IEEE SENSORS 2021

Virtual Conference Oct 31 - Nov 4, 2021

SENSORS 2021 CONFERENCE PROGRAM

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2021.ieee-sensorsconference.org

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WELCOME IEEE SENSORS 2021

Dear IEEE SENSORS 2021 participants

Welcome to the online SENSORS 2021!

On behalf of the Organizing Committee of the 20th IEEE SENSORS Conference, we are excited to welcome you to our online meeting environment. While we are disappointed that we are unable to be together in Sydney this year, we are still enthusiastic about the opportunity to “gather” online to discuss important research developments in the sensors community. With the tools for online presentation and chat, and the networking events aimed at engaging online attendees, we are confident that the meeting will be productive for those that commit to participating.

Despite some worldwide challenges, 2021 is still a fantastic time to be involved in sensor technologies. The technical area of sensors is one of the most exciting fields in which to work and study, and IEEE SENSORS 2021 is bringing together research scientists, engineers and practitioners from around the world to present their latest research, ideas, and applications. Advances continue at a rapid pace, and the use and application of sensors is expanding daily; as new developments occur, the IEEE SENSORS conference helps keep you informed and up to date on the technology as well as the people involved. We hope you will take the time to fully engage with other attendees and invited speakers, as our purpose is to not only provide information but also to facilitate collaborations and connections.

We will kick off our Conference with a Welcome Reception, highlighting Young Professionals. Over the next several days, you will have the opportunity to hear the a diverse set of globally-renowned Keynote Speakers: Professor Justin Gooding from University of New South Wales (Sydney), Professor Debbie Senesky from Stanford University, and Professor Jérôme Casas from University of Tours, France. In addition, a plenary session on Women in Sensors (WiSe) will highlight the contributions of some women leaders from our community. A broad combination of technical sessions – platform talks and poster sessions – will be presented in parallel each day, and we will have special sessions targeted for Young Professionals and Women in Sensors. Of course, all are welcome and encouraged to attend each of these events! As in previous years, we will have some dedicated time to highlight our sponsors and exhibitors. On Wednesday and Thursday mornings, we will have our annual awards ceremonies highlighting extraordinary achievements in our community, service to the IEEE Sensors Council, as well as conference awards. This is just a sampling of the exciting things happening this week; please refer to the full online program for complete details.

Our conference this year received a total of 568 submissions, of which 333 will be presented during the conference. Of these accepted submissions, 159 will be presented during oral presentation sessions, and the remainder will be presented as posters. All contributed papers went through an identical peer-review process; finally accepted papers will be published in the Conference Proceedings, available electronically on IEEE Xplore. Submissions were from academia (86.6%), research facilities and government laboratories (5.1%), industry (6.5%), and other (0.7%). The submitted papers came from all global regions, with about 35% from Europe, 41.4% from Asia/Pacific, 21.7% from North America and about 2% from Latin America and Middle East/Africa.

We are honored to have you participating in IEEE SENSORS 2021. We hope that you will learn, share, expand your network, and have a great time! We look forward to your feedback on this event and we hope to see you – physically – in Dallas (2022), Vienna (2023), and Kobe (2024)!

With some good fortune, we will be able to hold an IEEE SENSORS meeting in Sydney in the not-too-distant future.

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Track 1: Sensor Phenomenology, Modeling and Evaluation
Octavian Postolache, *Instituto de Telecomunicacoes, IT-IUL*
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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*

16.1: Emerging wearable sensors and systems
Hun Cao, *Southern Methodist University*
Etcetera.

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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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!

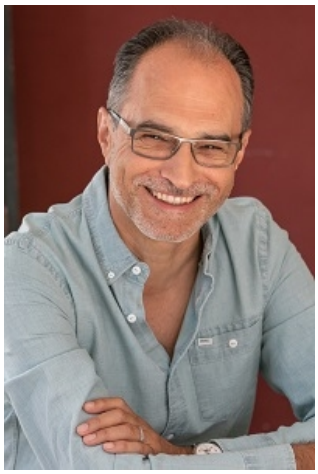
KEYNOTE SPEAKERS

" ‘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 nano-electronic 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.

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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	Roozbeh 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, *Zurich Instruments* Maria Dimaki, *Zurich Instruments*
13:00 – 14:00	Young Professionals Reception
13:30 – 14:45	Signal Processing for IoT – Decision Fusion in Sensor Networks Pierluigi Salvo Rossi, *University of Naples "Federico II", Italy* Domenico Ciuonzo, *University of Naples, Federico II, Italy* Pramod K. Varshney, *Director of CASE: Center for Advanced Systems and Engineering, USA*
15:00 – 16:30	Sensing using THz radiation Michael Shur, *Rensselaer Polytechnic Institute, USA*

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: Justin Gooding							
11:30 – 12:00	Exhibitor Presentations							
12:00 – 13:30	A1L-01: Microwave Sensors Applied in Medicine & Materials Science	A1L-02: Chemical, Electrochemical & Gas Sensors I	A1L-03: Acoustic & Ultrasonic Transducers	A1L-04: Sensor Packaging (including on Flexible Materials)	A1L-05: Sensor Networks (IoT)	A1L-06: Power Sources & Actuators I	A1L-07: Emerging Wearable Sensors & Systems I	A1L-08: Microfluidics & Biosensors I
13:30 – 14:30	Poster Sessions A2P-10 – A2P-15 & Exhibitors							
14:30 – 15:00	Social & Networking							

PROGRAM GRID – TUESDAY, NOVEMBER 2

All times listed in UTC

10:00 – 11:00	Social & Networking							
11:00 – 12:30	B1L-01: Optical Sensors I	B1L-02: Chemical, Electrochemical & Gas Sensors II	B1L-03: Inertial, Magnetic & Pressure Sensors	B1L-04: Sensor Systems I	B1L-05: Emerging Sensor Applications I	B1L-06: Sensor Data Processing I (Soft Sensors)	B1L-07: Emerging Sensors & Sensing Systems for Underground Infrastructure	B1L-08: Sensor Phenomenology I
12:30 – 14:30	WiSE Keynote Speakers FUNCTIONAL NANOMATERIALS AND DEVICES FOR BIOMEDICAL SENSING APPLICATIONS *Sohini Kar-Narayan* *SENSE AND SENSIBILITY: WHY DIVERSITY MATTERS* *Cathy Foley* ENVIRONMENTAL MONITORING VIA METAL OXIDES NANOSTRUCTURES CHEMICAL SENSORS *Elisabetta Comini* SELF-POWERED ELECTRONIC SKIN *Haixia Zhang*							
14:30 – 15:30	Poster Sessions B2P-10 – B2P-15 & Exhibitors							
15:30 – 16:00	Social & Networking							

PROGRAM GRID – WEDNESDAY, NOVEMBER 3

All times listed in UTC

10:00 – 11:30	Young Professional (YP) Technical Session				Social & Networking			
11:30 - 12:00	Sensors Council Awards							
12:00 – 13:30	C1L-01: Microwave Sensors for Industrial & Commercial Applications	C1L-02: Chemical, Electrochemical & Gas Sensors III	C1L-03: Tactile & Strain Sensors	C1L-04: Sensor Systems II	C1L-05: Sensor Networks (IoT) II	C1L-06: Sensor Materials, Processing & Fabrication I	C1L-07: Emerging Wearable Sensors & Systems II	C1L-08: Microfluidics & Biosensors II
13:30 – 14:00	Exhibitor 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							

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	D1L-02: Chemical, Electrochemical & Gas Sensors IV	D1L-03: Temprature Sensors & Others	D1L-04: Sensor Systems III	D1L-05: Emerging Sensor Applications II	D1L-06: Sensor Data Processing II (Navigation & Positioning)
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					

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

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

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
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

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
Liangqi 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 Farooq, 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 & Guozhen Liu, University of New South Wales

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 Iida{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
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: Guozhen Liu, The Chinese University of Hong Kong & 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

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: Valentina Zega, 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

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

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 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: 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
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}STMicroelectronics, 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 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

C2P-11-3
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
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

C2P-11-9
Gas sensing properties of CuO bundles network synthesized in liquid phase
Rutuja Bhusaria{1},, Jean-Sébastien Thomann{2},Renaud Leturcq{2}
{1}, Materials Research and Technology Department, Luxembourg Institute of Science and Technology, {2}Luxembourg University of Luxembourg, Luxembourg

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-14-8
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
STMicroelectronics Imaging Sub-Group, France; STMicroelectronics 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 Jaques{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

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: Valentina Zega, Politecnico di Milano

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 Technology, 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 Wu, 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.

D2P-11-11
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

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} American University in Cairo, Egypt; {2} Ain Shams University, 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