L-02: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS III SESSION CHAIRS: Marios Sophocleous, University of Cyprus & Aakash Jog, Tel Aviv University

C1L-02-1

12:00

Toward Subcutaneous Electrochemical Aptasensors for Neuropeptide Y

Hayley Richardson, Grace Maddocks, Kaila Peterson, Michael Daniele, Spyridon Pavlidis North Carolina State University, United States

C1L-02-2

12:15

High Electron Mobility Transistor-Based Hydrogen Sensor Using ITO as a Sensing Layer

Mohammad Iktiham Bin Taher{2}, Yacine Halfaya{3}, Rouba Alrammouz{5}, Mathieu Lazerges{5}, Aurelien Randi{5}, Tarik Moudakir{3}, Nossikpendou Yves Sama{3}, Thomas Guermont{1}, Nicolas Pelissier{1}, Thomas Pichler{4}, Médéric Piedevache{4}, Jacques Pironon {1}45-8 Energy, France; {2}GeoRessources laboratory, Université de Lorraine, France; {3}Lafayette

{1}45-8 Energy, France; {2}GeoRessources laboratory, Université de Lorraine, France; {3}Lafayet Institute, France; {4}Solexperts AG, France; {5}Université de Lorraine, France

C1L-02-3

12:30

Single-Sensor Gas Discrimination and Quantification Based on Novel Temperature Modulation Method

Maaki Saeki, Yuki Okura, Takefumi Yoshikawa, Tatsuya Iwata Toyama Prefectural University, Japan

C1L-02-4

12:45

A Graphene-Based Composite for Selective Detection of Ethylene at Ambient Environment Fowzia Akhter, Hasin Reza Siddiquei, Subhas Chandra Mukhopadhyay

Macquarie University, Australia

C1L-02-5

13:00

A Robotic Electrochemical Biosensor Based on Kinetic Electronics Technique

Shiyi Zhang{1}, Joseph Wang{2}, Kenshi Hayashi{1}, Fumihiro Sassa{1} {1}Kyushu University, Japan; {2}University of California San Diego, United States

C1L-02-6

13:15

An Electrochemical Immunosensor for Global DNA Methylation Determination Using Magnetic Bead-Based Enrichment and Enzymatic Amplification

Yitao Liang, Bin Zhang, Zexin Xue, Xuesong Ye, Bo Liang Zhejiang University, China



12:00 – 13:30 UTC C1L-03: TACTILE & STRAIN SENSORS

SESSION CHAIRS: Giacomo Langfelder, Politecnico di Milano & Kunihisa Tashiro, Shinshu University

C1L-03-1

12:00

Soft-Material-Based Highly Reliable Tri-Axis Tactile Thin-Film Sensors for Robotic Manipulation Tasks

Kei Tsukamoto, Akira Ebisui, Tetsuro Goto, Yoshiaki Sakakura, Ken Kobayashi, Satoshi Sato, Takahiro Kamei, Yutaka Imai, Kazumasa Nomoto BRD Contor, Sony Croup Corporation, Japan

R&D Center, Sony Group Corporation, Japan

C1L-03-2

12:15

Modeling the Optical Sensing Principle of the PapillArray Tactile Sensor

Pablo Martinez Ulloa{1}, David Cordova Bulens{1}, Benjamin Xia{2}, Heba Khamis{2}, Stephen Redmond{1}

{1}University College Dublin, Ireland; {2}University of New South Wales, Australia

C1L-03-3

12:30

Detection of Rigid Object Embedded in Skin Model Using Tactile Sensor for Palpation *Shu Ogawara, Jun Kido, Takashi Abe, Masayuki Sohgawa*

Niigata University, Japan

C1L-03-4

12:45

Low-Power Static and Dynamic Tactile Sensing Using In-Situ Fabricated PVDF-TrFE e-skin Jarred Fastier-Wooller, Trung Hieu Vu, Yong Zhu, Hong-Quan Nguyen, Van Thanh Dau, Dzung Viet Dao

Griffith University, Australia

C1L-03-5

13:00

An Internet-of-Things Enabled Flexible Strain Sensor for Stem Growth Measurements

Nafize Hossain, Shawana Tabassum University of Texas at Tyler, United States

C1L-03-6

13:15

Ultrasensitive Strain Sensor Enhanced by Bonded Light Emitting Diodes

Thanh Nguyen{1}, Toan Dinh{2}, Van Thanh Dau{1}, Abu Riduan Md Foisal{1}, Hung Nguyen{1}, Trung Hieu Vu{1}, Tuan Anh Pham{1}, Canh-Dung Tran{2}, Tuan-Khoa Nguyen{1}, Hoang-Phuong Phan{1}, Nam-Trung Nguyen{1}, Dzung Viet Dao{1} {1}Griffith University, Australia; {2}University of Southern Queensland, Australia



12:00 – 13:30 UTC C1L-04: SENSOR SYSTEMS II

SESSION CHAIRS: Javier Bilbao de Men, NM Numerical Modelling GmbH & Michael Daniele, NC State University

C1L-04-1

12:00

On the Influence of Home Appliances on the Smartphone's Inertial Sensors *Shunit Truzman*{2}, *Guy Revach*{1}, *Itzik Klein*{2} *{1}ETH Zürich, Switzerland; {2}University of Haifa, Israel*

C1L-04-2

12:15

On Amplitude-Gain-Control Optimization for Lissajous Frequency Modulated MEMS Gyroscopes *Marco Bestetti*{1}, *Giorgio Mussi*{1}, *Christian Padovani*{1}, *Andrea Donadel*{2}, *Carlo Valzasina*{2}, *Giacomo Langfelder*{1}, *Andrea Bonfanti*{1} {1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy

C1L-04-3

12:30

Magnetic Position Sensors Revisited

Markus Roos{2}, Javier Bilbao de Mendizabal{1} {1}maglab AG, Switzerland; {2}NM Numerical Modelling GmbH, Switzerland

C1L-04-4

12:45

A 14-Channel 7 GHz VCO-Based EPR-on-a-Chip Sensor with Rapid Scan Capabilities

Mohamed Atef Hassan{2}, Tarek Elrifai{2}, Ayman Sakr{2}, Michal Kern{2}, Klaus Lips{1}, Jens Anders{2}

{1}Helmholtz Center for Materials and Energy, Germany; {2}Institute of Smart Sensors, Universität Stuttgart, Germany

C1L-04-5

13:15

A Novel Light-to-Frequency Converter Based Analog Front-End for Optical Sensing Applications *Guido Di Patrizio Stanchieri{1}, Andrea De Marcellis{1}, Marco Faccio{1}, Elia Palange{1}, Ulkuhan Guler{2}*

{1}University of L'Aquila, Italy; {2}Worcester Polytechnic Institute, United States

12:00 – 13:30 UTC C1L-05: SENSOR NETWORKS (IoT) II SESSION CHAIRS: Henry Leung, University of Calgary & Binbin Chen, Singapore University of Technology & Design

C1L-05-1 12:00 Detection of Skin RGB Color with a Battery-Free NFC Skincare Device Syed Muhammad Ali, Wan-Young Chung Pukyong National University, Korea



C1L-05-2

12:15

Individual and Longitudinal Trend Analysis of Stairway Gait via Ambient Measurement Using Handrail-Shaped Force Sensor

Moe Hamada{2}, Koji Kitamura{1}, Yoshifumi Nishida{2} {1}Advanced Industrial Science and Technology, Japan; {2}Tokyo Institute of Technology, Japan

C1L-05-3

12:30

A LoRaWAN-Based Environmental Sensor System for Urban Tree Health Monitoring

Haokai Zhao{1}, Kevin Kam{1}, Ioannis John Kymissis{1}, Patricia Culligan{2} {1}Columbia University, United States; {2}University of Notre Dame, United States

C1L-05-4

12:45

Intrinsically Self-Powered, Battery-Free, and Sensor-Free Ambient Light Control System Roberto La Rosa{3}, Mario Costanza{2}, Andreas Burg{1}, Catherine Dehollain{1}, Patrizia Livreri{4} {1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}FEMTO-ST Institute, France; {3}ST Microelectronics, École Polytechnique Fédérale de Lausanne, Italy; {4}Università degli Studi di Palermo, Italy

C1L-05-5

13:00

Electronic System for Citizens' Air Quality Mapping

Sergio Palomeque-Mangut, Félix Meléndez, Jaime Gómez-Suárez, Patricia Arroyo, José-Ignacio Suárez, Jesús Lozano Universidad de Extremadura. Spain

12:00 – 13:30 UTC C1L-06: SENSOR MATERIALS, PROCESSING & FABRICATION I SESSION CHAIRS: Masato Sone, Tokyo Institute of Technology & Mohsen Asadnia, Macquarie University

C1L-06-1 12:00 Laser Induced Graphene-Based Glucose Biofuel Cell Md Faruk Hossain, Gymama Slaughter Center for Bioelectrics, Old Dominion University, United States

C1L-06-2 12:15 Directly Deposited Thin-Film Strain Gauges on Curved Metallic Surfaces

Rico Ottermann{2}, Daniel Klaas{2}, Folke Dencker{2}, Dominik Hoheisel{1}, Sebastian Jung{1}, Alexander Wienke{3}, Jan Friedrich Düsing{3}, Jürgen Koch{3}, Marc Christopher Wurz{2} {1}Baker Hughes Inteq GmbH, Germany; {2}Institute of Micro Production Technology, Leibniz University Hannover, Germany; {3}Laser Zentrum Hannover e.V., Germany



C1L-06-3

12:30

Piezoresistive 4H-Silicon Carbide (SiC) Pressure Sensor

Piotr Mackowiak{1}, Kolja Erbacher{1}, Manuel Baeuscher{1}, Michael Schiffer{1}, Klaus-Dieter Lang{2}, Martin Schneider-Ramelow{2}, Ha-Duong Ngo{3} {1}Fraunhofer Institute for Reliability and Microintegration, Germany; {2}Technische Universität Berlin, Germany; {3}University of Applied Sciences Berlin, Germany

C1L-06-4

12:45

Fabrication Process and Structural Characterization of Fused Silica-on-Silicon Toroidal Ring Gyroscope

Daryosh Vatanparvar, Doreen Hii, Andrei Shkel University of California, Irvine, United States

C1L-06-5

13:00

A Novel Engine Air Intake Sensor Based on 3D Printing and PCB Technology

Dimitrios-Nikolaos Pagonis{1}, Grigoris Kaltsas{1}, Tzoulian Koutsis{1}, Antonios Pagonis{2} {1}University of West Attica, Greece; {2}Wärtsilä Greece S.A., Greece

C1L-06-6

13:15

Characterization of Reversibly-Actuating Shape Memory Alloy Foils Produced by Planar Flow Casting

Ling Chen, David Renshaw, Michael Kellam, Ritaban Dutta, Daniel Liang Commonwealth Scientific and Industrial Research Organisation, Australia

12:00 – 13:30 UTC C1L-07: EMERGING WEARABLE SENSORS & SYSTEMS II SESSION CHAIRS: Mohamed Irfan Mohamed Refai, University of Twente & Hung Cao, University of California Irvine

C1L-07-1 12:00 INVITED: From Digital Twins to Wearables and Back Oliver Amft Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

C1L-07-2 12:30 ASRE: Adaptive Spatial Resolution Wearable EEG Yongchao Yang{1}, Ye Sun{2} {1}Michigan Technological University, United States; {2}University of Virginia, United States

C1L-07-3

12:45 Gel-Free Wearable Electroencephalography (EEG) with Soft Graphene Textiles *Ata Golparvar{1}, Ozberk Ozturk{2}, Murat Kaya Yapici{2} {1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Sabancı University, Turkey*



C1L-07-4 13:00 Tracking Lower Body 3D Kinematics Using Three IMUs Luke Wicent Sy{2}, Nigel Lovell{2}, Stephen Redmond{1} {1}University College Dublin, Ireland; {2}University of New South Wales, Australia

C1L-07-5

13:15

A Nano-Joule Burst-Mode Eye-Gaze Angle and Object Distance Sensor for Smart Contact Lenses

Chayanjit Ghosh{1}, Sakthidasan Kalidasan{1}, Mohit U. Karkhanis{1}, Alex Mastrangelo{2}, Aishwaryadev Banerjee{1}, Ross Walker{1}, Hanseup Kim{1}, Carlos H. Mastrangelo{1} {1}University of Utah, United States; {2}University of Washington, United States

12:00 – 13:30 UTC C1L-08: MICROFLUIDICS & BIOSENSORS II SESSION CHAIRS: Shekhar Bhansali, Florida International University & Loes Segerink, University of Twente/BIOS

C1L-08-1

12:00

Electroosmotic Pump Using a Glass Fiber Filter for High Flow Rate Water Transport *Rafael Ecker*{2}, *Andreas Fuchsluger*{2}, *Bernhard Jakoby*{1} {1}*Institute for Microelectronics and Microsensors, Johannes Kepler Universität Linz, Austria;* {2}*Johannes Kepler Universität Linz, Austria*

C1L-08-2

12:15

A Novel Calibration-Free Fully Integrated CMOS Capacitive Sensor for Life Science Applications Hamed Osouli Tabrizi{2}, Saghi Forouhi{2}, Omid Farhanieh{1}, Sebastian Magierowski{2}, Ebrahim Ghafar-Zadeh{2} {1}Sabancı University, Turkey; {2}York University, Canada

C1L-08-3

12:30 Flexible Organic Electrolyte Gated FET Biosensor with Integrated Soft Fluidics for Cortisol Monitoring in Oral Samples

Roslyn Massey, Ravi Prakash Carleton University, Canada

C1L-08-4

12:45

Linear Pulse-Frequency Modulator ISFET with a Wide Supply Range

Jose Cortes-Guzman{1}, Andreas Tsiamis{1}, David Cumming{2}, Srinjoy Mitra{1} {1}University of Edinburgh, United Kingdom; {2}University of Glasgow, United Kingdom

C1L-08-5

13:00

Development of a Flexible Wireless MWCNTs-Based ECG Monitoring Device

Yonatan Beyene, Ruth Bahre, Feysel Mohammed, Simin Masihi, Anthony Hanson, Masoud Panahi, Dinesh Maddipatla, Massood Atashbar Western Michigan University, United States



C1L-08-6 13:15 An Approach Towards Development of Point of Care Diagnostics Using ELISA

Nidhi Gupta{1}, Saakshi Dhanekar{2}, Sruti Chattopadhyay{1}, Shradha Suman Panda{2}, Harpal Singh{1}

{1}Indian Institute of Technology Delhi, India; {2}Indian Institute of Technology Jodhpur, India

14:00 – 15:00 UTC C2P-10: SENSOR SYSTEMS VI SESSION CHAIR: Boby George, IIT-Madras

C2P-10-1

Nonlinear Tactile Estimation Model Using Vibration Information from Tactile Sensor Mediated by Mechanoreceptors' Perceptibility

Momoko Sagara, Lisako Nobuyama, Kenjiro Takemura Keio University, Japan

C2P-10-2

A 125 dBΩ 1.1 GHz Transimpedance Amplifier for 150 MHz Capacitive MEMS Disk Oscillator *Hua Chen{2}, Ruiwei Xia{1}, Ke Liu{2}, Zhen Meng{2}, Yuepeng Yan{2}*

{1}Hisilicon Corporation, China; {2}Institute of Microelectronics Chinese Academy of Sciences, China

C2P-10-3

An Ultra-Low Power Voice Interface Design for MEMS Microphones Sensor

Jordan Chiao-Teng Chung, Chih-Cheng Lu, Wei-Shu Rih, Ching-Feng Lee, Cheng Ming Shih, Yu Li Yeh Industrial Technology Research Institute, Taiwan

C2P-10-4

Signal Classification Using a Mechanically Coupled MEMS Neural Network

Hamed Nikfarjam{4}, Amin Abbasalipour{4}, Mehari K. Tesfay{3}, Mohammad H. Hasan{1}, Siavash Pourkamali{4}, Roozbeh Jafari{2}, Fadi Alsaleem{3} {1}Columbus State University, United States; {2}Texas A&M University, United States; {3}University of

{1}Columbus State University, United States; {2} Lexas A&M University, United States; {3}University of Nebraska, United States; {4}University of Texas at Dallas, United States

14:00 – 15:00 UTC C2P-11: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS VI SESSION CHAIRS: Aakash Jog, Tel Aviv University & Marios Sophocleous, University of Cyprus

C2P-11-1

Characteristics of Hetero-Core Optical Fiber Hydrogen Sensor Based on Au/WO3/Pt Thin Film *Yuji Nagao{2}, Koji Yuhashi{2}, Ai Hosoki{1}, Michiko Nishiyama{2}, Shoichi Kubodera{2}, Kazuhiro Watanabe{2} {1}National Institute of Genetics, Japan; {2}Soka University, Japan*

C2P-11-2

Detection of Odorant Using TFT Multi-Array with Various Polymers

Sohee Kim, Hyun Woo Jang, Hyeokjin Kwon, Su Jin Heo, Goeun Pyo, Dong Su Kim, Ji Won Chae, Jae Eun Jang

Daegu Gyeongbuk Institute of Science and Technology, Korea



Principal Component Analysis Augmented Identification of Volatile Organic Compounds Using a Micromachined AT-Cut Quartz Resonator-Based Gas Sensor Array

Jiayuan Zhang{1}, Nishit Goel{2}, Vedant Sumaria{1}, Stephen Bart{2}, Srinivas Tadigadapa{1} {1}Northeastern University, United States; {2}TDK Invensense Inc, United States

C2P-11-4

C2P-11-3

Leaky-Waveguide-Conversion-Type POF Alkane-Gas Sensor Using Carbon-Black Dye

Naoki Yoda, Yutaka Suzuki, Masayuki Morisawa University of Yamanashi, Japan

C2P-11-5

Gas Discrimination Based on Feature Patterns of Sensor Transient Extracted by Memristor with Resistance-Voltage Converter

Takehiro Hirota, Takefumi Yoshikawa, Tatsuya Iwata Toyama Prefectural University, Japan

C2P-11-6

A Fringe Field Shaping CMOS Capacitive Imaging Array

Kangping Hu, Christopher Arcadia, Jacob Rosenstein Brown University, United States

C2P-11-7

Stress Effects in Semiconducting Metal Oxide (SMOx) Materials on MEMS Gas Sensors *Vedant Sumaria*{1}, *Nishit Goel*{2}, *Stephen Bart*{2} {1}Northeastern University, United States; {2}TDK Invensense Inc, United States

C2P-11-8

Invasive Species Prosopis Juliflora Derived Carbon Biomass/SnO2 Based Hazardous NO2 Gas Sensor

Vetrivel Sankar, Krishnan Balasubramaniam, Sundara Ramaprabhu Indian Institute of Technology Madras, India

14:00 – 15:00 UTC C2P-12: SENSOR DATA PROCESSING IV SESSION CHAIR: Marco Jose Da Silva, Federal University of Technology Parana

C2P-12-1

Compact CNN for Rapid Inter-Day Hand Gesture Recognition and Person Identification from sEMG

Benjakarn Leelakittisin, Theerawit Wilaiprasitporn, Thapanun Sudhawiyangkul Vidyasirimedhi Institute of Science and Technology, Thailand

C2P-12-2

Estimation of Leak Time Parameter Based on Fusion of Leak Behavior and Data Distribution Characteristic from Gas Flow Sensor Data

Jing Liang{1}, Shan Liang{1}, Hao Zhang{1}, Li Ma{2} {1}Chongqing University, China; {2}Southwest Oil and Gasfield Company, China



C2P-12-3

Estimation Method of Interfacial Stress Distribution by Inverse Analysis of Deformed Shape Data Yoshinao Kishimoto{1}, Yukiyoshi Kobayashi{1}, Feng Jin{2} {1}Tokyo City University, Japan; {2}Xi'an Jiaotong University, China

C2P-12-4

Air-Coupled Ultrasound Resonant Spectroscopy Sensitivity Study in Plant Leaf Measurements

Linas Svilainis{2}, Žilvinas Nakutis{2}, Valdas Eidukynas{2}, Dobilas Liaukonis{2}, Arturas Aleksandrovas{2}, Andrius Chaziachmetovas{2}, Tomas Gomez Alvarez-Arenas{1} {1}Institute for Physical and Information Technologies, Spain; {2}Kaunas University of Technology, Lithuania

C2P-12-5

ENFES: ENsemble FEw-Shot Learning for Intelligent Fault Diagnosis with Limited Data *Onat Gungor*{2}, *Tajana Rosing*{2}, *Baris Aksanli*{1}

{1}San Diego State University, United States; {2}University of California San Diego, United States

C2P-12-6

Autoencoder-Based Ultrasonic NDT of Adhesive Bonds

Ivan Kraljevski{2}, Frank Duckhorn{2}, Martin Barth{2}, Constanze Tschoepe{2}, Frank Schubert{2}, Matthias Wolff{1}

{1}Brandenburgische Technische Universität Cottbus-Senftenberg, Germany; {2}Fraunhofer Institute for Ceramic Technologies and Systems, Germany

C2P-12-7

Assessment of a Neural Network for the Correction of Measurement Errors

Phil Meier, Kris Rohrmann, Marvin Sandner, Marcus Prochaska Ostfalia University of Applied Sciences, Germany

C2P-12-8

Deep Learning Based Volume Fraction Estimation for Two-Phase Water-Containing Flows *Rafiul Rasel{1}, Benjamin Straiton{2}, Alex Solon{2}, Qussai Marashdeh{2}, Fernando Teixeira{1} {1}Ohio State University, United States; {2}Tech4Imaging, United States*

C2P-12-9

One-Shot Radar-Based Gesture Recognizer for Fast Prototyping

Xiaodong Cai{1}, Haoyang Wu{2}, Jingyi Ma{2}, Hemin Han{1}, Lili Michael Ma{1} {1}Intel Corporation, China; {2}Intel Labs China, China

14:00 – 15:00 UTC

C2P-13: SENSOR NETWORKS (IoT) III

SESSION CHAIRS: Henry Leung, University of Calgary & Binbin Chen, Singapore University of Technology & Design

C2P-13-1

Energy Monitoring Using LoRaWAN-Based Smart Meters and oneM2M Platform *Shubham Mante, Ruthwik Muppala, Niteesh D., Aftab Hussain*

International Institute of Information Technology, Hyderabad, India



C2P-13-2

Low-Cost NB-IoT Microgrid Power Quality Monitoring System

Dmitry Petrov, Konstantin Kroschewski, Ibrahim Mwammenywa, Geoffrey Mark Kagarura, Ulrich Hilleringmann Paderborn University, Germany

C2P-13-3

Using Redundancy in a Sensor Network to Compensate Sensor Failures

Nicolas Winkler{1}, Patrick Neumann{1}, Erik Schaffernicht{2}, Achim Lilienthal{2} {1}BAM Bundesanstalt für Materialforschung und -prüfung, Germany; {2}Örebro University, Sweden

C2P-13-4

A Doppler-Based Human Activity Recognition System Using WiFi Signals

Yao Ge{2}, Shibo Li{1}, Minjian Shentu{1}, Ahmad Taha{2}, Shuyuan Zhu{1}, Jonathan Cooper{2}, Muhammad Ali Imran{2}, Qammer H. Abbasi{2} {1}University of Electronic Science and Technology of China, China; {2}University of Glasgow, United Kingdom

C2P-13-5

Oversampling Highly Imbalanced Indoor Positioning Data Using Deep Generative Models Fahad Alhomayani, Mohammad Mahoor University of Denver, United States

14:00 – 15:00 UTC C2P-14: SENSOR MATERIALS, PROCESSING & FABRICATION II SESSION CHAIRS: Masato Sone, Tokyo Institute of Technology & Mohsen Asadnia, Macquarie University

C2P-14-1

Smartphone Sensor for Pesticide Monitoring Using CuO Modified Screen Printed Electrodes *Narat Maraprasertsak*{1}, *Patamaporn Subpanyadee*{1}, *Punvinai Vinaisuratern*{1}, *Chanchana Thanachayanont*{2}, *Porpin Pungetmongkol*{1}

{1}Chulalongkorn University, Thailand; {2}Thailand National Metal and Materials Technology Center, Thailand

C2P-14-2

DC Electric Metamaterial Behaviour in Tuned Fused Deposition Modelling Prints *Alexander Dijkshoorn, Thijs Hamstra, Remco Sanders, Stefano Stramigioli, Gijs Krijnen University of Twente, Netherlands*

C2P-14-3

New Heterostructured Ni3S2-rGO Based Room Temperature NH3 Sensor

Boitumelo Tlhaole{2}, Neil Coville{2}, Ella Linganiso{2}, Nathalie Redon{1}, Jean-Luc Wojkiewicz{1}, Thomas Fagniez{1}, Caroline Duc{1} {1}Université de Lille, France; {2}University of the Witwatersrand, South Africa

C2P-14-4

Investigation of the Effect of Printing Angle and Device Orientation on Micro-Stereolithographically Printed, and Self-Insulated, 24-Well, High-Throughput 3D Microelectrode Arrays

Jorge Manrique Castro, Avra Kundu, Adam Rozman, Swaminathan Rajaraman University of Central Florida, United States



C2P-14-5 Towards All-Polymeric Cochlear Implant Micro-Electrode Arrays Alberto Miralles-Abete, Paddy French

Delft University of Technology, Netherlands

C2P-14-6

A Screen-Printed Stretchable Bioelectrical Sensing Sleeve with QuasiDry Microfluid-Wicking Interface

Mingde Zheng, Salvatore Zarra, Bibek Samanta Nokia Bell Labs, United States

C2P-14-7

Towards the Development of Soft Force and Pressure Sensors for Robot Safety Applications Jennifer Case{1}, Nagarajan Rangarajan{2}, Joseph Falco{1}, Kenneth Kimble{1} {1}National Institute of Standards and Technology, United States; {2}National Institutes of Health, United States

C2P-14-8

High Strength Piezoelectric Materials for Extreme Environments

Tim Comyn, Peter Cowin, Tim Stevenson Ionix Advanced Technologies, United Kingdom

C2P-14-9

Anisotropic Magneto-Resistive Sensor Effect Based Sensor Using Daisy Chain on Polyether Ether Ketone Substrate

Sascha de Wall, Sebastian Bengsch, Eike Fischer, Folke Dencker, Marc Christopher Wurz Institute of Micro Production Technology, Leibniz University Hannover, Germany

C2P-14-10

Membrane-Based Artificial Hair Sensors for Flow Sensing and Haptic Exploration *Minerva Vargas Gleason, Walter Lang*

Institute for Microsensors, Actuators and Systems, Universität Bremen, Germany

C2P-14-11

Implantable Sufficiently Integrated Multimodal Flexible Sensor for Intracranial Monitoring

Tiezhu Liu{1}, Pan Yao{1}, Zhou Li{2}, Hongqing Feng{2}, Chengyu Zhuang{4}, Xuan Sun{3}, Chunxiu Liu{1}, Ning Xue{1}

{1}Aerospace Information Research Institute, Chinese Academy of Sciences, University of Chinese Academy, China; {2}Beijing Institute of Nanoenergy and Nanosystems, University of Chinese Academy of Sciences, China; {3}Beijing Tiantan Hospital, Capital Medi

C2P-14-12

Stretchable Pressure Sensor Using Thermoplastic Polyurethane and Conductive Inks Jawad Ahmad{2}, Johan Sidén{1}, Henrik Andersson{2} {1}Mid Sweden Unievrsity, Sweden; {2}Mid Sweden University, Sweden

C2P-14-13

Biodegradable Additive Manufactured Ferroelectret as Mechanical Sensor

Omar Ben Dali, Sergey Zhukov, Claas Hartman, Heinz von Seggern, Gerhard Martin Sessler, Mario Kupnik

Technische Universität Darmstadt, Germany



C2P-14-14 Dual-Printed Soil Sensors for Nitrate and Moisture Monitoring

Shenwei Yin, Muhammadeziz Tursunniyaz, Jingyi Huang, Joseph Andrews University of Wisconsin-Madison, United States

C2P-14-15

Carbon Nanotubes/Polymer Films for Microsensors Applications

Marco Antonio Cen-Puc, Tim Mike de Rijk, Minerva Vargas Gleason, Walter Lang Institute for Microsensors, Actuators and Systems, Universität Bremen, Germany

C2P-14-16

Fully Printed pH Sensor Based in Carbon Black/Polyaniline Nanocomposite Shirin Mahinnezhad, Homa Emami, Mohsen Ketabi, Ahmad Al Shboul, Najet Belkhamssa, Andy Shih, Ricardo Izquierdo École de Technologie Supérieure, Canada

C2P-14-17

Aerosol-Jet Printing of Flexible Green Graphene Humidity Sensors for IoT Applications Mohsen Ketabi, Ahmad Al Shboul, Shirin Mahinnezhad, Ricardo Izquierdo École de Technologie Supérieure, Canada

C2P-14-18

Inkjet Printed 3D Gold Electrochemical Sensor on Shape Memory Polymer for Lead Detection Annatoma Arif, Angela Mendez Contreras, Sheikh Dobir Hossain, Robert C. Roberts University of Texas at El Paso, United States

C2P-14-19

Printed Capacitive Pressure Sensor with Enhanced Sensitivity Through a Layered PDMS/BaTiO3 Structure

Wenxin Wu, Kevin Schnittker, Joseph Andrews University of Wisconsin-Madison, United States



11:00 – 12:30 UTC D1L-01: OPTICAL SENSORS II SESSION CHAIRS: Minghong Yang, Wuhan University of Technology & Hengky Chandrahalim, The U.S. Air Force Institute of Technology

D1L-01-1

11:00

An All-in-One 64-Zone SPAD-Based Direct-Time-of-Flight Ranging Sensor with Embedded Illumination

Fabrice Martin, Pascal Mellot, Adam Caley, Bruce Rae, Colin Campbell, Duncan Hall, Sara Pellegrini ST Microelectronics Imaging Sub-Group, France; ST Microelectronics Imaging Sub-Group, United Kingdom

D1L-01-2

11:15

Wavelength Selective Colloidal Quantum Dot Photodetectors for Spectral Analysis

Carlo Venettacci{2}, Andrea De Iacovo{2}, Federica Mitri{2}, Carlo Giansante{1}, Lorenzo Colace{2} {1}CNR-NANOTEC, Italy; {2}University Roma Tre, Italy

D1L-01-3

11:30

Fiber Optic Biosensor Based on Long Period Grating for the Detection of Vitamin D

Flavio Esposito{3}, Lucia Sansone{1}, Anubhav Srivastava{3}, Angela Maria Cusano{2}, Stefania Campopiano{3}, Michele Giordano{1}, Agostino Iadicicco{3} {1}National Research Council of Italy, Italy; {2}Regional Centre on Information Communication Technology-CeRICT, Italy; {3}University of Naples Parthenope, Italy

D1L-01-4

11:45

Chemical Identifier for Particulate Matter Monitoring in Construction Sites

Javier Nuñez, Robin Koldeweij, Joe Trimboli, Arjen Boersma TNO Netherlands Organisation for Applied Scientific Research, Netherlands

D1L-01-5

12:00

Period Grating Fibers for Potential Refractive Index Sensing

Mengchuan Xing{2}, Frederic Surre{2}, James Sharp{2}, Han Cheng Seat{1} {1}Université de Toulouse, France; {2}University of Glasgow, United Kingdom

11:00 – 12:30 UTC D1L-02: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS IV SESSION CHAIRS: Preethi Preethichandra, Central Queensland University & Marios Sophocleous, University of Cyprus

D1L-02-1 11:00 A Single-Chip Dual-Transduction Gas Sensor for BTX Detection Xueyou Sun, Ye Chang, Hemi Qu, Wei Pang, Xuexin Duan State Key Laboratory of Precision Measuring Technology and Instruments, Tianjin University, China



D1L-02-2

11:15

A 3D MoS2/Carbon Nanofiber Network for Room Temperature Methane Sensing

Chengcheng Xu, Xiaosong Du, Jingjing Yang, Yin Long, Yang Wang University of Electronic Science and Technology of China, China

D1L-02-3

11:30

A Model to Predict Mass Spectrum from Odor Impression Using Deep Neural Network Daisuke Hasebe, Takamichi Nakamoto

Tokyo Institute of Technology, Japan

D1L-02-4

11:45

An Ultrasensitive Fluorescent Paper Based Acidic Gas Sensing Platform

Sachin Kadian{1}, Narendra Chaulagain{2}, Harshitha Rajashekhar{2}, Damini Vrushabendrakumar{2}, Gaurav Manik{1}, Karthik Shankar{2} {1}Indian Institute of Technology Roorkee, India; {2}University of Alberta, Canada

D1L-02-5

12:00

Influence of Lanthanum Oxycarbonate Deposition on Carbon Dioxide Detection

Fabien Le Pennec, Ludovic Le Roy, Carine Perrin-Pellegrino, Marc Bendahan, Sandrine Bernardini Aix Marseille Université, Université de Toulon, CNRS, IM2NP, AMUtech Institute, France

D1L-02-6

12:15

Discrimination of VOCs Along with Concentration Change Detection Applying a Combination of DWT and Machine Learning Tools

Snehanjan Acharyya, Sudip Nag, Prasanta Guha Indian Institute of Technology Kharagpur, India

11:00 – 12:30 UTC D1L-03: TEMPRATURE SENSORS & OTHERS

SESSION CHAIRS: Kunihisa Tashiro, Shinshu University & Giacomo Langfelder, Politecnico di Milano

D1L-03-1

11:00

SAW-RFID Temperature and Strain Sensors on Metallic Substrates

Prince Mengue{1}, Baptiste Paulmier{1}, Sami Hage-Ali{1}, Cécile Floer{1}, Hamid M'jahed{1}, Alexander Shvetsov{2}, Sergei Zhgoon{2}, Omar Elmazria{1} {1}Jean Lamour Institute, Université de Lorraine, CNRS, France; {2}National Research University Moscow Power Engineering Institute, Russia

D1L-03-2

11:15

Characterization of Induced Pluripotent Stem Cells Using a Pyroelectric Sensor Salvatore Andrea Pullano, Marta Greco, Stefania Scalise, Elvira I. Parrotta, Valeria Lucchino, Gianni Cuda, Antonino S. Fiorillo



Magna Graecia University of Catanzaro, Italy

D1L-03-3 11:30 Dynamic Thermoregulatory Photonic Crystal Fabric for Personal Thermal Management Mohamed Boutghatin, Yan Pennec, Salim Alhajj-Assaf, Michèle Carette, Vincent Thomy, Abdellatif Akjouj, Bahram Djafari-Rouhani IEMN, Université de Lille, France

D1L-03-4 11:45

Rapid Fabrication of High-Responsivity Photodetectors Utilizing AlGaN/GaN on Sapphire Hong-Quan Nguyen, Abu Riduan Md Foisal, Thanh Nguyen, Hung Nguyen, Trung Hieu Vu, Jarred Fastier-Wooller, Sadegh Aberoumand, Van Thanh Dau, Hoang-Phuong Phan, Dzung Viet Dao Griffith University, Australia

D1L-03-5

12:00

Linear Organic Transistor Based Temperature Sensor Between 230 and 330 K Rosalba Liguori, Luigi Di Benedetto, Gian Domenico Licciardo

Università degli Studi di Salerno, Italy

D1L-03-6

12:15

Improving MOSFET Piezoresistive Strain Gauges Limit of Detection Using Lock-In Principle *Thibault P. Delhaye, Nicolas Roisin, Nicolas André, Laurent A. Francis, Denis Flandre Université catholique de Louvain, Belgium*

11:00 – 12:30 UTC D1L-04: SENSOR SYSTEMS III SESSION CHAIRS: Michael Daniele, NC State University & Boby George, IIT-Madras

D1L-04-1 11:00 Amplitude Recovery of Saturated Sinusoidal Signals Ravi Abhishek Shankar, Mohit Singh, Byunghoo Jung Purdue University, United States

D1L-04-2

11:15

S2L-SLAM: Sensor Fusion Driven SLAM Using Sonar, LiDAR and Deep Neural Networks *Niels Balemans{2}, Peter Hellinckx{3}, Steven Latré{3}, Philippe Reiter{3}, Jan Steckel{1} {1}CoSys-Lab, University of Antwerp, Belgium; {2}IDLab, CoSys-Lab, University of Antwerp, Belgium; {3}IDLab, University of Antwerp, Belgium*

D1L-04-3

11:30

Design and Implementation of a Mobile Urban Low-Cost Environmental Sensor Network *Alex Cabral*{1}, *Asta Roseway*{2}, *Paul Johns*{2} *{1}Harvard University, United States; {2}Microsoft Research, United States*



D1L-04-4

11:45

A Wireless, Multi-Channel Printed Capacitive Strain Gauge System for Structural Health Monitoring

Kshama Lakshmi Ranganatha{1}, Kaelee Novich{1}, Timothy Phero{1}, Kiyo Fujimoto{1}, Doug Litteken{2}, David Estrada{1}, Brian Jagues{1}, Benjamin Johnson{1} {1}Boise State University, United States; {2}National Aeronautics and Space Administration, United States

D1L-04-5

12:00

Motor-Imagery EEGNet-Based Processing on a Low-Spec SoC Hardware

Ana Caren Hernandez-Ruiz, Daniel Enériz, Nicolas Medrano, Belen Calvo University of Zaragoza, Spain

11:00 - 12:30 UTC D1L-05: EMERGING SENSOR APPLICATIONS II SESSION CHAIRS: Azadeh Hashemi & Volker Nock, University of Canterbury

D1L-05-1

11:00

Long-Lasting Leaf Water Stress Detector Based on an Infrared Micromechanical Photoswitch and a Solar Powered Sunlight Digitizer

Antea Risso, Vageeswar Rajaram, Matilde Maria Pavese, Sungho Kang, Sila Deniz Calisgan, Zhenyun Qian. Matteo Rinaldi

Northeastern University, United States

D1L-05-2

11:15

Design of a Novel Biosensor Implant for Farmed Atlantic Salmon (Salmo Salar)

Eirik Svendsen, Martin Føre, Lise Lyngsnes Randeberg, Jo Arve Alfredsen Norwegian University of Science and Technology, Norway

D1L-05-3

11:30

Polarization Image Sensor-Based Laser Scanner for Reflective Metals: Architecture and Implementation

Jaime Marco-Rider, Lars Tingelstad, Olav Egeland Norwegian University of Science and Technology, Norway

D1L-05-4 11:45 Map-Aided Fusion of IMU PDR and RSSI Fingerprinting for Improved Indoor Positioning Md Abdulla Al Mamun, Mehmet Rasit Yuce Monash University, Australia



THURSDAY, NOVEMBER 4

D1L-05-5 12:00 Pseudo-Passive Indoor ToF Sensing Exploiting Visible Light Communication Sources Faisal Ahmed, Miguel Heredia Conde, Otmar Loffeld ZESS, Universität Siegen, Germany

D1L-05-6

12:15

Real-Time Dosimetry of Ultrahigh Dose-Rate X-Ray Beams Using Scintillation Detectors Shahirah Shaharuddin{1}, Alexander Hart{2}, Daniel Cecchi{2}, Magdalena Bazalova-Carter{2}, Mark Foley{1} {1}National University of Ireland Galway, Ireland; {2}University of Victoria, Canada

11:00 – 12:30 UTC D1L-06: SENSOR DATA PROCESSING II (Navigation & Positioning) SESSION CHAIRS: Ashish Pandharipande, Signify & Valérie Renaudin, Université Gustav Eiffel

D1L-06-1

11:00

Fusion from Multimodal Gait Spatiotemporal Data for Human Gait Speed Classifications Abdullah Alharthi, Krikor Ozanyan University of Manchester, United Kingdom

D1L-06-2

11:15 Lightweight Online Semi-Supervised Learning Algorithm for Ultrasonic Gesture Recognition Pixi Kang, Xiangyu Li Tsinghua University, China

D1L-06-3 11:30 Calibration-Free Target Detection Based on Thermal and Distance Sensor Fusion Sanaz Kianoush{2}, Stefano Savazzi{3}, Vittorio Rampa{3}, Leonardo Costa{1}, Denis Tolochenko{1} {1}Cognimade s.r.l, Italy; {2}IEIIT CNR, Italy; {3}IEIIT-CNR, Italy

D1L-06-4 11:45 Effective Very-Wide-Area 3D ToF Sensing Alvaro Lopez Paredes{1}, Miguel Heredia Conde{2}, Otmar Loffeld{2} {1}Universität Siegen, Germany; {2}ZESS, Universität Siegen, Germany

D1L-06-5 12:00 DeepTracks: Geopositioning Maritime Vehicles in Video Acquired from a Moving Platform Jianli Wei, Guanyu Xu, Alper Yilmaz Ohio State University, United States





D1L-06-6 12:15 Self-Supervised Underwater Source Localization Based on Contrastive Predictive Coding Xiaoyu Zhu, Hefeng Dong, Pierluigi Salvo Rossi, Martin Landrø Norwegian University of Science and Technology, Norway

14:00 – 15:00 UTC D2P-10: SENSOR SYSTEMS VII SESSION CHAIR: Vincenzo Romano Marrazzo, University of Naples Federico II

D2P-10-1

Compressive Detection for Camera Array Images

Rui Ma, Guangyao Ding, Qi Hao Southern University of Science and Technology, China

D2P-10-2

External Load-Based Sensing of Electrical Current Degradation in Industrial Robots *Vinh Nguyen, Jeremy Marvel National Institute of Standards and Technology, United States*

D2P-10-3

Adding Object Manipulation Capabilities to Social Robots by Using 3D and RGB Cameras Data *Giovanni Mezzina, Daniela De Venuto Politecnico di Bari, Italy*

D2P-10-4

Research on Online Non-Intrusive Load Identification System Based on Multi-Threaded CUSUM-MLP algorithm

Hang Zhao{1}, Guangfen Wei{1}, Chunhua Hu{2}, Qian Liu{2} {1}Shandong Technology and Business University, China; {2}Yantai Dongfang Wisdom Electric CO., LTD., China

D2P-10-5

Fiber Optic Monitoring System Ready for 4-20mA Industrial Control Standard

Vincenzo Romano Marrazzo{2}, Francesco Fienga{2}, Dario Laezza{2}, Michele Riccio{2}, Andrea Irace{2}, Salvatore Buontempo{1}, Giovanni Breglio{2} {1}Istituto Nazionale di Fisica Nucleare, Italy; {2}Università degli Studi di Napoli Federico II, Italy

D2P-10-6

Radiographic Inspection of Submerged Arc Welding Using Semantic Segmentation *Yi Zhao, Shiyi Liu, Xiaohui Li Chang'an University, China*

14:00 – 15:00 UTC D2P-11: PHYSICAL SENSORS & APPLICATIONS SESSION CHAIR: Kunihisa Tashiro, Shinshu University

D2P-11-1

Compact Pitot-Static-Tube-Based Waterflow Sensor for Biologging of Marine Animals *Takuto Kishimoto*{1}, *Ryosuke Saito*{2}, *Hiroto Tanaka*{2}, *Hidetoshi Takahashi*{1} {1}Keio University, Japan; {2}Tokyo Institute of Tech<u>no</u>logy, Japan



D2P-11-2

DC Electric Field Sensor Based on Polyimide Substrate

Tao Chen, Brandon Hill, Sadna Isik, Cyrus Shafai, Lot Shafai University of Manitoba, Canada

D2P-11-3

Simulink Model for an External Safety Mechanism in Inductive Position Sensors

Gentjan Qama{2}, Josef Janisch{1}, Juergen Kernhof{1}, Angel Karachomakov{1} {1}Renesas Electronics Corporation, Germany; {1}Renesas Electronics Corporation, Bulgaria; {1}Renesas Electronics Corporation, Austria; {2}Renesas Electronics Corporation/Renesas Electronics Europe GmbH, Germany

D2P-11-4

Identification and Compensation of Anisodamping for High Q Factor Resonator Under Whole-Angle Mode

Jiangkun Sun, Yongmeng Zhang, Sheng Yu, Qingsong Li, Xiang Xi, Xuezhong Wu, Dingbang Xiao National University of Defense Technology, China

D2P-11-5

A Sub-0.1°/H Bias-Instability MEMS Gyroscope Using Resonant Constant-Frequency Driving Technique

Haibin Ŵu, Xudong Zheng, Yaojie Shen, Xuetong Wang, Zhonghe Jin, Zhipeng Ma Zhejiang University, China

D2P-11-6

Self-Oscillating DC Current Transformer with Nanocrystalline Core

Václav Grim, Pavel Ripka Czech Technical University in Prague, Czech Rep.

D2P-11-7

Sensor for Bilateral Human Bite Force Measurements

Sven Suppelt{2}, Romol Chadda{2}, Niklas Schäfer{2}, Robert Sader{1}, Mario Kupnik{2} {1}Goethe University Frankfurt, Germany; {2}Technische Universität Darmstadt, Germany

D2P-11-8

Sensitivity Enhancement of MEMS Tactile Sensor by Redesign of Microcantilever and Strain Gauge

Ren Kaneta, Takumi Hasegawa, Takashi Abe, Masayuki Sohgawa Niigata University, Japan

D2P-11-9

Electrostatic-Capacitive MEMS Stiffness Sensor with Position-Feedback Mechanism *Alessandro Nastro, Marco Ferrari, Vittorio Ferrari*

Università degli Studi di Brescia, Italy

D2P-11-10

Race-Track Fluxgate Sensor Scaling Versus Noise

Vojtech Petrucha, Mattia Butta Czech Technical University in Prague, Czech Rep.



14:00 – 15:00 UTC D2P-12: OPTICAL SENSORS IV SESSION CHAIR: Minghong Yang, Wuhan University of Technology

D2P-12-1

Optical Fiber Multipoint Light Measurement System for the Investigation of Plant Cultivation Light Environment

Takumi Kondo{2}, Tadao Matsunaga{2}, Ei Endo{1}, Koutoku Ohmi{2}, Sang-Seok Lee{2} {1}Tottori Horticultural Experiment Station, Japan; {2}Tottori University, Japan

D2P-12-2

Synthesis of Fluorescent Nitrogen-Doped Carbon Spheres from Corncob Residue for the Detection of Fe (III) in Aqueous Solutions

Lindokuhle Magagula{3}, Nosipho Moloto{3}, Siziwe Gqoba{3}, Patricia Kooyman{1}, Tshwafo Motaung{2}, Ella Linganiso{3}

{1}University of Cape Town, South Africa; {2}University of South Africa, South Africa; {3}University of the Witwatersrand, South Africa

D2P-12-3

CuFeSe2 Quantum-Dot Based Infrared Photodetectors with Functionality in the Ambient *Tanuj Kumar, Anumol Sugathan, Krishnamachari Narasimhan, Anshu Pandey, Sushobhan Avasthi Indian Institute of Science, India*

D2P-12-4

Vertical Coupling Into a Photonic Crystal Waveguide Using Band Folding Design *Reyhaneh Jannesari{2}, Florian Dubois{3}, Gerald Pühringer{2}, Gerald Stocker{1}, Andreas Tortschanoff{3}, Thomas Grille{1}, Bernhard Jakoby{2} {1}Infineon Technologies Austria AG, Austria; {2}Institute for Microelectronics and Microsensors, Johannes Kepler Universität Linz, Austria; {3}Silicon Austria Labs GmbH, Austria*

D2P-12-5

Feasibility Study of Multi-Wavelength Optical Probe to Analyze Magnesium Implant Degradation Effects

Hafiz Wajahat Hassan, Anna Mathew, Haroon Khan, Olga Korostynska, Peyman Mirtaheri Oslo Metropolitan University, Norway

D2P-12-6

Research on a Miniature Optical Force Accelerometer

Junji Pu, Kai Zeng, Yulie Wu, Dingbang Xiao National University of Defense Technology, China

D2P-12-7

Optimization of Suspended Ladder BG Silicon Sensors for High Wavelength or Amplitude Sensitivity

Siim Heinsalu, Yuichi Matsushima, Hiroshi Ishikawa, Katsuyuki Utaka Waseda University, Japan



14:00 – 15:00 UTC D2P-13: MICROFLUIDICS & BIOSENSORS III SESSION CHAIRS: Chirasree RoyChaudhuri, IIEST & Loes Segerink, University of Twente/BIOS

D2P-13-1

Single-Probe Heat-Pulse Microsensor for Water Transportation Measurement in Plant Shoots Fumiya Ino, Wataru Kameda, Kyohei Terao, Hidekuni Takao, Fusao Shimokawa Kagawa University, Japan

D2P-13-2

A New Foundry-Based Open-Gate Junction Field-Effect Transistor (OG-JFET) as Electronic Sensing Platform (ESP) for Life Science Applications

Abbas Panahi{2}, Hamed Osouli Tabrizi{2}, Priyadarshini Mangannavar{1}, Oleg Chebotarev{1}, Andrew Fung{1}, Ebrahim Ghafar-Zadeh{2} {1}CMC Microsystems, Canada; {2}York University, Canada

D2P-13-3

Low-Cost Color Sensor for Automating Analytical Chemistry Processes Shreya Malkurthi, Kirthi Vignan Reddy Yellakonda, Anushka Tiwari, Aftab Hussain International Institute of Information Technology, Hyderabad, India

D2P-13-4

A Wireless Passive Capacitively Coupled Contactless Conductivity Detection (WPC4D) for Microfluidic Flow Monitoring

Bao-Anh Hoang{2}, Hang Tran Thanh{4}, Ha Nguyen Thi Ngoc{3}, Thao Pham Ngoc{4}, Kien Do Trung{4}, Ngoc-Thanh Le{5}, Tran-Thuy Nguyen{1}, Trinh Chu Duc{4}, Tung Thanh Bui{4}, Loc Do Quang{4}

{1}E Hospital, Vietnam; {2}University of Engineering and Technology, Vietnam National University, Vietnam; {3}Vietnam Academy of Science and Technology, Vietnam; {4}Vietnam National University, Vietnam; {5}Vietnam National University and E Hospital, Vietn

D2P-13-5

Acoustic Particle Manipulation Along Three Orthogonal Directions in Laser Engraved Microfluidic Channels

Andreas Fuchsluger{2}, Marcus Andreas Hintermüller{2}, Rafael Ecker{2}, Norbert Cselyuszka{3}, Mohssen Moridi{3}, Bernhard Jakoby{1}

{1}Institute for Microelectronics and Microsensors, Johannes Kepler Universität Linz, Austria; {2}Johannes Kepler Universität Linz, Austria; {3}Silicon Austria Labs GmbH, Austria

D2P-13-6

Rapid MicroRNA Detection Using Paper-Based Isothermal Amplification

Jingjing Qian, Qinming Zhang, Joyce C. Lai, Yixuan Wang, Meng Lu Iowa State University, United States



14:00 – 15:00 UTC D2P-14: EMERGING WEARABLE SENSORS & SYSTEMS III SESSION CHAIRS: Mohamed Irfan Mohamed Refai, University of Twente & Hung Cao, University of California Irvine

D2P-14-1

A Wearable Human-Machine Interface Based on Triboelectric Sensors Technology

Chunkai Qiu, Fan Wu, Mehmet Rasit Yuce Monash University, Australia

D2P-14-2

Effect of Stitch Pattern on the Electrical Properties of Wale-Wise Knitted Strain Sensors and Interconnects

Pei Zhi Chia, Ujjaval Gupta, Ying Yi Tan, Jun Liang Lau, Alvee Ahmed, Gim Song Soh, Hong Yee Low Singapore University of Technology and Design, Singapore

D2P-14-3

Design and Fabrication of Paper-Based Stretchable Sensor for Respiration Monitoring

Nishith Shagle{2}, Thanh Nguyen{2}, Trung Hieu Vu{1}, Hung Nguyen{1}, Hoang-Phuong Phan{1}, Van Thanh Dau{1}, Pingan Song{2}, Hao Wang{2}, Nam-Trung Nguyen{1}, Dzung Viet Dao{1}, Toan Dinh{2} {1}Griffith University, Australia; {2}University of Southern Queensland, Australia

D2P-14-4

Development of Hysteresis-Free and Linear Knitted Strain Sensors for Smart Textile Applications Beyza Bozali, Joris van Dam, Linda Plaude, Kaspar Jansen Delft University of Technology, Netherlands

D2P-14-5

Self-Powered Wireless UV Sensor with Intervals of Wireless Transmission

Shunta Furumura{2}, Yasuhiro Hiraga{2}, Fumiyasu Utsunomiya{1}, Minoru Sudo{1}, Ami Tanaka{2}, Takakuni Douseki{2} {1}ABLIC Inc., Japan; {2}Ritsumeikan University, Japan

D2P-14-6

Leaf-FIT: A Wearable Leaf Sensor for In-Situ and Real-Time Monitoring of Plant Phytohormones *Nafize Hossain, Tanzila Noushin, Shawana Tabassum University of Texas at Tyler, United States*

D2P-14-7

IoT-Based Reconfigurable Micropump for Drug Delivery Applications

Youssef Kotb{2}, Mariam Hegazy{2}, Kareem Abdelrahman{2}, Zahwa Nour{2}, Mohammed Al-Jebzi{2}, Omar Ibrahim{2}, Ahmed Gouda{3}, Mona Abdel-Mottaleb{1}, Mohamed Serry{2} {1}Ain Shams University, Egypt; {2}American University in Cairo, Egypt; {3}Nawah Scientific, Egypt

D2P-14-8

Wearable Skin Vapor Sensing System for Continuous Monitoring of Various Health and Lifestyles

Bongmook Lee, Michael Lim, Veena Misra North Carolina State University, United States



D2P-14-9

A Low-Power 54µW Adaptive Analog Front-End with Adaptive Intensity Control for an Organic PPG Sensor in Wearable Devices

Rajeev Kumar Pandey{1}, Paul C.-P. Chao{2} {1}National Chiao Tung University, Taiwan; {2}National Yang Ming Chiao Tung University, Taiwan

D2P-14-10

Highly Sensitive Cone-Structured Porous Pressure Sensors for Respiration Monitoring Applications

Masoud Panahi, Simin Masihi, Anthony Hanson, Dinesh Maddipatla, Xingzhe Zhang, Valliammai Palaniappan, Binu Baby Narakathu, Bradley Bazuin, Massood Atashbar Western Michigan University, United States

D2P-14-11

Noncontact Electrophysiology Monitoring Systems for Assessment of Canine-Human Interactions

Parvez Ahmmed{2}, Timothy Holder{2}, Marc Foster{2}, Ivan D Castro{1}, Aakash Patel{1}, Tom Torfs{1}, Alper Bozkurt{2} {1}IMEC, Belgium; {2}North Carolina State University, United States

14:00 – 15:00 UTC D2P-15: SENSORS IN INDUSTRIAL PRACTICES SESSION CHAIR: James Brusey, Coventry University

D2P-15-1

Multi-Source Data Fusion Method Based on Nearest Neighbor Plot and Track Data Association *Shulian Zhao*{1}, Yi Huang{2}, Ke Wang{2}, Tao Chen{1}

{1}China Automotive Engineering Research Institute Company, China; {2}Chongqing University, China

