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# IEEE SENSORS 2020 Track Chairs

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## Track 3: Chemical, Electrochemical and Gas Sensors

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## Track 4: Microfluidics and Biosensors

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## Track 5: Optical Sensors

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

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**Boris Stoeber,** The University of British Columbia, Canada

## Track 7: Acoustic and Ultrasonic Sensors

**Sheng-Shian Li,** National Tsing Hua University, Taiwan

**Krishnan Balasubramaniam,** Indian Institute of Technology Madras, India

## Track 8: Sensor Packaging (including on Flexible Materials)

**R. Ravi Selvaganapathy,** McMaster University, Canada **Eric MacDonald,** Youngstown State University, USA

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

**Jorge Sá Silva,** University of Coimbra, Portugal
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## Track 10: Emerging Sensor Applications

**Volker Nock,** University of Canterbury, New Zealand

**Pal Varga,** Budapest University of Technology and Economics, Hungary

## Track 11: Sensor Systems: Signals, Processing and Interfaces

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**Michael Daniele,** NC State University, USA

## Track 12: Actuators and Sensor Power Systems

**Xiaohong (Ellen) Wang,** Tsinghua University, China

**Andrew Holmes,** Imperial College, UK

## Track 13: Sensors in Industrial Practices (Only for industry i.e. first author from industry)

**István Gódor,** Ericsson Research, Hungary
**Stoyan Nihtianov,** Delft University of Technology, The Netherlands

## Track 14: Live Demonstration of Sensors and Sensing Technologies

**Tao Li,** U. Cincinatti, US
**Behraad Bahreyni,** Simon Fraser University, Ca

## Track 15: Focus Sessions

**Chris Roberts,** University of Texas at El Paso, USA
**Ashwin Seshia,** University of Cambridge, UK

## Track 16: Sensors Letters/Sensors Journal

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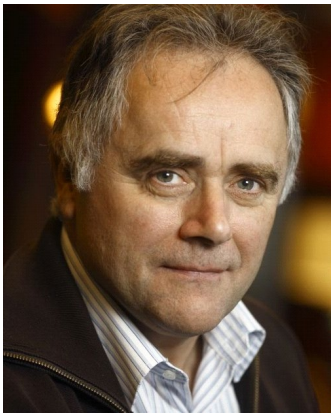
The IEEE Sensors Council's YouTube Channel is growing!

*Because of the parallel sessions, IEEE SENSORS 2020 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

### "DEEP-TRENCH ISOLATION : THE HOLY GRAIL FOR IMAGE SENSORS?"



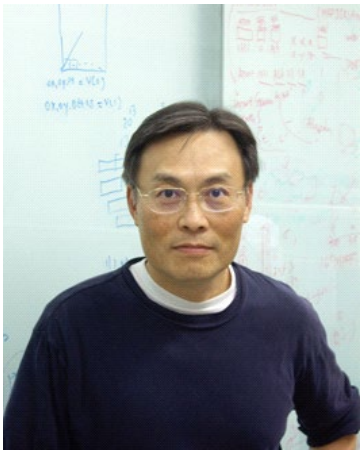
**Albert Theuwissen,** Professor, Harvest Imaging & Professor TU Delft

For many years, pixel size shrinkage was the main R&D focus in the field of CMOS image sensors (CIS). The innovations have been mainly driven by the mobile phone industry. However, a pixel size of 1 um seemed to be the lower limit of what could be mass-fabricated in a CMOS image sensor process, maintaining a low cost and maintaining a decent performance. Recently Deep Trench Isolation (DTI) was introduced in the CIS production process. This opened a completely new horizon for smaller pixels and/or higher performance pixels, without sacrificing performance. Pixel shrinkage re-continued and 0.5 um seems to become the new target.

An overview will be given of the DTI developments needed to implement this technology in CIS without creating negative effects on the pixel performance (optical effects, electrical effects, leakage current, etc). But now that the DTI technology is made CIS compatible, new dimensions and new features can be added to CMOS image sensors. Examples are wide dynamic range (for automotive and industrial applications), enhanced near-IR sensitivity (for distance measurements and security applications), vertical photodiodes (fabricated in the third dimension), image sensors stacked to a processing die, global shutter pixels, etc. The various new applications will be reviewed in the presentation, together with a future outlook of what CMOS image sensors can bring : Will the main CIS focus still be the consumer stuff? Will the mobile phone industry remain the driving force behind CIS innovation?

## Keynote Speakers

### "Developing anti-SARS-CoV-2 nucleocapsid protein antibodies with phage-displayed synthetic antibody libraries designed with computational methods"



**An-Suei Yang**, Professor, Genomics Research Center, Academia Sinica, Taipei, Taiwan

The SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) outbreak in late-2019 in Wuhan China has led to global COVID-19 (coronavirus infectious disease 2019) pandemic, declared by the World Health Organization in March 11, 2020. During the outbreak of infectious diseases, tests to detect infected patients are urgently needed. RT-PCR-based detection of viral genetic materials and antibody IgG and IgM responding to the pathogen infection in human blood can be deployed quickly once the pathogen's genome sequence become known, but the downsides of these tests limit the broad deployment of the PCR-based tests, or do not provide information on the real-time contagiousness of the pathogen infection in the antibody tests. A third kind of test based on lateral flow immunoassay (LFIA) on viral antigens could provide infection information for disease treatment and prevention without additional facility and instrumentation with turnaround times of 15-20 minutes – much like existing rapid influenza diagnostic tests, and is of particular value for infectious disease outbreak control in regions of insufficient resources. The key component of the LFIA for an antigen is the capture and detection antibody pair binding the target antigen with high affinity and specificity on two distinctively separate epitopes on the antigen. Because attaining suitable antibodies could be time-consuming and labor/cost-intensive, the LFIA devices are usually the most difficult to achieve rapidly among the three kinds of tests. Facing the challenge, we generated antibodies in IgG form that recognize both SARS-CoV-2 and the original SARS-CoV nucleocapsid (N) proteins. None of the IgGs bind the N protein of other human coronavirus strains. Our group accomplished antibody discoveries in 19 days, by working with our phage-displayed synthetic antibody libraries1, which had been designed with artificial intelligence models trained on antibody-antigen interactions2, constructed with chemically synthesized DNA, and expressed and then stored with phage display systems3. The antibody discovery processes were carried out in bacterial cultures, without need for animal facilities, thus mitigating time, material and environmental costs while enabling successful development of useful monoclonal antibodies. After completing the anti-N protein IgG development, our group completed a LFIA device prototype within one month. This work establishes a technological platform for rapidly developing LFIA devices in responding not only to the current COVID-19 pandemic but also in managing other infectious disease outbreaks in humans and animals. Indeed, we applied the technological platform to develop LFIA devices for avian influenza virus antigen in 2016 (manuscript submitted) and for African swine fever virus antigen in 2019 (manuscript in preparation). Developing solutions in responding to the challenges from the COVID-19 pandemic, we have demonstrated that the phage-displayed synthetic antibody libraries designed with computational methodologies could drive innovations in treating and preventing diseases.

## Keynote Speakers

### "SENSING IN 3D PRINTED MULTI-FUNCTIONAL STRUCTURES"

**Eric MacDonald,** Professor, Mechanical Engineering, The University of Texas at El Paso

3D printing has been historically relegated to fabricating conceptual models and prototypes; however, increasingly, research is now focusing on fabricating functional end-use products. As patents for 3D printing expire, new low-cost systems are being adopted more widely and this trend is leading to a diversity of new applications, processes and available materials. However, currently the technology is generally confined to fabricating single-material structures. For additively-manufactured products to be economically meaningful, sensing is required to be incorporated (printed directly or robotically placed) to provide electronic, electromechanical, electromagnetic, thermodynamic, chemical and optical content. By interrupting the 3D printing and employing complementary manufacturing processes, additional functional content can be included in mass-customized structures. This presentation will review work in multi-process 3D printing for creating structures with embedded sensors for anatomy-specific wearable electronics, electromagnetics, propulsion, embedded sensors in soft tooling and even in metal and ceramic structures

## Invited Speakers

| Track ID | Track Name | Name | Paper Title |
|---|---|---|---|
| 1 | Sensor Phenomenology, Modeling and Evaluation | Antti Vehkaoja | Effect of skin tone and activity to the performance of wrist-worn optical beat-to-beat heart rate monitoring |
| 2 | Sensor Materials, Processing and Fabrication (including Printing | Sam Emaminejad | Emerging Wearable Bioelectronics: Creating a New Era of Personalized Medicine |
| 3 | Chemical, Electrochemical and Gas Sensors | Jonhn Atkinson | The use of printing technology for the production of potentiometric and amperometric chemical sensors |
| 4 | Microfluidics and Biosensors | Omer Inan | Multi-Modal Local Physiological Sensing at the Intravenous Catheter Insertion Site |
| 5 | Optical Sensors | Sahin Ozdemir | Sensing at Exceptional Points |
| 6 | Physical Sensors - Temperature, Mechanical, Magnetic and Others | Johannes Classen | Evolution of Bosch Inertial Measurement Units for Consumer Electronics |
| 7 | Acoustic and Ultrasonic Sensors | Amit Lal | CMOS integrated Gigahertz Ultrasonic Sensors and Actuators |
| 8 | Sensor Packaging (including on Flexible Materials) | Shweta Agarwala | Printing Conformal Electronics on Unconventional Substrates: Emergence of new class of devices |
| 9 | Sensor Networks (including IoT and related areas) | Guoyi Xu | Indoor Object Sensing Using Radio-Frequency Identification with Inverse Solutions |
| 10 | Emerging Sensor Applications | Steve Mann | Sensing of the Self, Society, and the Environment |
| 11 | Sensor Systems: Signals, Processing and Interfaces | Tomoki Uno | Detection of Chemical Trail on the Floor by Mobile Robot: Using Fans to Enhance Chemical Reception at Gas Sensors |
| 12 | Actuators and Sensor Power Systems | Xin Zhang | Functional metamaterials enabled by microsystems |
| 13 | Sensors in Industrial Practices (Only for industry i.e. first author from industry) | Holger Rumpf | Laser Reseal – Combination of Accelerometer and Gyroscope Sensors in a Single MEMS Chip |
| 15.1 | Emerging Technologies for Flexible and Printed Energy Autonomous Sensing Systems | Francisco Molina-Lopez | Emerging Thermoelectric Generators Based on Printed and Flexible Electronics Technology |
| 15.2 | Sensor Systems for Assisted Living and Effective Telehealth | Steve Xu | Advanced, Bio-Integrated Sensors for Older Adults: COVID-19 and Beyond |
| 15.3 | Sensors and Sensor Systems for AgriFood and Connected Farming | Yosi Shacham-Diamand | A Study on the Dielectric Behaviour of Plant Cell Suspensions using Wideband Electrical Impedance Spectroscopy (WB-EIS) |
| 15.4 | Quantum Sensors | Milos Nesladek | Quantum Sensing with Diamond Electron and Nuclear Spin Qubits |
| 15.5 | Bioresorbable and Biodegradable Sensors | Guiseppe Barillaro | Bioresorbable and Biodegradable Electronics and Photonics |

## Program Grid – Sunday, October 25

**All times listed in UTC +1**

| | | |
|---|---|---|
| 14:00 - 15:30 | **Tutorial Track 1: Optical Sensing**<br>"Distributed Optical Fibre Sensing: Can a single strand of optical fibre replaces 100,000 sensors?"<br>Ali Masoudi | **Tutorial Track 2: Printed, flexible, and mobile sensing**<br>"Flexible and Printed Sensors: Materials, Technology and Selected Applications"<br>Sharmistha Bhadra |
| 15:30 - 16:00 | **BREAK** | |
| 16:00 - 17:30 | **Tutorial Track 1: Optical Sensing**<br>"Handheld Near-Infrared Spectroscopy: Realistic Quality Control and Protection against Product Counterfeiting versus Empty Promises"<br>Heinz W. Siesler | **Tutorial Track 2: Printed, flexible, and mobile sensing**<br>"Getting most out of your SENSORS: Mixed-Methods Research Methodology Enabling Identification, Modelling and Predicting Human Aspects of Mobile Sensing "In the Wild"<br>Katarzyna Wac & Alexandre De Masi |
| | | |

## Program Grid – Monday, October 26

**All times listed in UTC +1**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11:30 - 12:00 | **Digital Conference Brunner / Meet & Greet** | | | | | | |
| 12:30 - 14:00 | A1L-01: Sensor Systems: Signals, Processing & Interfaces I | A1L-02: Physical Sensors: Inertial & Resonant Devices | A1L-04: Chemical, Electrochemical & Gas Sensors I | A1L-05: Sensor Networks I | A1L-06: Emerging Sensor Applications I | Poster A1 | |
| 14:00 - 14:30 | Opening & Welcome // S2021 Announcement | | | | | | |
| 14:30 - 15:30 | **Keynote 1** | | | | | | |
| 15:30 - 16:30 | Lunch / Panel Discussion | | | | | | |
| 16:30 - 18:00 | A2L-01: Acoustic & Ultrasonic Transducers | A2L-02 Microfluidics & Biosensors I | A2L-04 Sensor Phenomenology I | A2L-05 Optical Sensors I | A2L-06 Sensor Materials, Processing & Fabrication (including Printing) I | A2L-07 Sensors for AgriFood & Connected Farming I | Poster A2 |
| 17:30 - 18:30 | **Young Professionals** | | | | | | |

## Program Grid – Tuesday, October 27

**All times listed in UTC +1**

| | | | | | | |
|---|---|---|---|---|---|---|
| 12:00 - 12:30 | **Digital Conference Brunner / Meet & Greet** | | | | | |
| 12:30 - 14:00 | B1L-01: Sensor Systems: Signals, Processing & Interfaces II | B1L-02: Sensors in Industrial Practices I | B1L-04: Chemical, Electrochemical & Gas Sensors III | B1L-05: Sensor Networks II | B1L-06: Emerging Sensor Applications II | B1P-08: Live Demonstrations |
| 14:00 - 14:30 | Break / Sensor Council Awards | | | | | |
| 14:30 - 15:30 | **Keynote 2** | | | | | |
| 15:30 - 16:30 | Lunch / Industry Panel Discussion | | | | | |
| 16:30 - 18:00 | B2L-01: Sensor Systems: Signals, Processing & Interfaces III | B2L-02: Physical Sensors: Mechanical Sensors | B2L-04: Packaging I | B2L-05: Sensors for AgriFood & Connected Farming II | B2L-06: Quantum Sensors | Poster B2 |

## Program Grid – Wednesday, October 28

**All times listed in UTC +1**

| | | | | | | |
|---|---|---|---|---|---|---|
| 12:00 - 12:30 | **Digital Conference Brunner / Meet & Greet** | | | | | |
| 12:30 - 14:00 | C1L-01: Actuators & Sensor Power Systems I | C1L-02: Microfluidics & Biosensors II | C1L-04: Sensor Phenomenology II | C1L-05: Wearable Sensors for Telemedicine | C1L-06: Emerging Technologies for Flexible & Printed Energy Autonomous Sensing Systems I | Poster C1 |
| 14:00 - 14:30 | Break / / Conference Awards | | | | | |
| 14:30 - 15:30 | **Keynote 3** | | | | | |
| 15:30 - 16:30 | Lunch / Panel Discussion | | | | | |
| 16:30 - 18:00 | C2L-01: Sensor Systems: Signals, Processing & Interfaces IV | C2L-02: Physical Sensors: Magnetic & Electric Devices | C2L-04: Bioresorbable & Biodegradable Sensors | C2L-05: Optical Sensors II | C2L-06: Emerging Sensor Applications III | Poster C2 |

IEEE SENSORS 2020
WTC, Rotterdam, The Netherlands October 25-28, 2020

## Live DEMOnstrations

This year's program will include Live Demonstrations. Demos give attendees the opportunity to have an interactive experience with new technological devices. Demonstrations will reveal the essence of the research and provide further understanding for attendees.

Demos will be on Tuesday, October 27 at 12:30. The number preceding the demo indicates the demo position on the layout.

**12:30 – 14:00**

**B1P-08: LIVE DEMONSTRATION**
**Session Chairs: Behraad Bahreyni, Simon Fraser University & Tao Li, University of Cincinnati**

**B1P-08-1**
**LIVE DEMONSTRATION: SENCU - A POWER-EFFICIENT SENSOR SYSTEM**

*Ssu-Ying Chen, Chih-Chyau Yang, Fu-Cheng Cheng, Yu-An Kuo, Jin-Ju Chue, Chen-Chia Chen, Chien-Ming Wu, Chun-Ming Huang*
*Taiwan Semiconductor Research Institute, Taiwan*

**B1P-08-2**
**LIVE DEMONSTRATION: PASSIVE SENSOR SETUP FOR ROAD CONDITION MONITORING**

*Felix Kortmann{1}, Julin Horstkötter{1}, Alexander Warnecke{1}, Nicolas Meier{2}, Jens Heger{2}, Burkhardt Funk{2}, Paul Drews{2}*
*{1}HELLA GmbH & Co. KGaA, Germany; {2}Leuphana University Luxneburg, Germany*

**B1P-08-3**
**DYNAMIC GRIP-FORCE CONTROL USING REAL-TIME FRICTION ESTIMATION FROM INCIPIENT SLIP EVENTS**

*Heba Khamis{2}, Benjamin Xia{2}, Stephen Redmond{1}*
*{1}University College Dublin, Ireland; {2}UNSW Sydney, Australia*

**B1P-08-4**
**LIVE DEMONSTRATION: A TRIMODAL TIME-OF-FLIGHT CAMERA FEATURING MATERIAL SENSING**

*Miguel Heredia Conde{2}, Thomas Kerstein{1}, Bernd Buxbaum{1}, Otmar Loffeld{2}*
*{1}pmdtechnologies ag, Germany; {2}University of Siegen, Germany*

12:30 – 14:00

**A1L-01: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES I**
**Session Chair: Patrick K. Kroh, Friedrich-Alexander-Universit Erlangen-Narnberg**

12:30

**DETECTION OF CHEMICAL TRAIL ON THE FLOOR BY MOBILE ROBOT: USING FANS TO ENHANCE CHEMICAL RECEPTION AT GAS SENSORS**

*Tomoki Uno{2}, Maki Sawano{2}, Haruka Matsukura{1}, Hiroshi Ishida{2}*
*{1}Osaka Univrsity, Japan; {2}Tokyo University of Agriculture and Technology, Japan*

13:00

**SMART SENSORS HW/SW INTERFACE BASED ON BRAIN-ACTUATED PERSONAL CARE ROBOT FOR AMBIENT ASSISTED LIVING**

*Giovanni Mezzina, Daniela De Venuto*
*Politecnico di Bari, Italy*

3:15

**AUTONOMOUS NEURO-NAVIGATION SYSTEM FOR NEUROSURGICAL ROBOTICS**

*Pon V Deepika{1}, Sriram Marisetty{1}, Pavan Kumar Reddy{1}, Vinay C K{1}, Srikanth T K{1}, Vikas Vazhayil{2}, Madhav Rao{1}*
*{1}IIIT-Bangalore, India; {2}NIMHANS, India*

13:30

**TOWARDS A COMPACT, HIGH-SPEED OPTICAL LINK-BASED 3D OPTOACOUSTIC IMAGER**

*Çağla Özsoy, Andrea Cossettini, Pascal Hager, Sergei Vostrikov, Xosé Luís Deán-Ben, Luca Benini, Daniel Razansky*
*ETH Zurich, Switzerland*

13:45

**A COMPACT AND INFRASTRUCTURE-FREE CONFINED SPACE SENSOR FOR 3D SCANNING AND SLAM**

*Daqian Cheng{2}, Haowen Shi{2}, Michael Schwerin{2}, Michelle Crivella{1}, Lu Li{2}, Howie Choset{2}*
*{1}Boeing Research & Technology, United States; {2}Carnegie Mellon University, United States*

12:30 – 14:00

**A1L-02: PHYSICAL SENSORS: INERTIAL & RESONANT DEVICES**
**Session Chair: Boris Stoeber, The University of British Columbia**

12:30

**EVOLUTION OF BOSCH INERTIAL MEASUREMENT UNITS FOR CONSUMER ELECTRONICS**

*Johannes Classen{1}, Florian Kult{1}, Dušan Radović{1}, Thomas Zebrowski{1}, Amin Jemili{1}, Andrea Visconti{1}, Chinwuba Ezekwe{3}, Alexander Buhmann{2}, Manuel Dietrich{2}, Axel Grosse{2}, Robert Maul{2}, Carsten Geckeler{2}, Rudy Eid{2}*

*{1}Bosch Sensortec GmbH, Germany; {2}Robert Bosch GmbH, Germany; {3}Robert Bosch LLC, United States*

13:00

**50-KHZ MEMS GYROSCOPES BASED ON NEMS SENSING WITH 1.3 MDPS/√HZ ARW AND 0.5 °/H STABILITY**
*Marco Gadola{1}, Federico Maspero{1}, Giacomo Langfelder{1}, Marc Sansa{2}, Thierry Verdot{2}, Audrey Berthelot{2}, Philippe Robert{2}*
*{1}Politecnico di Milano, Italy; {2}Univ. Grenoble Alpes, CEA, LETI, France*

13:15

**MEMS REAL-TIME CLOCKS BASED ON EPITAXIAL POLYSILICON: SYSTEM-LEVEL REQUIREMENTS AND EXPERIMENTAL CHARACTERIZATION**
*Giorgio Mussi{1}, Paolo Frigerio{1}, Gabriele Gattere{2}, Giacomo Langfelder{1}*
*{1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy*

13:30

**A NOVEL THERMAL PIEZORESISTIVE COUPLED RESONATOR IMPLEMENTING MODE LOCALIZATION FOR MASS SENSING**
*Shashwat Bhattacharya, Jyoti Satija, Shyam Trivedi, Sheng-Shian Li*
*National Tsing Hua University, Taiwan*

13:45

**OPTICAL FIBER-TIP HEAT SENSOR FEATURING A MULTIPOSITIONAL FABRY–PÉROT CAVITY RESONATOR**
*Jeremiah Williams{2}, Jonathan Smith{2}, Joseph Suelzer{1}, Nicholas Usechak{1}, Hengky Chandrahalim{2}*
*{1}Air Force Research Laboratory, United States; {2}The US Air Force Institute of Technology, United States*

12:30 – 14:00

**A1L-04: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS I**
**Session Chairs: Marios Sophocleous, University of Cyprus & Thomas Thundat, University of Buffalo**

12:30

**THE USE OF PRINTING TECHNOLOGY FOR THE PRODUCTION OF POTENTIOMETRIC AND AMPEROMETRIC CHEMICAL SENSORS**
*John K Atkinson*
*University of Southampton, United Kingdom*

13:00

**3D ASSEMBLY OF WS2 NANOMATERIAL FOR H2S GAS SENSING APPLICATION**
*Aanchal Alagh{1}, Fatima Ezahra Annanouch{1}, Jean François Colomer{2}, Eduard Llobet{1}*
*{1}Universitat Rovira I Virgili, Spain; {2}University of Namur, Belgium*

13:15

**A NEW DUAL RF SENSOR IN GAS DETECTION AND HUMIDITY INFLUENCE**
*Julien George{4}, Hamida Hallil{2}, Corinne Dejous{1}, Eric Cloutet{3}, Aurelien Perigaud{4}, Stephane Bila{4}, Dominique Baillargeat{4}*
*{1}Univ. Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; {2}Univ. Bordeaux, Bordeaux INP, CNRS, IMS, UMR 5218, France; {3} Université de Bordeaux, LCPO, UMR 5629, France; {4}University of Limoges, CNRS, XLIM UMR 7252, France*

13:30

**ULTRA-HIGH SENSITIVE SERS GAS SENSOR TO DETECT GEOSMIN**
*Lin Chen{1}, Noriko Shiramatsu{1}, Bin Chen{1}, Fumihiro Sassa{1}, Shoichi Sameshima{3}, Tatsuya Seki{2}, Kenshi Hayashi{1}*
*{1}Kyushu University, Japan; {2}Meiden Aqua Business Company, Japan; {3}Meidensha Corporation, Japan*

13:45

**AU NANOFLOWERS MODIFIED MAGNETIC AND FLEXIBLE BIOSENSOR FOR BISULFITE-FREE HCC GLOBAL DNA METHYLATION DETECTION**
*Bobo Huang, Yitao Liang, Bin Zhang, Qingpeng Cao, Tingting Tu, Xuesong Ye, Bo Liang*
*Zhejiang University, China*

12:30 – 14:00

**A1L-05: SENSOR NETWORKS I**
**Session Chairs: Binbin Chen, Singapore University Of Technology and Design & Jorge Sá Silva, University of Coimbra**

12:30

**INDOOR OBJECT SENSING USING RADIO-FREQUENCY IDENTIFICATION WITH INVERSE SOLUTIONS**
*Guoyi Xu, Pragya Sharma, Edwin C. Kan*
*Cornell University, United States*

13:00

**RESPIRE: ROBUST SENSOR PLACEMENT OPTIMIZATION IN PROBABILISTIC ENVIRONMENTS**
*Onat Gungor{3}, Tajana Simunic Rosing{2}, Baris Aksanli{1}*
*{1}San Diego State University, United States; {2}University of California San Diego, United States; {3}University of California San Diego & San Diego State University, United States*

13:15

**DISTRIBUTED MEASUREMENT OF LIGHT CONDITIONS FOR INDOOR PHOTOVOLTAIC APPLICATIONS**
*Sebastian Bader, Xinyu Ma, Bengt Oelmann*
*Mid Sweden University, Sweden*

13:30

**SOLAR-POWERED CRYSTAL-FREE 802.15.4 WIRELESS TEMPERATURE SENSOR**
*Alex Moreno{2}, Austin Patel{2}, Titan Yuan{2}, Andrew Fearing{2}, Jan Rentmeister{1}, Jason Stauth{1}, Kristofer Pister{2}*
*{1}Dartmouth College, United States; {2}University of California, Berkeley, United States*

12:30 – 14:00

**A1L-06: EMERGING SENSOR APPLICATIONS I**
**Session Chair: Rolland Vida, Budapest University of Technology and Economics**

12:30

**SENSING OF THE SELF, SOCIETY, AND THE ENVIRONMENT**
*Steve Mann, Cayden Pierce, Aman Bhargava, Christopher Tong, Khantil Desai, Kyle O'Shaughnessy*
*MannLab Canada, Canada*

13:00

**INTERNET OF BIRDS (IOB): SONG BASED BIRD SENSING VIA MACHINE LEARNING IN THE CLOUD: HOW TO SENSE, IDENTIFY, CLASSIFY BIRDS BASED ON THEIR SONGS?**
*Krista Nagy, Tibor Cinkler, Csaba Simon, Rolland Vida*
*BME-TMIT, Hungary*

13:15

**CHARACTERIZING AND OPTIMIZING PIEZO HARVESTERS FOR TRAIN INTERIORS**
*Milan Saliya, Nikolaos Kouvelas, R. Venkatesha Prasad, Niels Hokke*
*TU Delft, Netherlands*

13:30

**ESPORTS PLAYERS PROFESSIONAL LEVEL AND TIREDNESS PREDICTION USING EEG AND MACHINE LEARNING**
*Nikita Melentev{3}, Andrey Somov{3}, Evgeny Burnaev{3}, Irina Strelnikova{1}, Galina Strelnikova{1}, Elizaveta Melenteva{2}, Alexander Menshchikov{3}*
*{1}Moscow State Academy of Physical Education, Russia; {2}Pirogov Russian National Research Medical University, Russia; {3}Skoltech, Russia*

13:45

**ALGORITHM-CIRCUIT CROSS-LAYER CONTROL FOR DIGITAL PIXEL IMAGE SENSORS**
*Mandovi Mukherjee, Burhan Ahmad Mudassar, Minah Lee, Saibal Mukhopadhyay*
*Georgia Institute of Technology, United States*

12:30 – 14:00

## A1P-08: ACOUSTIC & ULTRASONIC SENSORS
**Session Chairs: Krishnan Balasubrama, Indian Institute of Technology Madras & Sheng-Shian Li, National Tsing Hua University**

**A1P-08-1**
**MODE IDENTIFICATION OF DENOISED SH GUIDED WAVES USING VARIATIONAL MODE DECOMPOSITION METHOD**
*Hongyu Sun{2}, Lisha Peng{2}, Songling Huang{2}, Shen Wang{2}, Qing Wang{1}, Wei Zhao{2}*
*{1}Durham University, United Kingdom; {2}Tsinghua University, China*

**A1P-08-2**
**HIGH-SENSITIVITY PHOTONIC CRYSTAL DIAPHRAGM BASED SAPPHIRE FABRY-PEROT ACOUSTIC SENSOR FOR HIGH-TEMPERATURE APPLICATIONS**
*Jiayan Wang, Weizheng Yuan, Zhibo Ma, Tongxin Guo*
*Northwestern Polytechnical University, China*

**A1P-08-3**
**PHASE SHIFT BASED LEVEL SENSING USING TWO GUIDED WAVE MODE T (0, 1) AND F(1,1) ON A THIN WAVEGUIDE**
*Nishanth Raja, Krishnan Balasubramanian*
*Indian Institute of Technology -Madras, India*

**A1P-08-4**

**THEORETICAL STUDY AND FINITE ELEMENT SIMULATION OF ZNO/GAAS HIGHER-ORDER LAMB WAVES FOR MICROSENSOR APPLICATION IN LIQUID MEDIA**
*Muhammad Hamidullah, Céline Élie-Caille, Thérèse Leblois*
*FEMTO-ST Institute, France*

**A1P-08-5**
**NUMERICAL ANALYSIS OF A TUBULAR PHONONIC CRYSTAL SENSOR**
*Abdellatif Gueddida{1}, Yan Pennec{1}, Stéphanie Hémon{1}, Frieder Lucklum{2}, Michael Vellekoop{2}, Nikolay Mukhin{4}, Ralf Lucklum{4}, Bernard Bonello{3}, Bahram Djafari-Rouhani{1}*
*{1}IEMN, France; {2}IMSAS, Germany; {3}INSP, France; {4}OVGU, Germany*

**A1P-08-6**
**ATTENUATION OF ULTRASONIC GUIDED WAVE ON BURIED ILLUMINATION PILLAR**
*Hiroyuki Nakamoto, Akiko Kaji*
*Kobe University, Japan*

**A1P-08-7**
**MEASUREMENTS OF MICROPHONE ARRAY PHASE AND AMPLITUDE BEHAVIOR TOWARDS CONTROLLABLE BEAMFORMING**
*Yiqi Jia, Bonnie Gray, Rodney Vaughan*
*Simon Fraser University, Canada*

**A1P-08-8**
**ENHANCED NON-CONTACT ULTRASONIC TESTING USING AN AIR-COUPLED OPTICAL MICROPHONE**
*Georg Kaniak{2}, Wolfgang Rohringer{2}, Matthias Brauns{2}, Nils Panzer{2}, Fabian Lücking{2}, Balthasar Fischer{2}, Sebastian Brand{1}, Christian Große{1}*
*{1}Fraunhofer Institute for Microstructure of Materials and Systems, Germany; {2}XARION Laser Acoustics GmbH, Austria*

**A1P-08-9**
**HYBRIDIZATION OF LOVE SURFACE ACOUSTIC WAVES IN SIO2/ST-QUARTZ STRUCTURE WITH RESONANT PILLARS GRAFTED ON THE META-SURFACE**
*Yuxin Liu{2}, Abdelkrim Talbi{2}, Cécile Ghouila-Houri {2}, El Houssaine El Boudouti{1}, Olivier Bou Matar{2}, Philippe Pernod{2}, Djafari Rouhani{2}*
*{1}LPMR, Department of Physics, Faculty of Sciences, University Mohammed I, Morocco; {2}Univ. Lille, CNRS, Centrale Lille, ISEN, Univ. Valenciennes, UMR 8520 - IEMN & LIA LICS/ LEMAC, France*

12:30 – 14:00

**A1P-09: MICROFLUIDICS & BIOSENSORS III**
**Session Chairs: Leandro Lorenzelli, Fondazione Bruno Kessler (FBK) & Lucanos Strambini, Consiglio Nazionale delle Ricerche - CNR**

**A1P-09-1**
**TRACKING OXYGEN CONSUMPTION IN 3D CELL CULTURES WITH PHOSPHORESCENT BIOSENSORS**
*Kristina Rivera{1}, Madison Craft{1}, Scott Magness{2}, Michael Daniele{1}*
*{1}North Carolina State University, United States; {2}Unviersity of North Carolina at Chapel Hill, United States*

**A1P-09-2**
**A NOVEL SWEAT RATE AND CONDUCTIVITY SENSOR PATCH MADE WITH LOW-COST FABRICATION TECHNIQUES**
*Annemarijn Steijlen, Jeroen Bastemeijer, Kaspar Jansen, Patrick French, Andre Bossche*
*Delft University of Technology, Netherlands*

**A1P-09-3**
**VERSATILE FABRICATION AND INTEGRATION METHOD OF OPTICAL OXYGEN SENSORS IN ORGAN-ON-CHIPS**
*Elsbeth Bossink, Juliëtte Slob, Dorothee Wasserberg, Loes Segerink, Mathieu Odijk*
*BIOS Lab on a Chip, University of Twente, Netherlands*

**A1P-09-4**
**QUANTIFICATION OF CEA FROM HUMAN PLASMA USING PLASMONIC ENHANCEMENT OF FLUORESCENCE AND ACOUSTIC STREAMING**
*Yuqi Huang, Venkat Bhethanabotla*
*University of South Florida, United States*

**A1P-09-5**
**MICROELECTRODE ARRAY DESIGNING FOR DUMMIES: CONTRIBUTION OF THE TRACKS TO THE IMPEDANCE BEHAVIOR AND THE NOISE LEVEL**
*Tomi Ryynänen, Pasi Kallio*
*Tampere University, Finland*

**A1P-09-6**
**MODELING AND DESIGN CONSIDERATIONS FOR RESISTIVE IMPEDANCE-BASED FLOW CYTOMETRY**
*Jacob Dawes, Jinwon Kim, Matthew Johnston*
*Oregon State University, United States*

**A1P-09-7**
**ROLE OF SHAPE OF GOLD NANOPARTICLES IN SENSING BIOMOLECULES USING RADIO-FREQUENCY BASED SENSORS**
*Annesha Mazumder, Syed Azeemuddin, Tapan Kumar Sau, Prabhakar Bhimalapuram*
*International Institute of Information Technology, Hyderabad, India*

12:30 – 14:00

## A1P-10: OPTICAL SENSORS III

**Session Chair: Minghong Yang, Wuhan University of Technology**

**A1P-10-1**
**THERMO-COUPLED TEMPERATURE SENSORS BY SEVEN-CORE MCF STRUCTURES**
*Farhan Mumtaz{2}, Yutang Dai{2}, Wenbin Hu{2}, Muhammad Aqueel Ashraf{1}, Shu Cheng{2}, Pu Cheng{2}*
*{1}Quaid-i-Azam University, Islamabad., Pakistan; {2}Wuhan University of Technology, China*

**A1P-10-2**
**STRAIN SENSING USING COLLOIDAL QUANTUM DOTS INTEGRATED WITH EPOXY**
*Michael Sherburne{2}, Candice Roberts{2}, John Brewer Jr.{2}, Thomas Weber{1}, Tod Laurvick{2}, Hengky Chandrahalim{2}*
*{1}Los Alamos National Laboratory, United States; {2}The US Air Force Institute of Technology, United States*

**A1P-10-3**
**A HIGH-SENSITIVITY OPTICAL MEMS ACCELEROMETER BASED ON SOI DOUBLE-SIDE MICROMACHINING**
*Ziqiang Qu{1}, Huafeng Liu{1}, Hao Ouyang{1}, Chenyuan Hu{1}, Liangcheng Tu{2}*
*{1}Huazhong University of Science and Technology, China; {2}Sun Yat-sen University, China*

**A1P-10-4**
**COPPER OXIDE COATED D-SHAPED OPTICAL FIBERS FOR THE DEVELOPMENT OF LMR REFRACTOMETERS**
*Aritz Ozcariz, Ignacio Vitoria, Francisco Javier Arregui, Carlos Ruiz Zamarreño*
*Public University of Navarra, Spain*

**A1P-10-5**
**NOISE REDUCTION EFFECT OF FOLDING-INTEGRATION ADC IN AN 8K IMAGE SENSOR DRIVEN AT VAIROUS FRAME RATES**
*Kohei Tomioka{1}, Toshio Yasue{1}, Ryohei Funatsu{1}, Kodai Kikuchi{1}, Tomoki Matsubara{1}, Takayuki Yamashita{1}, Shoji Kawahito{2}*
*{1}Japan Broadcasting Corporation (NHK) Science and Technology Research Laboratories, Japan; {2}Shizuoka University, Japan*

**A1P-10-6**
**LOSSY MODE RESONANCE SENSORS BASED ON TUNGSTEN OXIDE THIN FILMS**
*Ignacio Del Villar{2}, Dina Bohorquez{2}, Domenico Caputo{3}, Alessio Buzzin{3}, Francesco Chiavaioli{1}, Francesco Baldini{1}, Carlos R. Zamarreño{2}, Ignacio R. Matias{2}*
*{1}National Research Council of Italy CNR, Italy; {2}Public University of Navarra, Spain; {3}University of Rome, Italy*

**A1P-10-7**
**HYBRID SI ETCHING FOR PERFORMANCE ENHANCEMENT OF THE ATMOSPHERIC CMOS MEMS INFRARED SENSOR**
*Pen-Sheng Lin, Yijia Wang, Ming-Ching Cheng, Yu-Chen Chen, Yu-Cheng Huang, Weileun Fang*
*National Tsing Hua University, Taiwan*

**A1P-10-8**
**COMPREHENSIVE MODELING OF PHOTON DETECTION PROBABILITY IN CMOS-BASED SPADS**
*Saman Kohneh Poushi, Hiwa Mahmoudi, Bernhard Steindl, Michael Hofbauer, Horst Zimmermann*
*EMCE, Vienna University of Technology, Austria*

**A1P-10-9**

**A 1ST ORDER INCREMENTAL SIGMA-DELTA WITH REFINED DIGITALLY IMPLEMENTED FEED-FORWARD FOR 2-STAGE ADC**
*Toshio Yasue{2}, Fortunato Frazzica{5}, Annachiara Spagnolo{1}, David San Segundo Bello{3}, Maarten De Bock{4}, Piet Wambacq{1}, Jan Craninckx{1}*
*{1}imec, Belgium; {2}Japan Broadcasting Corporation, Japan; {3}Pyxalis, France; {4} Spectricity, Belgium; {5}Vrije Universiteit Brussel, Belgium*

**A1P-10-10**
**DYNAMIC RESPONSE OF GOLD-COATED OPTICAL FIBER SENSORS SUBJECTED TO VOLTAGE VARIATIONS**
*Asier Rodriguez-Garde{2}, Abian Bentor Socorro-Leranoz{1}, Maria Elena Martinez{2}, Javier Goicoechea{2}, Ignacio Raul Matias{2}*
*{1}Public University of Navarra, Spain; {2}Public University of Navarre, Spain*

**A1P-10-11**
**DEVELOPMENT OF AN OPTICAL SENSOR FOR THE NON-DESTRUCTIVE TESTING OF GRINDING BURN**
*Andras Kovacs, Isman Khazi, Ali Zahedi, Ulrich Mescheder, Bahman Azarhoushang*
*Hochschule Furtwangen University, Germany*

**A1P-10-12**
**AN ULTRAFAST ACTIVE QUENCHING CIRCUIT FOR SPAD IN CMOS 28NM FDSOI TECHNOLOGY**
*Mohammadreza Dolatpoor Lakeh{1}, Jean-Baptiste Kammerer{1}, Wilfried Uhring{1}, Jean-Baptiste Schell{1}, Francis Calmon{2}*
*{1}ICube, University of Strasbourg and CNRS, France; {2}Institut des Nanotechnologies de Lyon, UMR CNRS 5270, Université de Lyon, France*

12:30 – 14:00

## A1P-11: SENSOR MATERIALS, PROCESSING & FABRICATION (INCLUDING PRINTING)-II
**Session Chairs: Sone Masato, Tokyo Institute of Technology & Shubhra Gangopadhyay, National Science Foundation**

**A1P-11-1**
**CHARACTERIZATION OF HIGHLY-STRETCHABLE SCREEN-PRINTED LIQUID METAL PRESSURE SENSORS**
*Johanna Zikulnig{2}, Gregor Fritz{1}, Lukas Rauter{2}, Lisa-Marie Faller{1}*
*{1}Carinthia University of Applied Sciences, Austria; {2}Silicon Austria Labs GmbH, Austria*

**A1P-11-2**
**FLOW NOISE AROUND UNDERWATER AXISYMMETRIC MODELS WITH BIO-INSPIRED COATING**
*Zhonggang Zhang, Wei Gao, Shanzhong Wang, Binghe Ma, Jian Luo, Jinjun Deng*
*Laboratory of Micro/Nano Systems for Aerospace, Northwestern Polytechnical University, China*

**A1P-11-3**
**POLYSILICON THIN FILM DEVELOPED ON ULTRA-THIN FLEXIBLE GLASS FOR TEMPERATURE SENSOR**
*Juan Quintana, Thinh Nguyen, Chong Ahn*
*Microsystems and BioMEMS Laboratory, United States*

**A1P-11-4**
**COMPARISON OF REGENERATED FIBER BRAGG GRATINGS PROPERTIES IN STANDARD AND B/GE CO-DOPED SINGLE-MODE SILICA FIBERS**
*Nazila Safari Yazd, Karima Chah, Christophe Caucheteur, Patrice Mégret*
*University of Mons, Belgium*

**A1P-11-5**
**IN-SITU MONITORING OF LAYER-WISE FABRICATION BY ELECTRICAL RESISTANCE MEASUREMENTS IN 3D PRINTING**
*Alexander Dijkshoorn, Patrick Neuvel, Stefano Stramigioli, Gijs Krijnen*
*University of Twente, Netherlands*

**A1P-11-6**
**ELECTRICAL CHARACTERISATION OF ß-Ga2O3 SCHOTTKY DIODE FOR DEEP UV SENSOR APPLICATIONS**
*Douglas Vieira{1}, N Badiei{2}, Je Evans{2}, Neri Alves{3}, Jeff Kettle{1}, Lijie Li{2}*
*{1}Bangor University, United Kingdom; {2}Swansea University, United Kingdom; {3}UNESP, Brazil*

**A1P-11-7**
**THIOGLYCOLIC ACID FUNCTIONALIZED MOS2 BASED HG2+ AND CD2+ION DETECTION**
*Santanab Majumder, Avik Sett, Dipak K Goswami, Tarun K Bhattacrayya*
*IIT Kharagpur, India*

**A1P-11-8**
**3D-PRINTED CALORIMETRIC FLOW SENSOR**
*Gerjan Wolterink, Ameya Umrani, Martijn Schouten, Remco Sanders, Gijs Krijnen*
*University of Twente, Netherlands*

**A1P-11-9**
**A FACILE FABRICATION OF POROUS AND BREATHABLE DIELECTRIC FILM FOR CAPACITIVE PRESSURE SENSOR**
*Azmal Chowdhury, Iman Khakpour, Borzooye Jafarizadeh, Nezih Pala, Chunlei Wang*
*Florida International University, United States*

**A1P-11-10**
**EFFECT OF SURFACE MICROSTRUCTURE ON THE LONG-TERM ANTI-BACTERIAL PERFORMANCE FOR SLIPPERY LIQUID INFUSED POROUS SURFACES**
*Guangyi Cai, Qi Zeng, Tianzhun Wu*
*Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China*

**A1P-11-11**
**PEDOT:PSS HYDROGEL BASED FLEXIBLE ELECTRODES FOR WEARABLE ECG MONITORING**
*Shiyi Xu, Tianyu Li, Hangxu Ren, Xiyu Mao, Xuesong Ye, Bo Liang*
*Zhejiang University, China*

**14:00 – 14:30**

**OPENING & WELCOME // S2021 ANNOUNCEMENT**

**14:30 – 15:30**

**KEYNOTE TALK 1**

**15:30 – 16:30**

**LUNCH // PANEL DISCUSSION**

**16:30 – 18:00**

**A2L-01: ACOUSTIC & ULTRASONIC TRANSDUCERS**
**Session Chairs: Krishnan Balasubrama, Indian Institute of Technology Madras & Sheng-Shian Li, National Tsing Hua University**

**16:30**

**CMOS INTEGRATED GIGAHERTZ ULTRASONIC SENSORS AND ACTUATORS**
*Amit Lal*

**17:00**

**ULTRA-COMPACT CLAMP-ON LIQUID LEVEL SENSOR BASED ON A LOW-VOLTAGE CMUT**
*Fabian Merbeler{2}, Sebastian Anzinger{1}, Christian Bretthauer{2}, Mario Kupnik{3}*
*{1}Albert-Ludwigs Universität Freiburg, Germany; {2}Infineon Technologies AG, Germany; {3}Technischer Universität Darmstadt, Germany*

**17:15**

**POLYMER PMUT ARRAY FOR HIGH-BANDWIDTH UNDERWATER COMMUNICATIONS**
*Pieter Gijsenbergh, Alexandre Halbach, Yongbin Jeong, David Cheyns, Xavier Rottenberg, Veronique Rochus*
*IMEC, Belgium*

**17:30**

**EMBEDDED AIR-COUPLED ULTRASONIC 3D SONAR SYSTEM WITH GPU ACCELERATION**
*Gianni Allevato, Matthias Rutsch, Jan Hinrichs, Marius Pesavento, Mario Kupnik*
*Technische Universit Darmstadt, Germany*

**17:45**

**AI SPEAKER: A SCOPE OF UTILIZING SUBWAVELENGTH DIRECTIONAL SENSING OF BIO–INSPIRED MEMS DIRECTIONAL MICROPHONE**
*Ashiqur Rahaman, Byungki Kim*
*Korea University of Technology and Education, Korea*

16:30 – 18:00

**A2L-02: MICROFLUIDICS & BIOSENSORS I**
**Session Chairs: Giuseppe Barillaro, University of Pisa & Loes Segerink, University of Twente**

16:30

**MULTI-MODAL LOCAL PHYSIOLOGICAL SENSING AT THE INTRAVENOUS CATHETER INSERTION SITE**
*Samer Mabrouk{2}, Zahidee Rodriguez{1}, Subhendu De{1}, Kevin Maher{1}, Leanne West{3}, Lynn Pogue{1}, Amy Parker{1}, Adith Srivatsava{2}, Arjun Sonti{2}, Omer Inan{2}*
*{1}Childrens Healthcare of Atlanta, United States; {2}Georgia Institute of Technology, United States; {3}Georgia Tech Research Institute, United States*

17:00

**A DUAL LOVE WAVE AND IMPEDANCE-BASED SENSOR: RESPONSE ENRICHMENT**
*Maxence Rube{2}, Ollivier Tamarin{2}, Martine Sebeloue{2}, Hamida Hallil{1}, Laurent Linguet{2}, Dominique Rebiere{1}, Corinne Dejous{1}*
*{1}Université de Bordeaux - IMS, France; {2}University of French GUIANA, France*

17:15

**MEASURING THERMAL CONDUCTIVITY IN A MICROFLUIDIC DEVICE WITH THE TRANSIENT** *THERMAL OFFSET (TTO) METHOD*
*Gilles Oudebrouckx{1}, Thijs Vandenryt{1}, Seppe Bormans{1}, Patrick Wagner{2}, Ronald Thoelen{1}*
*{1}Hasselt University, Belgium; {2}KU Leuven, Belgium*

17:30

**ULTRA-HIGH FREQUENCY (500 MHZ) CAPACITANCE SPECTROSCOPY FOR NANOBIOSENSING**
*Andrea Cossettini{3}, Denis Brandalise{5}, Pierpaolo Palestri{6}, Alessandro Bertacchini{5}, Michele Ramponi{1}, Frans Widdershoven{4}, Luca Benini{2}, Luca Selmi{5}*
*{1}Active Technologies S.r.l., Italy; {2}ETH Zurich, University of Bologna, Switzerland; {3} ETH Zurich, University of Udine, Switzerland; {4}NXP Semiconductors, Delft University of Technology, Netherlands; {5}University of Modena and Reggio Emilia, Italy*

17:45

**MONITORING FIBRIN POLYMERIZATION EFFECTS ON WHOLE BLOOD COAGULATION USING A** *MICROFLUIDIC DIELECTRIC SENSOR*
*Sina Pourang, Debnath Maji, Ujjal Sekhon, Anirban Sen Gupta, Michael Suster, Pedram Mohseni*
*Case Western Reserve University, United States*

16:30 – 18:00

**A2L-04: SENSOR PHENOMENOLOGY I**
**Session Chairs: Ravinder Dahiya, University of Glasgow & Shubhra Gangopadhyay, National Science Foundation**

16:30

**EFFECT OF SKIN TONE AND ACTIVITY ON THE PERFORMANCE OF WRIST-WORN OPTICAL BEAT-TO-BEAT HEART RATE MONITORING**
*Antti Puranen{2}, Tuomas Halkola{1}, Ole Kirkeby{1}, Antti Vehkaoja{2}*
*{1}PulseOn Oy, Finland; {2}Tampere University, Finland*

17:00

**DESIGN OF MICROWAVE SENSOR ARRAY FOR NEXT-GENERATION NEUTRINO MASS MEASUREMENTS**
*Mark Jones, Maurio Grando*
*Pacific Northwest National Laboratory, United States*

17:15

**INSTABILITIES DUE TO ELECTROSTATIC TUNING OF FREQUENCY-SPLIT IN CORIOLIS VIBRATORY GYROSCOPES**
*Daryosh Vatanparvar, Andrei Shkel*
*University of California, Irvine, United States*

17:30

**COMBINING PHYSICS-BASED SIMULATION AND MACHINE LEARNING FOR EIT-BASED TACTILE SENSING**
*Niccolò Biasi, Nicola Carbonaro, Lucia Arcarisi, Alessandro Tognetti*
*University of Pisa, Italy*

17:45

**ANALYSIS AND EXPERIMENT ON THE PARAMETRICALLY AMPLIFIED AND PUSH-PULL DRIVEN RESONATORS**
*Kai Wu, Kuo Lu, Qingsong Li, Yi Xu, Dingbang Xiao, Xuezhong Wu*
*National University of Defense Technology, China*

16:30 – 18:00

**A2L-05: OPTICAL SENSORS I**
**Session Chair: Hengky Chandrahalim, The US Air Force Institute of Technology**

16:30

**SENSING AT EXCEPTIONAL POINTS**
*Sahin Ozdemir*
*Pennsylvania State University, United States*

17:00

**F-TOUCH SENSOR FOR THREE-AXIS FORCES MEASUREMENT AND GEOMETRY OBSERVATION**
*Wanlin Li{2}, Yohan Noh{1}, Akram Alomainy{2}, Ivan Vitanov{2}, Yu Zheng{3}, Peng Qi{4}, Kaspar Althoefer{2}*
*{1}Brunel University London, United Kingdom; {2}Queen Mary University of London, United Kingdom; {3}Tencent, China; {4}Tongji University, China*

17:15

**FIBER CROSS-COUPLING MECHANISMS IN OPTICAL PRESSURE SENSOR ARRAYS**
*Christian-Alexander Bunge{1}, Jan Kallweit{2}, Levent Colakoglu{2}, Thomas Gries{2}*
*{1}Hochschule Technik, Wirtschaft und Kultur Leipzig (HTWK), Germany; {2}Institut of Textiltechnik, RWTH Aachen University, Germany*

17:30

**OPTICAL ABSORPTION SENSING WITH DUAL-SPECTRUM SILICON LEDS IN SOI-CMOS TECHNOLOGY**
*Satadal Dutta, Peter Steeneken, Gerard Verbiest*
*TU Delft, Netherlands*

17:45

**EVALUATION OF THE THERMAL RESPONSE OF LIVER TISSUE UNDERGOING MICROWAVE TREATMENT BY MEANS OF FIBER BRAGG GRATING SENSORS**
*Martina Zaltieri{1}, Elena De Vita{2}, Francesca De Tommasi{1}, Carlo Massaroni{1}, Eliodoro Faiella{1}, Bruno Beomonte Zobel{1}, Agostino Iadicicco{2}, Emiliano Schena{1}, Rosario Francesco Grasso{1}, Stefania Campopiano{2}*
*{1}Università Campus Bio-Medico di Roma, Italy; {2}University of Naples, Italy*

16:30 – 18:00

**A2L-06: SENSOR MATERIALS, PROCESSING & FABRICATION (INCLUDING PRINTING) I**
**Session Chairs: Shubhra Gangopadhyay, National Science Foundation & Sone Masato, Tokyo Institute of Technology**

16:30

**EMERGING WEARABLE BIOELECTRONICS: CREATING A NEW ERA OF PERSONALIZED MEDICINE**
*Sam Emaminejad*
*Track 2 Sensor Materials, Processing and Fabrication (including Printing), United States*

17:00

**FLEXIBLE GRAPHENE-ON-PDMS SENSOR FOR HUMAN MOTION MONITORING APPLICATIONS**
*Debarun Sengupta, Vigneshraj Muthuram, Ajay Giri Prakash Kottapalli*
*University of Groningen, Netherlands*

17:15

**HIGHLY SENSITIVE FLEXIBLE/STRETCHABLE SMART INSOLE PRESSURE SENSOR WITH MULTI-WALLED CARBON NANOTUBES AND POLYDIMETHYLSILOXANE DOUBLE-LAYER COMPOSITES**
*Jae Sang Heo{2}, Daniel Goldberg{1}, Edward Large{1}, Insoo Kim{2}*
*{1}University of Connecticut, United States; {2}University of Connecticut School of Medicine, United States*

17:30

**PDMS FLOW SENSORS WITH GRAPHENE PIEZORESISTORS USING 3D-PRINTING AND SOFT LITHOGRAPHY**
*Amar Kamat, Bayu Jayawardhana, Ajay Giri Prakash Kottapalli*
*University of Groningen, Netherlands*

17:45

**FABRICATION PROCESS FOR FREE-STANDING SMART HYDROGEL PILLARS FOR SENSING APPLICATIONS**
*Navid Farhoudi, Jules J. Magda, Florian Solzbacher, Christopher F. Reiche*
*University of Utah, United States*

16:30 – 18:00

**A2L-07: SENSORS FOR AGRIFOOD & CONNECTED FARMING I**
**Session Chairs: Marios Sophocleous, University of Cyprus & Alper Bozkurt, North Carolina State University**

16:30

**A STUDY ON THE DIELECTRIC BEHAVIOUR OF PLANT CELL SUSPENSIONS USING WIDEBAND ELECTRICAL IMPEDANCE SPECTROSCOPY (WB-EIS)**
*Kian Kadan-Jamal{1}, Aakash Jog{1}, Marios Sophocleous{2}, Dayananda Desagani{1}, Orian Teig-Sussholz{1}, Julius Georgiou{2}, Adi Avni{1}, Yosi Shacham-Diamand{1}*
*{1}Tel Aviv University, Israel; {2}University of Cyprus, Cyprus*

17:00

**RF COILS CHARACTERIZATION IN SOIL FOR WIRELESS SOIL SENSING APPLICATIONS**
*Weijie Luo{1}, Ramesh Goel{1}, Shad Roundy{1}, Cody Zesiger{2}, Darrin Young{1}*
*{1}University of Utah, United States; {2}Utah State University Extension, United States*

17:15

**AN ENVIRONMENTAL STATION WITH BIOIMPEDANCE CAPABILITIES FOR AGRICULTURAL DEPLOYMENT**
*James Reynolds, Matthew Taggart, Michael Daniele, Thomas Rufty, Alper Bozkurt*
*NC State University, United States*

17:30

**ULTRA-LOW ENERGY PEST DETECTION FOR SMART AGRICULTURE**
*Davide Brunelli{3}, Tommaso Polonelli{2}, Luca Benini{1}*
*{1}ETH, Switzerland; {2}University of Bologna, Italy; {3}University of Trento, Italy*

17:45

**FEASIBILITY OF SIGNAL TRANSMISSION FOR PLANT BODY CHANNEL COMMUNICATION IN TOBACCO**
*Aakash Jog, Lee Bar-On, Adi Avni, Yosi Shacham-Diamand*
*Tel Aviv University, Israel*

16:30 – 18:00

## A2P-08: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES V
## Session Chair: Michael Daniele, NCSU

**A2P-08-1**
**CONVOLUTIONAL AUTOENCODERS FOR HEALTH INDICATORS EXTRACTION IN PIEZOELECTRIC SENSORS**
*Ivan Kraljevski{2}, Frank Duckhorn{2}, Constanze Tschoepe{2}, Matthias Wolff{1}*
*{1}Chair of Communications Engineering, BTU Cottbus-Senftenberg, Cottbus, Germany; {2}Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Dresden, Germany*

**A2P-08-2**
**NEW CORRECTION METHODS FOR NONORTHOGONALITY AND AMPLITUDE MISMATCH OF ANGLE POSITION SENSOR BY USING ATAN2-FUNCTION**
*Jie Zhou{2}, Markus Dietrich{2}, Paul Walden{2}, Johannes Kolb{3}, Martin Doppelbauer{1}*
*{1}Karlsruhe Institute of Technology, Germany; {2}Schaeffler Automotive Buehl GmbH & Co. KG, Germany; {3}Schaeffler Technologies AG & Co. KG - SHARE at KIT, Karlsruhe, Germany*

**A2P-08-3**
**MAGNETIC POSITION TRACKING USING INDUCTOR COILS AND IMU**
*Mohit Singh, Ravi Abhishek Shankar, Byunghoo Jung*
*Purdue University, United States*

**A2P-08-4**
**A PRACTICAL APPROACH FOR THE EVALUATION OF NOISE IN OSCILLATOR-BASED RESISTIVE SENSOR INTERFACES**
*Rafael Puyol{1}, Yannick Molle{1}, Sylvain Pétré{2}, Thomas Walewyns{3}, Laurent Francis{1}, Denis Flandre{1}*
*{1}UCLouvain, Belgium; {2}UCLouvain & VOCSens, Belgium; {3}VOCSens, Belgium*

**A2P-08-5**
**ISFET DIGITAL READOUT CIRCUIT WITH AN ON-CHIP MIPS PROCESSOR**
*Shaghayegh Aslanzadeh, Ava Hedayatipour, Nicole McFarlane*
*University of Tennessee, Knoxville, United States*

**A2P-08-6**
**CMOS-BASED READOUT AND CONTROL ELECTRONICS FOR MICROGRIPPERS**
*Diego Barrettino, Marco Mattavelli*
*Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland*

**A2P-08-7**
**HIGH DYNAMIC RANGE (HDR) SIGNAL PROCESSING ON SOFTWARE-DEFINED RADIO**
*Phillip Do, Jesse Hernandez, Zhao Lu, Danson Garcia, Steve Mann*
*MannLab Canada, Canada*

**A2P-08-8**
**HDR AGC SIGNAL OPTIMIZATION APPLIED TO AUDIO**
*Jesse Hernandez, Danson Evan Garcia, Steve Mann*
*Mannlab, Canada*

**A2P-08-1**
**CONVOLUTIONAL AUTOENCODERS FOR HEALTH INDICATORS EXTRACTION IN PIEZOELECTRIC SENSORS**

**A2P-08-9**
**SYNCHRONIZATION OF MULTIPLE TIME-OF-FLIGHT CAMERAS USING PHOTODIODES**
*Thorben Wübbenhorst, Felix Wermke, Beate Meffert*
*Humboldt-Universität zu Berlin, Germany*

**A2P-08-10**
**INERTIAL MEMS SENSORS ACCURACY IMPROVEMENT BY INTERVAL FUSION WITH PREFERENCE AGGREGATION**
*Sergey Muravyov, Pavel Baranov, Liudmila Khudonogova, Minh Dai Ho*
*TPU, Russia*

**A2P-08-11**
**DEEP-LEARNING FOR HAND-GESTURE RECOGNITION WITH SIMULTANEOUS THERMAL AND RADAR SENSORS**
*Sruthy Skaria{1}, Da Huang{1}, Akram Al-Hourani{1}, Robin J.Evans{2}, Margaret Lech{1}*
*{1}RMIT University, Australia; {2}The University of Melbourne, Australia*

16:30 – 18:00

## A2P-09: SENSOR NETWORKS III

**Session Chairs: Binbin Chen, Singapore University Of Technology and Design & Jorge Sá Silva, University of Coimbra**

**A2P-09-1**
**WIRELESS INERTIAL MEASUREMENTS ON A WIND TURBINE ROTOR BLADE**
*Frank Berkemeyer, Walter Lang*
*University of Bremen, Germany*

**A2P-09-2**
**SMART CITY BATTERY OPERATED IOT BASED INDOOR AIR QUALITY MONITORING SYSTEM**
*Siavash Esfahani, Piers Rollins, Jan Specht, Marina Cole, Julian Gardner*
*University of Warwick, United Kingdom*

**A2P-09-3**
**WEARABLE IOT ELECTRONIC NOSE FOR URINARY INCONTINENCE DETECTION**
*Siavash Esfahani, Michael Shanta, Jan Specht, Yuxin Xing, Marina Cole, Julian Gardner*
*University of Warwick, United Kingdom*

**A2P-09-4**
**ADAPTIVE TOA ESTIMATION WITH IMPERFECT LOS AND NLOS KNOWLEDGE IN UWB POSITIONING SYSTEMS**
*Iker Sobron, Iratxe Landa, Iñaki Eizmendi, Manuel Velez*
*University of the Basque Country (UPV/EHU), Spain*

**A2P-09-5**
**AN OPEN SOURCE IOT FRAMEWORK FOR A DISTRIBUTED MODULAR LOW-COST LASER-BASED SENSING PLATFORM**
*Jan Bauer{1}, Yannic Toschke{2}, Alexander Tessmer{2}, Björn Bourdon {2}, Nils Aschenbruck{2}, Mirco Imlau{2}*
*{1}Fraunhofer FKIE, Germany; {2}Univ. of Osnabrueck, Germany*

**A2P-09-6**
**A TWO-ARM ARCHIMEDEAN CIRCULARLY POLARIZED SPIRAL SLOT ANTENNA FOR IOT DEVICES IN 5G NETWORK**
*Maryam Eshaghi, Rashid Rashidzadeh*
*University of Windsor, Canada*

**A2P-09-7**
**QOS-AWARE SMALL-CELL-OVERLAID HETEROGENEOUS SENSOR NETWORK DEPLOYMENT FOR EHEALTH**
*Hao Ran Chi, M Fatima Domingues, Ayman Radwan*
*Instituto de Telecommunicações, Portugal*

**A2P-09-8**
**LOW-COST SYNCHRONIZATION FOR WLAN SENSORS**
*Thomas Feys{2}, Stijn Crul{1}, Geoffrey Ottoy{2}*
*{1}Barco NV, Belgium; {2}KU Leuven, Belgium*

**A2P-09-9**
**DEVELOPMENT OF A PORTABLE MONITORING SYSTEM FOR INDOOR E-CIGARETTES EMISSION**
*Michael Lim, Bongmook Lee*
*North Carolina State University, United States*

**A2P-09-10**
**WIRELESS GRAPHENE TEMPERATURE SENSOR**
*Andrey Somov{1}, Evgeniya Kovalska{2}, Anna Baldycheva{3}*
*{1}Skolkovo Institute of Science and Technology, Russia; {2}University of Chemistry and Technology, Czech Rep.; {3}University of Exeter, United Kingdom*

**A2P-09-11**
**A CROSS LAYER PROTOCOL PHY/MAC FOR BODY PATHLOSS IN IEEE 802.11AH IOT NETWORKS**
*Prasaja Wikanta, Andy Triwinarko, Iyad Dayoub, Elhadj Dogheche*
*UPHF, France*

**A2P-09-12**
**THE VIRTUAL SENSOR CONCEPT - SEPARATING SENSOR SOFTWARE FROM THE HARDWARE**
*Jarrod Trevathan{1}, Wayne Read{1}, Abdul Sattar{1}, Simon Schmidtke{2}, Tony Sharp{2}*
*{1}Griffith University, Australia; {2}Substation33, Australia*

**A2P-09-13**
*AN* **ONLINE** *QUANTITATIVE MEASURE OF DENSITY FOR LOW-POWER IOT NETWORKS*
*Marlon Santos, Yuri Melo, Lucas Barbosa, André Riker, Marilia Curado*
*Federal University of Pará, Portugal; Federal University of Pará, Brazil*

**A2P-09-14**
**PROTECTING HEALTH CARE WORKERS FROM INFECTIOUS DISEASES USING PHYSICAL PROXIMITY NETWORKS (PPN)**
*Asanka Rathnayaka, Md Abdulla Al Mamun, Fan Wu, Stephanie Curtis, Andrew Stewardson, Mehmet Yuce*
*Monash University, Australia*

**16:30 – 18:00**

**A2P-10: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS III**
**Session Chairs: Marios Sophocleous, University of Cyprus & Thomas Thundat, University of Buffalo**

**A2P-10-1**
**COMPARATIVE STUDY OF SPIN-COATED AND VAPOUR DEPOSITED NICKEL OXIDES FOR DETECTING VOCS**
*Sai Kiran Ayyala{2}, Jone Him Tsang{1}, Chris Blackman{1}, James Antony Covington{2}*
*{1}University College London, United Kingdom; {2}University of Warwick, United Kingdom*

**A2P-10-2**
**HETERO-CORE FIBER SPR SENSOR WITH IONIC LIQUID GEL COATING FOR CO2 DETECTION**
*Mitsuhiro Suzuki, Michiko Nishiyama, Kazuhiro Watanabe, Junichi Ida*
*SOKA University, Japan*

**A2P-10-3**
**CAPACITIVE PROPERTIES OF CERAMIC HUMIDITY SENSORS MADE FROM POROUS PEROVSKITE FILMS**
*Hamid Farahani{1}, Rahman Wagiran{2}, Gerald Urban{1}*
*{1}University of Freiburg, Germany; {2}University Putra Malaysia (UPM), Malaysia*

**A2P-10-4**
**TEMPERATURE CHARACTERISTICS OF HETERO-CORE OPTICAL FIBER AU/TIO2 SPR SENSORS FABRICATED BY SPUTTERING AND LAYER-BY-LAYER STACKING TECHNIQUES**
*Koji Yuhashi, Michiko Nishiyama, Jun-Ichi Ida, Shoichi Kubodera, Kazuhiro Watanabe*
*Soka University, Japan*

**A2P-10-5**
**COBALT BASED SOLID STATE PHOSPHATE SENSOR WITH SUBMICROMOLAR DETECTION RANGE**
*Vinay Patel, P. Ravi Selvaganapathy*
*McMaster University, Canada*

**A2P-09-11**
**A CROSS LAYER PROTOCOL PHY/MAC FOR BODY PATHLOSS IN IEEE 802.11AH IOT NETWORKS**
*Prasaja Wikanta, Andy Triwinarko, Iyad Dayoub, Elhadj Dogheche*
*UPHF, France*

**A2P-10-6**
**INFLUENCE OF CARRIER GAS ON MICROWAVE GAS RESPONSE**
*Alexis Lasserre{1}, Ludmilla Grzelak{2}, Jerome Rossignol{1}, Didier Stuerga{1}, Olivier Brousse{3}, Pierre Pribetich{1}, Michel Paindavoine{3}*
*{1}GERM, Dept Interfaces, Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR CNRS 6303, France; {2}GERM, Dept Interfaces, Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR CNRS 6303 & Yumain, France; {3}Yumain, France*

**A2P-10-7**
**ODOR SOURCE DETECTION WITH HIGH SPEED MULTI GAS SENSING ROBOT SYSTEM USING AUNPS-FLUORESCENT MOLECULAR COUPLING OPT-CHEMICAL LSPR SENSOR**
*Yasuhiro Kusuda, Zhongyuan Yang, Kohei Semasa, Fumihiro Sassa, Kenshi Hayashi*
*Kyushu University, Japan*

**16:30 – 18:00**

**A2P-11: EMERGING SENSOR APPLICATIONS IV**
**Session Chair: Volker Nock, University of Canterbury**

**A2P-11-1**
**FLASH LIDAR IMAGING AND CLASSIFICATION OF VEHICLES**
*Graeme Nash{2}, Vladimyros Devrelis{1}*
*{1}Ballistic Systems Pty Ltd, Australia; {2}DST Group, Australia*

**A2P-11-2**
**CAPACITANCE-BASED CONTACTLESS MONITORING OF ASEPTIC PACKAGE INTEGRITY AND CONTENT QUALITY**
*Hari Krishna Salila Vijayalal Mohan, Andrew Alexander Malcolm, Fang Cheng*
*Advanced Remanufacturing and Technology Centre (ARTC), Singapore*

**A2P-11-3**
**THROUGH THICK AND THIN: IMAGING THROUGH OBSCURANT USING SPAD ARRAY**
*Joyce Mau{3}, Vladimyros Devrelis{2}, Geoffrey Day{3}, Graeme Nash{3}, Jochen Trumpf{1}, Dennis Delic{3}*
*{1}ANU, Australia; {2}Ballistic Systems Pty Ltd, Australia; {3}DST Group, Australia*

**A2P-11-4**
**SEAL INTEGRITY TESTING UTILIZING NON-DESTRUCTIVE CAPACITIVE SENSING FOR PRODUCT PACKAGING ASSURANCE**
*Jieming Pan{2}, Yida Li{2}, Yuxuan Luo{3}, Xiangyu Zhang{2}, Zaifeng Yang{1}, David Liang Tai Wong{2}, Xuhua Niu{2}, Chen-Khong Tham{2}, Aaron Voon-Yew Thean{2}*
*{1}Institute of High-Performance Computing, A Star, Singapore; {2}National University of Singapore, Singapore; {3}Zhejiang University, China*

**A2P-11-5**
**ONLINE MONITORING OF THERMOPLASTIC CRYSTALLIZATION WITH MINIATURIZED INTERDIGITAL SENSORS**
*Martina Hübner{2}, Aynur Klatt{2}, Michael Koerdt{1}, Walter Lang{2}*
*{1}Faserinstitut Bremen e. V., Germany; {2}University Bremen, Institute for Microsensor,-actuators and -systems (IMSAS), Germany*

**A2P-11-6**
**CONCEPTUAL DESIGN OF AUTOMOTIVE SENSOR SYSTEMS**
*Maike Hartstern{2}, Viktor Rack{1}, Wilhelm Stork{3}*
*{1}BMW AG, Germany; {2}BMW AG / Karlsruhe Institute of Technology (KIT), Germany; {3} Karlsruhe Institute of Technology (KIT), Germany*

**A2P-11-7**
**DEPLOYMENT OF INALN/GAN HALL-EFFECT SENSORS FOR BUCKET TRANSFORMER MONITORING AND FORECASTING**
*Jiya Janowitz{2}, Max Holliday{2}, Karen Dowling{2}, Brandon Yeung{2}, Sai Kumar{2}, Ricardo Peterson{2}, Hannah Alpert{2}, Caitlin Chapin{2}, Jhorge Lopez{1}, Debbie Senesky{2}*
*{1}Prolec GE, Mexico; {2}Stanford University, United States*

**A2P-11-8**
**DETERMINATION OF FAT CONTENT IN FOODS USING A NEAR-INFRARED SPECTROSCOPY SENSOR**
*Barry William Mulvey*
*University College Dublin, Ireland*

**A2P-11-9**
**DRAGON: DRONE FOR RADIATION DETECTION OF GAMMAS AND NEUTRONS**
*Davide Brunelli{2}, Felix Pino{1}, Cristiano Fontana{1}, Lucio Pancheri{2}, Sandra Moretto{1}*
*{1}University of Padova, Italy; {2}University of Trento, Italy*

**A2P-11-10**
**PIEZOELECTRIC ENERGY HARVESTING FROM A COMPOSITE CANTILEVER BEAM UNDER SINUSOIDAL EXCITATION**
*Theofanis Plagianakos, Nikolaos Margelis, Nikolaos Leventakis, Georgios Bolanakis, Panagiotis Vartholomeos, Evangelos Papadopoulos*
*National Technical University of Athens, Greece*

**A2P-11-11**
**THE AIR QUALITY PARADIGM INSIDE CAR MICROENVIRONMENTS: BALANCING BETWEEN PM2.5 AND CO2 OFFSETS**
*Jelle Hofman, Valerio Panzica La Manna*
*IMEC, Netherlands*

12:30 – 14:00

**B1L-01: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES II**
**Session Chair: Cagla Özsoy Özsoy, ETH Zurizh**

12:30

**ARTEFACT-SUPPRESSING ANALOG SPIKE DETECTION CIRCUIT FOR FIRING-RATE MEASUREMENTS IN CLOSED-LOOP RETINAL NEUROSTIMULATORS**
*Andreas Erbslöh{2}, Reinhard Viga{2}, Karsten Seidl{1}, Rainer Kokozinski{1}*
*{1}Fraunhofer Institute for Microelectronic Circuits and Systems, Germany; {2}University of Duisburg-Essen, Germany*

12:45

**PACT CAM: WEARABLE SENSOR SYSTEM TO CAPTURE THE DETAILS OF CIGARETTE SMOKING IN FREE-LIVING**
*Masudul Imtiaz, Delwar Hossain, Volkan Senyurek, Prajakta Belsare, Edward Sazonov*
*University of Alabama, United States*

13:00

**WEARABLE MOTION SENSORS AND ARTIFICIAL NEURAL NETWORK FOR THE ESTIMATION OF VERTICAL GROUND REACTION FORCES IN RUNNING**
*Salvatore Tedesco{2}, Eduardo Perez-Valero{2}, Dimitrios Sokratis Komaris{2}, Luke Jordan{1}, John Barton{2}, Liam Hennessy{1}, Brendan O'Flynn{2}*
*{1}Setanta College, Ireland; {2}Tyndall National Institute, University College Cork, Ireland*

13:15

**ANALYSIS OF BODY-INDUCED THERMAL SIGNATURES FOR SOCIAL DISTANCING MONITORING**
*Stefano Savazzi{2}, Vittorio Rampa{2}, Leonardo Costa{1}, Denis Tolochenko{1}*
*{1}Cognimade S.r.L., Italy; {2}Consiglio Nazionale delle Ricerche CNR-IEIIT, Italy*

13:30

**A ZERO VELOCITY DETECTOR FOR FOOT-MOUNTED INERTIAL NAVIGATION SYSTEMS AIDED BY DOWNWARD-FACING RANGE SENSOR**
*Chi-Shih Jao, Yusheng Wang, Andrei Shkel*
*University of California, Irvine, United States*

13:45

**REAL TIME LEVEL GROUND WALKING VS STAIR-CLIMBING LOCOMOTION MODE DETECTION**
*Md Rejwanul Haque, Masudul H Imtiaz, Xiangrong Shen, Edward Sazonov*
*The University of Alabama, United States*

12:30 – 14:00

**B1L-02: SENSORS IN INDUSTRIAL PRACTICES I**
**Session Chairs: Giuseppe Barillaro, University of Pisa & Alper Bozkurt, North Carolina State University**

12:30

**LASER RESEAL – COMBINATION OF ACCELEROMETER AND GYROSCOPE SENSORS IN A SINGLE MEMS CHIP**
*Holger Rumpf, Jens Frey, Kurt Ritzau, Achim Breitling, Peter Staffeld, Mawuli Ametowobla*
*Robert Bosch GmbH, Germany*

13:00

**A NEW METHOD FOR DETECTING LEAKS IN MEMS ACCELEROMETERS AT WAFER-LEVEL**
*Ulrich Baehr{1}, Marvin Freier{1}, Matthew Lewis{1}, Wolfgang Rosenstiel{2}, Oliver Bringmann{2}*
*{1}Bosch GmbH, Germany; {2}University of Tuebingen, Germany*

13:15

**UAS: IOT ON-LINE SENSORS FOR POWER LINE INSPECTION**
*Pablo Medrano{1}, Jesus Villadangos{2}, Jose Javier Astrain{2}*
*{1}FuVeX, Spain; {2}Public University of Navarre, Spain*

13:30

**RADAR-BASED SITUATIONAL AWARENESS FOR INDUSTRIAL SAFETY APPLICATIONS**
*Philipp Sommer, Anton Rigner, Martin Zlatanski*
*ABB, Switzerland*

13:45

**ENHANCED PROPERTIES OF AEROSOL JET PRINTED PZT: TOWARDS REALIZING FLEXIBLE AUTOMOTIVE SENSORS**
*Ahmed Alfadhel{1}, Jing Ouyang{2}, Denis Cormier{2}, David Borkholder{2}*
*{1}Research Products Development Company, Saudi Arabia; {2}Rochester Institute of Technology, United States*

**12:30 – 14:00**

**B1L-04: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS II**
**Session Chairs: Thomas Thundat, University of Buffalo & Marios Sophocleous, University of Cyprus**

**12:30**

**PENCIL GRAPHITE NEEDLE-SHAPED BIOSENSOR FOR ANAESTHETIC MONITORING IN HUMAN SERUM**
*Simone Aiassa{2}, Sinan Yilmaz{1}, Sandro Carrara{1}, Danilo Demarchi{2}*
*{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Politecnico di Torino, Italy*

**12:45**

**EFFECT OF LIGHT ACTIVATION ON CHEMICAL GAS SENSORS BASED ON ALIGNED NANOWIRES**
*Camilla Baratto{1}, Viktoria Golovanova{5}, Guido Faglia{2}, Thi Thanh Le Dang{4}, Hanna Hakola{3}, Tapio Niemi{3}, Nikolai Tkachenko{3}, Bohgan Nazarchurk{5}, Vyacheslav Golovanov{5}*
*{1}CNR-INO, Sphera Group Brescia, Italy; {2}DII-University of Brescia, Italy; {3}Faculty of Engineering and Natural Sciences, Tampere University, Finland; {4}ITIMS-Hanoi University of Science and Technology, Vietnam; {5}South Ukrainian National University*

**13:00**

**GLYCEROL CONCENTRATION MONITORING USING HIGH-RESOLUTION NON-CONTACT RF SENSOR**
*Zahra Abbasi, Masoud Baghelani, Mojgan Daneshmand*
*University of Alberta, Canada*

**13:15**

**A HIGHLY STABLE $CA^{2+}$ ION-SELECTIVE FLEXIBLE SENSOR BASED ON TREATED PEDOT: PSS TRANSDUCING LAYER**
*Chani Park, Hyosang Yoon, Md Abu Zahed, Jaeyeong Park*
*Kwangwoon University, Korea; Kwangwoon University, Bangladesh*

**13:30**

**BATIO3 SENSITIVE FILM ENHANCEMENT FOR CO2 DETECTION**
*Fabien Le Pennec, El Halabi Amine, Sandrine Bernardini, Carine Perrin-Pellegrino, Khalifa Aguir, Marc Bendahan*
*Aix Marseille Univ IM2NP, France*

**13:45**

**A CHEMIRESISTIVE CO2 SENSOR BASED ON CNT-FUNCTIONAL POLYMER COMPOSITE FILMS**
*Zachary Siefker{1}, Abhi Boyina{1}, James Braun{1}, Xikang Zhao{2}, Bryan Boudouris{2}, Nikhil Bajaj{3}, George Chiu{3}, Jeffrey Rhoads{3}*
*{1}Ray W. Herrick Laboratories and School of Mechanical Engineering, Purdue University, United States; {2}Charles D. Davidson School of Chemical Engineering, Purdue University, United States; {3}Ray W. Herrick Laboratories, Birck Nanotechnology Center, and School of Mechanical Engineering, Purdue University, United States*

12:30 – 14:00

**B1L-05: SENSOR NETWORKS II**
**Session Chairs: Jorge Sá Silva, University of Coimbra & Binbin Chen, Singapore University Of Technology and Design**

12:30

**SENSOR NETWORK FOR MONITORING LIVESTOCK BEHAVIOUR**
*Jinshan Luo{3}, Atsushi Ito{3}, Akira Sasaki{3}, Madoka Hasegawa{3}, Shiori Ashibe{3}, Yoshikazu Nagao{3}, Yuko Hiramatsu{1}, Kotaro Torii{1}, Toru Aoki{2}*
*{1}Chuo University, Japan; {2}Tochigi Prefecture Dairy Co-operative, Japan; {3} Utsunomiya University, Japan*

12:45

**IMPROVING LOW POWER LISTENING (LPL) MECHANISM TO SAVE ENERGY CONSUMPTION IN WSN**
*Jessye Dos Santos, Guillaume Terrasson, Alvaro Llaria*
*ESTIA, France*

13:00

**KITECAM A NOVEL APPROACH TO LOW-COST AERIAL SURVEILLANCE**
*Abhinav Navnit, Deeksha Devendra, Anushka Tiwari, Aftab Hussain*
*International Institute of Information Technology (IIIT) Hyderabad, India*

13:15

**AN EFFICIENT LEARNING METHOD FOR SOUND CLASSIFICATION USING TRANSFER LEARNING FOR HAMMERING TEST**
*Tsubasa Fukumura{4}, Masafumi Koike{4}, Hayato Aratame{3}, Katsuhiko Hibino{2}, Atsushi Ito{1}, Yoshihisa Kawamura{2}*
*{1}Chuo University, Japan; {2}PORT DENSHI Corporation, Japan; {3}Tohoku Pioneer Co., Ltd., Japan; {4}Utsunomiya University, Japan*

13:30

**MONITORING OF ELECTRIC BUSES WITHIN AN URBAN SMART CITY ENVIRONMENT**
*Jose Javier Astrain, Francisco Falcone, Antonio Lopez, Pablo Sanchis, Jesus Villadangos, Ignacio Matias*
*UPNA, Spain*

13:45

**SMARTWATCH-BASED HUMAN ACTIVITY RECOGNITION USING HYBRID LSTM NETWORK**
*Sakorn Mekruksavanich{2}, Anuchit Jitpattanakul{1}*
*{1}Faculty of Applied Science, King Mongkut's University of Technology North Bangkok, Thailand; {2}School of Information and Communication Technology, University of Phayao, Thailand*

12:30 – 14:00

**B1L-06: EMERGING SENSOR APPLICATIONS II**
**Session Chair: Volker Nock, University of Canterbury**

12:30

**A LOW-COST CAPACITANCE-BASED NON-DESTRUCTIVE EVALUATION PLATFORM FOR FAST MOVING CONSUMER GOODS (FMCG) INDUSTRIAL APPLICATIONS**
*Hari Krishna Salila Vijayalal Mohan, Andrew Alexander Malcolm, Fang Cheng*
*Advanced Remanufacturing and Technology Centre (ARTC), Singapore*

12:45

**PHOTOACOUSTIC SENSING INSTRUMENTATION USING 70 W 905 NM PULSED LASER SOURCE FOR PROTON-INDUCED THERMOACOUSTIC EFFECT EMULATION**
*Elia Arturo Vallicelli, Mattia Oliver Cosmi, Giuseppe Chirico, Maddalena Collini, Andrea Baschirotto, Marcello De Matteis*
*University of Milano - Bicocca, Italy*

13:00

**OPTIMIZATION OF PIEZORESISTIVE MOTION DETECTION FOR AMBIENT NEMS APPLICATIONS**
*Chaoyang Ti{3}, Atakan Ari{3}, Miguel Gonzalez{1}, Cenk Yanik{4}, Ismet I Kaya{4}, M. Selim Hanay{2}, Kamil L Ekinci{3}*
*{1}Aramco Americas, Aramco Research Center-Houston, United States; {2}Bilkent University, Turkey; {3}Boston University, United States; {4}Sabanci University, Turkey*

13:15

**OPTIMIZING NOVEL INORGANIC SCINTILLATION DETECTORS FOR APPLICATIONS IN MEDICAL PHYSICS**
*Kevin Byrne{2}, Skye Conlan{2}, Magdalena Bazalova-Carter{1}, Mark Foley{2}*
*{1}Department of Physics & Astronomy, University of Victoria, Canada; {2}School of Physics, National University of Ireland Galway, Galway, Ireland, Ireland*

13:30

**TEMPERATURE DEPENDENCE OF NOVEL INORGANIC SCINTILLATION DETECTORS**
*David Oreilly, Kashan Qayyum, Majed Alharbi, Mark Foley*
*School of Physics, National University of Ireland Galway, Galway, Ireland, Ireland*

13:45

**CIGARETTE SMOKE EXPOSURE COMPUTATION USING BIOIMPEDANCE SENSOR**
*Prajakta Belsare{2}, Volkan Seyurek{1}, Masudul Imtiaz{2}, Edward Sazonov{2}*
*{1}Mississippi State University, United States; {2}University of Alabama, United States*

12:30 – 14:00

**B1P-08: LIVE DEMONSTRATION**
**Session Chairs: Behraad Bahreyni, Simon Fraser University & Tao Li, University of Cincinnati**

**B1P-08-1**
**LIVE DEMONSTRATION: SENCU - A POWER-EFFICIENT SENSOR SYSTEM**
*Ssu-Ying Chen, Chih-Chyau Yang, Fu-Cheng Cheng, Yu-An Kuo, Jin-Ju Chue, Chen-Chia Chen, Chien-Ming Wu, Chun-Ming Huang*
*Taiwan Semiconductor Research Institute, Taiwan*

**B1P-08-2**
**LIVE DEMONSTRATION: PASSIVE SENSOR SETUP FOR ROAD CONDITION MONITORING**
*Felix Kortmann{1}, Julin Horstkötter{1}, Alexander Warnecke{1}, Nicolas Meier{2}, Jens Heger{2}, Burkhardt Funk{2}, Paul Drews{2}*
*{1}HELLA GmbH & Co. KGaA, Germany; {2}Leuphana University Luxenburg, Germany*

**B1P-08-3**
**DYNAMIC GRIP-FORCE CONTROL USING REAL-TIME FRICTION ESTIMATION FROM INCIPIENT SLIP EVENTS**
*Heba Khamis{2}, Benjamin Xia{2}, Stephen Redmond{1}*
*{1}University College Dublin, Ireland; {2}UNSW Sydney, Australia*

**B1P-08-4**
**LIVE DEMONSTRATION: A TRIMODAL TIME-OF-FLIGHT CAMERA FEATURING MATERIAL SENSING**
*Miguel Heredia Conde{2}, Thomas Kerstein{1}, Bernd Buxbaum{1}, Otmar Loffeld{2}*
*{1}pmdtechnologies ag, Germany; {2}University of Siegen, Germany*

12:30 – 14:00

## B1P-09: MICROFLUIDICS & BIOSENSORS IV
**Session Chair: Leandro Lorenzelli, Fondazione Bruno Kessler (FBK)**

**B1P-09-1**
**REUSABLE ACOUSTIC TWEEZERS ENABLE 2D PATTERNING OF MICROPARTICLES IN MICROCHAMBER ON A DISPOSABLE SILICON CHIP SUPERSTRATE**
*Jingui Qian, Jifeng Ren, Yi Liu, Raymond H. W. Lam, Joshua E.-Y. Lee*
*City University of Hong Kong, Hong Kong*

**B1P-09-2**
**IN-LINE MICROELECTRODE ARRAYS FOR IMPEDANCE MAPPING OF MICROPHYSIOLOGICAL SYSTEMS**
*Ashlyn Young{2}, Vladimir Pozdin{1}, Michael Daniele{2}*
*{1}Florida International University, United States; {2}North Carolina State University, United States*

**B1P-09-3**
**ADVANCED CHARACTERISATION OF A SENSOR SYSTEM FOR DROPLET-BASED MICROFLUIDICS**
*Max Bartunik{2}, Marco Fleischer{2}, Werner Haselmayr{1}, Jens Kirchner{2}*
*{1}Institute for Communications Engineering and RF-Systems, Johannes Kepler University Linz (JKU), Austria; {2}Institute for Electronics Engineering, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany*

**B1P-09-4**
**MICROWAVE ABLATION APPLICATOR WITH TUMOR DETECTION ABILITY**
*Markus Kochanek{1}, Carolin Hessinger{1}, Martin Schüßler{1}, Rolf Jakoby{1}, Frank Hübner{2}, Thomas J. Vogl{2}*
*{1}Technical University of Darmstadt, Germany; {2}University Hospital Frankfurt, Germany*

**B1P-09-5**
**DEVELOPMENT OF A FLEXIBLE AND WIRELESS ECG MONITORING DEVICE**
*Dinesh Maddipatla, Lucas Bonek, Stephen Fenech, Nicholas Sapoznik, Anthony Hanson, Simin Masihi, Masoud Panahi, Massood Atashbar*
*Western michigan University, United States*

**B1P-09-6**
**A HANDHELD DETECTION BIOSENSOR FOR RESPIRATORY PATHOGENS IN YOUNG CHILDREN**
*Amal Kabalan, Ziqi Qu*
*Bucknell Univesity, United States*

12:30 – 14:00

## B1P-10: SENSOR LETTERS / SENSOR JOURNAL PAPERS

**B1P-10-1**
**INVESTIGATION OF CHARGE PLASMA ENHANCED TUNNEL FIELD EFFECT TRANSISTOR FOR HYDROGEN GAS SENSING APPLICATION**
*Debapriya Som{1}, Budhaditya Majumdar{2}, Souvik Kundu{1}, Sayan Kanungo{1}*
*{1}BITS-Pilani, Hyderabad Campus, India; {2}Macquarie University, Australia*

**B1P-10-2**
**INDUCTIVE ENERGY HARVESTING FROM CURRENT-CARRYING STRUCTURES**
*Steven Wright{1}, Michail Kiziroglou{1}, Sasa Spasic{2}, Nebojsa Radosevic{2}, Eric Yeatman{1}*
*{1}Imperial College London, United Kingdom; {2}SENIS A. G., Switzerland*

**B1P-10-3**
**PERSON IDENTIFICATION BASED ON MICRO-DOPPLER SIGNATURES OF SIT-TO-STAND AND STAND-TO-SIT MOVEMENTS USING A CONVOLUTIONAL NEURAL NETWORK**
*Kenshi Saho, Keisuke Inuzuka, Keitaro Shioiri*
*Toyama Prefectural University, Japan*

**B1P-10-4**
**INTELLIGENT MATERIAL CLASSIFICATION AND IDENTIFICATION USING A BROADBAND MILLIMETER-WAVE FREQUENCY COMB RECEIVER**
*Babak Jamali, Deeban Ramalingam, Aydin Babakhani*
*University of California, Los Angeles, United States*

**B1P-10-5**
**COHERENT RADIATION FROM A SWARM OF WIRELESSLY POWERED AND SYNCHRONIZED SENSOR NODES**
*Hamed Rahmani, Yuxiang Sun, Mohit Kherwa, Suparno Pal, Aydin Babakhani*
*UCLA, United States*

**B1P-10-6**
**TOWARDS A MACHINE-LEARNING-ASSISTED DIELECTRIC SENSING PLATFORM FOR POINT-OF-CARE WOUND MONITORING**
*Hamed Rahmani, Maani Archang, Babak Jamali, Mahdi Forghani, Aaron Ambrus, Deeban Ramalingam, Zhengyang Sun, Philip Scumpia, Hilary Coller, Aydin Babakhani*
*UCLA, United States*

**B1P-10-7**
**INCORPORATING A NOVEL HEXAAZATRIPHENYLENE DERIVATIVE TO A FLEXIBLE SCREEN-PRINTED ELECTROCHEMICAL SENSOR FOR COPPER ION DETECTION IN WATER SAMPLES**
*Dinesh Maddipatla{2}, Tahseen Saeed{2}, Binu Narakathu{2}, Sherine Obare{1}, Massood Atashbar{2}*
*{1}University of North Carolina at Greensboro, United States; {2}Western Michigan University, United States*

**B1P-10-8**
**NON-CONTACT VITAL SIGNS MONITORING THROUGH VISIBLE LIGHT SENSING**
*Hisham Abuella, Sabit Ekin*
*Oklahoma State University, United States*

**B1P-10-9**
**A PIEZOELECTRIC MN-DOPED PMN-PT/METGLAS MAGNETOELECTRIC GYRATOR: ENHANCED POWER EFFICIENCY AT REDUCED SIZE**
*Xin Zhuang{1}, Min Gao{3}, Xiao Tang{3}, Chung-Ming Leung{3}, Junran Xu{3}, Gopalan Srinivasan{2}, Jiefang Li{3}, Haosu Luo{1}, Dwight Viehland{3}*
*{1}Chinese Academy of Sciences, China; {2}Oakland University, United States; {3}Virginia Tech, United States*

**B1P-10-10**
**A LOW-VOLTAGE, LOW-CURRENT, DIGITAL-DRIVEN MEMS MIRROR FOR LOW-POWER LIDAR**
*Dingkang Wang{2}, Lenworth Thomas{2}, Sanjeev Koppal{2}, Yingtao Ding{1}, Huikai Xie{1}*
*{1}Beijing Institute of Technology, China; {2}University of Florida, United States*

**B1P-10-11**
**EXPERIMENTAL CHARACTERIZATION OF A PIEZOELECTRIC LEAF-CELL SENSOR FOR SIMULTANEOUS FLUID DENSITY AND SOUND SPEED MEASUREMENT**
*Dwight Swett*
*Aramco Americas, United States*

12:30 – 14:00

## B1P-11: PHYSICAL SENSORS I
**Session Chairs: Hanseup Kim, University of Utah & Giacomo Langfelder, Politecnico di Milano**

**B1P-11-1**
**ADVANCED CAPACITOR ARRANGEMENT FOR ENHANCED SPATIAL RESOLUTION IN TACTILE SENSORS**
*Shi-Yu Ke, Yu-Wen Chen, Rongshun Chen, Cheng-Yao Lo*
*National Tsing Hua University, Taiwan*

**B1P-11-2**
**SENSITIVITY AND RESONANCE FREQUENCY EVALUATIONS FOR A CANTILEVER TYPE HETERO-CORE FIBER OPTIC ACCELEROMETER**
*Akihito Matsuo, Miyuki Kadokura, Hiroshi Yamazaki, Michiko Nishiyama, Kazuhiro Watanabe*
*SOKA University, Japan*

**B1P-11-3**
**DESIGN METHODOLOGY OF SQUARE WAVE EXCITED RING CORE FOR FLUXGATE SENSOR**
*Laurent Malané{2}, Jean-Baptiste Kammerer{2}, Luc Hébrard{2}, Vinciane Chereau{1}*
*{1}ECA-Robotics, France; {2}Laboratoire ICUBE / University of Strasbourg, France*

**B1P-11-4**
**DEVELOPMENT OF VIBRATION SENSOR USING GIANT MAGNETOSTRICTIVE MATERIAL FOR SELF-POWERED STRUCTURAL HEALTH MONITORING SYSTEM**
*Shinji Koganezawa{2}, Tomotake Ishii{1}, Hiroshi Tani{2}, Renguo Lu{2}, Norio Tagawa{2}*
*{1}Graduate School of Kansai University, Japan; {2}Kansai University, Japan*

**B1P-11-5**
**GIANT HUMIDITY RESPONSIVENESS OF PLATINUM FUNCTIONALIZED WS2 NANOSHEET BASED CHEMIRESISTORS**
*Aashi Gupta{2}, Neha Sakhuja{2}, Ravindra Jha{1}, Navakanta Bhat{3}*
*{1}Central Electronics Engineering Research Institute (CEERI), Pilani, Rajasthan, India; {2} Indian Institute of Science, India; {3}Indian Institute of Science (IISc), India*

**B1P-11-6**
**SOFT TACTILE SENSOR DETECTING AIR-WATER INTERFACE**
*Tatsuya Usui, Hiroki Ishizuka, Takumi Kawasetsu, Koh Hosoda, Sei Ikeda, Osamu Oshiro*
*Osaka University, Japan*

**B1P-11-7**
**FREQUENCY CHARACTERISTICS OF HETERO-CORE FIBER ACCELEROMETER WITH TWO ORTHOGONAL VIBRATIONAL MODES OF AN ARCH SHAPE BEAM STRUCTURE**
*Miyuki Kadokura, Hiroshi Yamazaki, Michiko Nishiyama, Kazuhiro Watanabe*
*SOKA University, Japan*

**B1P-11-8**
**THICKNESS MEASUREMENT OF CURVED-SURFACE BIOLOGICAL TISSUE WITH AIR GAP ELIMINATION BY TRIPLE-RING COMPLEMENTARY SPLIT-RING RESONATORS**
*Yao-Hui Wang, Chin-Lung Yang*
*National Cheng-Kung University, Taiwan*

**B1P-11-9**
**GIANT SENSITIVITY THROUGH FULLY-PASSIVE AND CHIP-LESS PARAMETRIC TEMPERATURE SENSORS**
*Hussein Hussein, Cristian Cassella*
*Northeastern University, United States*

**B1P-11-10**
**DEVELOPMENT OF HIGH-PRECISION CRYOGENIC NUCLEAR MAGNETIC RESONANCE PROBE BASED ON THE TECHNOLOGY OF LIQUID NITROGEN FLOW CONTROL**
*Qingsong Cai{2}, Rongsheng Lu{2}, Jianxiong Hu{1}, Zhonghua Ni{2}, Hong Yi{2}*
*{1}Jiangsu Mag-med Medical Technology Co., LTD, China; {2}Southeast University, China*

**B1P-11-11**
**A METAPLATE IN MEMS FOR INNOVATIVE APPLICATIONS: VIBRATION ISOLATION AND TUNABLE MECHANICAL FILTERS**
*Zhichao Yao{1}, Valentina Zega{2}, Yan Su{1}, Alberto Corigliano{2}*
*{1}Nanjing University of Science and Technology, China; {2}Politecnico di Milano, Italy*

**B1P-11-12**
**STUDY OF A MINIATURIZED SANDWICH-LIKE CBT MONITORING SENSOR**
*Xianglin Ren, Xuesong Ye, Congcong Zhou*
*Zhejiang University, China*

**B1P-11-13**
**A MEMS TYPE DAMPING VISCOUS VACUUM GAUGE FOR HIGH VACUUM MEASUREMENT**
*Chengxiang Wang, Yulie Wu, Zhanqiang Hou, Yunbin Kuang, Yongmeng Zhang, Xuezhong Wu, Dingbang Xiao*
*National University of Defense Technology, China*

**B1P-11-14**
**MAGNETIC FLUX REGULATION LARGELY BOOSTS MAGNETORESISTIVE SENSORS**
*Jiafei Hu, Qingfa Du, Mengchun Pan, Peisen Li, Kun Sun, Wei Wang, Junsheng Zhang, Junping Peng, Weicheng Qiu, Dixiang Chen*
*National University of Defense Technology, China*

14:00 – 14:15

**BREAK**

14:15 – 14:30

**SENSOR COUNCIL AWARDS**

14:30 – 15:30

**KEYNOTE TALK 2**

15:30 – 16:30

**LUNCH // INDUSTRY PANEL DISCUSSION**

16:30 – 18:00

**B2L-01: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES III**
**Session Chair: Madhav Rao, IIIT-Bangalore (IIITB)**

16:30

**EVALUATION OF NEURAL NETWORK ARCHITECTURES FOR CLASSIFICATION OF SONAR ECHOES IN AIR**
*Patrick Kroh, Jan Mrochen, Stefan Rupitsch*
*Sensor Technology, University Erlangen-Nürnberg, Germany*

16:45

**DATA RECOVERY METHOD FOR MLF SIGNALS BASED ON SINC FUCNTION FOR OIL & GAS PIPELINE**
*Lisha Peng, Songling Huang, Shen Wang, Wei Zhao*
*Tsinghua University, China*

17:00

**TOLERANCE COMPENSATION BASED ON GAUSSIAN PROCESSES FOR ANGLE MEASUREMENTS WITH MAGNETIC SENSOR ARRAYS**
*Thorben Schüthe, Klaus Jünemann, Karl-Ragmar Riemschneider*
*Hamburg University of Applied Sciences, Germany*

17:15

**AVOIDING TRANSIENTS IN LOW-LEVEL SENSING OF SECONDARY ELECTRON YIELD**
*Matthew Vincie, Tod Laurvick, Hengky Chandrahalim, Richard Cobb, James Sattler*
*Air Force Institute of Technology, United States*

17:30

**GROUND TARGET CLASSIFICATION FROM SAR IMAGE WITH THE PIXEL COMPLEMENT FOR TARGET SHAPE**
*Hongliang Zhu{2}, Minyi Hon{4}, Wat Wong{1}, Rocky Leung{3}, Nang Lin{5}, Kinley Lin{2} {1}The Chinese University of Hong Kong, Hong Kong; {2}The Chinese University of Hong Kong, Shenzhen, China; {3}The University of Tokyo, Japan; {4}University of Minnesota, United States; {5}Washington University in St. Louis, United States*
*National Cheng-Kung University, Taiwan*

16:30 – 18:00

**B2L-02: PHYSICAL SENSORS: MECHANICAL SENSORS**
**Session Chairs: Sheng-Shian Li, National Tsing Hua University & Reza Abdolvand, University of Central Florida**

16:30

**CMOS CHIP FOR SOLID-STATE TACTILE FORCE SENSOR**
*Sheng-Kai Yeh{1}, Chao-Chun Ning{2}, Chih-Yuan Yeh{2}, Sheng-Hsiang Tseng{2}, Ying-Zong Juang{2}, Weileun Fang{1}*
*{1}Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, Taiwan; {2}Taiwan Semiconductor Research Institute, Hsinchu, Taiwan, Taiwan*

16:45

**DIRECT DEPOSITION OF THIN-FILM STRAIN GAUGES WITH A NEW COATING SYSTEM FOR ELEVATED TEMPERATURES**
*Rico Ottermann{2}, Daniel Klaas{2}, Folke Dencker{2}, Dominik Hoheisel{1}, Peter Rottengatter{1}, Thomas Kruspe{1}, Marc Christopher Wurz{2}*
*{1}Baker Hughes Inteq GmbH, Germany; {2}Institute of Micro Production Technology, Germany*

17:00

**FULLY 3D PRINTED MECHANICAL PRESSURE SENSORS: A COMPARISON OF SENSING MECHANISMS**
*Ryan van Dommelen{1}, Julien Berger{1}, Rubaiyet Haque{1}, Marco Binelli{2}, Gilberto de Freitas Siqueira{3}, André Studart{2}, Danick Briand{1}*
*{1}École Polytechnique Fédérale de Lausanne (EPFL), Switzerland; {2}Swiss Federal Institute of Technology in Zürich (ETHZ), Switzerland; {3}Swiss Federal Laboratories for Materials Science and Technology (EMPA), Switzerland*

17:15

**AERODYNAMIC WALL PRESSURE MEASUREMENT USING A HIGH TEMPERATURE GRADIENT PIRANI MICRO-SENSOR**
*Cécile Ghouila-Houri{1}, Munique Kazar-Mendes{1}, Thomas Arnoult{1}, Romain Viard{3}, Quentin Gallas{4}, Eric Garnier{5}, Alain Merlen{2}, Abdelkrim Talbi{1}, Philippe Pernod{1}*
*{1}Centrale Lille - IEMN, France; {2}IEMN, France; {3}JMH Conception, France; {4}LMFL, France; {5}ONERA, France*

17:30

**DEVELOPMENT OF A MASS FLOW SENSOR BASED ON LOW TEMPERATURE COFIRED CERAMICS FOR ANALYSIS OF EXHAUST GAS UP TO 500 °C**
*Carolin Lohrberg{2}, Christian Lenz{2}, Lisa Kreher{4}, Franz Bechtold{4}, Stefan Carstens{1}, Gert Springer{3}, Steffen Ziesche{2}*
*{1}EngineSens Motorsensor GmbH, Germany; {2}Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany; {3}i2s Intelligente Sensorsysteme Dresden GmbH, Germany; {4}VIA electronic GmbH, Germany*

*17:45*
**OPTICAL FIBER TIP MICRO ANEMOMETER**
*Jeremiah Williams{2}, Joseph Suelzer{1}, Nicholas Usechak{1}, Hengky Chandrahalim{2}*
*{1}Air Force Research Laboratory, United States; {2}The US Air Force Institute of Technology, United States*

16:30 – 18:00

**B2L-04: PACKAGING I**
**Session Chairs: Eric MacDonald, University of Texas & Ravi Selvaganapathy, McMaster University**

16:30

**PRINTING CONFORMAL ELECTRONICS ON UNCONVENTIONAL SUBSTRATES: EMERGENCE OF NEW CLASS OF DEVICES**
*Shweta Agarwala*
*Aarhus University, Denmark*

17:00

**THIN FILM TRANSFERRING VIA PVA SUBSTRATE AND CONTACTING OF SENSOR INSIDE ELASTOMER MATRIX**
*Sebastian Bengsch{2}, Eike Fischer{2}, Ulrich Giese{1}, Marc Christoper Wurz{2}*
*{1}Deutsches Institut für Kautschuktechnologie, Germany; {2}Leibniz University Hanover, Germany*

17:15

**ANISOTROPIC CONDUCTIVE FILM & FLIP-CHIP BONDING FOR LOW-COST SENSOR PROTOTYPING ON RIGID & FLEX PCB**
*Serguei Stoukatch{1}, Nicolas André{2}, Thibault Delhaye{2}, Francois Dupont{1}, Jean-Michel Redouté{1}, Denis Flandre{2}*
*{1}Liege University, Belgium; {2}Université Catholique de Louvain, Belgium*

17:30

**SEMI-AUTOMATED PACKAGING OF TRANSDUCER ARRAYS FOR 3D ULTRASOUND COMPUTER TOMOGRAPHY**
*Martin Angerer, Michael Zapf, Benjamin Leyrer, Nicole V. Ruiter*
*Karlsruhe Institute of Technology, Germany*

17:45

**A MINIATURE NON-INVASIVE WIRELESS TAIL-CUFF-BASED HEART RATE SENSOR WITH MOTION ARTIFACTS SUPPRESSION FOR REAL-TIME MONITORING OF LABORATORY MICE**
*Weijie Luo, Darrin Young*
*University of Utah, United States*

16:30 – 18:00

**B2L-05: SENSORS FOR AGRIFOOD & CONNECTED FARMING II**
**Session Chairs: Alper Bozkurt, North Carolina State University & Marios Sophocleous, University of Cyprus**

16:30

**AN INTEGRATED ELECTRONIC INTERFACE FOR BIO-ELECTROCHEMICAL PLANT-BASED SENSORS**
*Aakash Jog{2}, Yahav Avigal{2}, Assaf Avital{2}, Jayteerth Amble{2}, Aviv Peled{1}, Yosi Shacham-Diamand{2}*
*{1}Cartasense Ltd., Israel; {2}Tel Aviv University, Israel*

16:45

**SPATIAL RECONSTRUCTION OF SOIL MOISTURE CONTENT USING NON-CONTACT THERMOACOUSTIC IMAGING**
*Aidan Fitzpatrick, Ajay Singhvi, Amin Arbabian*
*Stanford University, United States*

17:00

**WIRELESS SENSOR NODE PLATFORM FOR IN-PLANT STRESS MONITORING**
*Affan Abbasi, Marvin Suggs, Logan Walz, Asma Mahar, Ayesha Hassan, Robert Murphree, Sajib Roy, Trenton Roberts, Jia Di, Alan Mantooth*
*University of Arkansas, United States*

17:15

**PLANTS AND ENVIRONMENTAL SENSORS FOR SMART AGRICULTURE, AN OVERVIEW**
*Umberto Garlando{1}, Lee Bar-On{2}, Adi Avni{2}, Yosi Shacham-Diamand{2}, Danilo Demarchi{1}*
*{1}Politecnico di Torino, Italy; {2}Tel Aviv University, Israel*

16:30 – 18:00

**B2L-06: QUANTUM SENSORS**
**Session Chairs: Alton Horsfall, University of Durham & Cristian Bonato, Heriot-Watt University**

16:30

**WIRING UP SILICON-CARBIDE ROOM-TEMPERATURE QUANTUM SYSTEMS**
*Matthias Niethammer, Raphael Nold, Naoya Morioka, Jawad Ul Hassan, Takeshi Ohshima, Junichi Isoya, Florian Kaiser, Ti...*

17:00

**ANALYSIS OF PHOTODIODE SENSING DEVICES IN A PHOTONIC INTEGRATED CHIP SOLUTION FOR QUANTUM COMPUTING**
*Luca Gemma{2}, Martino Bernard{1}, Mher Ghulinyan{1}, Davide Brunelli{2}*
*{1}FBK Fondazione Bruno Kessler, Italy; {2}University of Trento, Italy*

17:15

**HIGH TC SUPERCONDUCTING TUNNEL JUNCTIONS FOR CRYOGENIC TEMPERATURE MEASUREMENT**
*Krishna Balasubramanian*
*Indian Institute of Technology Kanpur, India*

16:30 – 18:00

**B2P-08: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES VI**
**Session Chairs: Michael Daniele, NCSU & Francisco Falcone, UPNA**

**B2P-08-1**
**A DATA-DRIVEN ARCHITECTURE FOR SENSOR VALIDATION BASED ON NEURAL NETWORKS**
*Hossein Darvishi{2}, Domenico Ciuonzo{3}, Eivind Rosón Eide{1}, Pierluigi Salvo Rossi{2}*
*{1}Kongsberg Digital AS, Norway; {2}Norwegian University of Science and Technology, Norway; {3}University of Naples "Federico II," Italy*

**B2P-08-2**
**IMPROVEMENT OF ODOR IMPRESSION PREDICTIVE MODEL USING MACHINE LEARNING**
*Keisuke Ito, Takamichi Nakamoto*
*Tokyo Institute of Technology, Japan*

**B2P-08-3**
**OPTICAL SYNCHRONIZATION OF MULTIPLE TIME-OF-FLIGHT CAMERAS IMPLEMENTING TDMA**
*Felix Wermke, Thorben Wübbenhorst, Beate Meffert*
*Humboldt-Universität zu Berlin, Germany*

**B2P-08-4**
**DATA FUSION FOR SUBSEA OIL SPILL DETECTION THROUGH WIRELESS SENSOR NETWORKS**
*Gianluca Tabella{1}, Nicola Paltrinieri{1}, Valerio Cozzani{2}, Pierluigi Salvo Rossi{1}*
*{1}NTNU Norwegian University of Science and Technology, Norway; {2}University of Bologna, Italy*

**B2P-08-5**
**SEMI-GRADIENT FOR COLOR PIXEL RECONSTRUCTION IN A RGBZ CMOS SENSOR**
*Valentin Rebiere{1}, Antoine Drouot{2}, Bertrand Granado{1}, Arnaud Bourge{2}, Andrea Pinna{1}*
*{1}Lip6, France; {2}STMicroelectronics, France*

**B2P-08-6**
**GPU-ACCELERATED TENSOR DECOMPOSITION FOR MOVING OBJECT DETECTION FROM MULTIMODAL IMAGING**
*Junchi Bin, Meng Kang, Zheng Liu*
*University of British Columbia, Okanagan Campus, Canada*

**B2P-08-7**
**SURFACE CHARACTERIZATION OF AIRCRAFT INTERIOR PARTS**
*Christian Eitzinger, Alexander Walch, Lukas Hartung*
*Profactor GmbH, Austria*

**B2P-08-8**
**ACQUISITION OF MULTIPLE EVENTS IN DIRECT TIME-OF-FLIGHT LIDAR USING SINGLE-PHOTON AVALANCHE DIODES**
*Andre Buchner{1}, Bedrich Hosticka{1}, Olaf Schrey{1}, Jan Frederik Haase{1}, Jennifer Ruskowski{1}, Anton Grabmaier{2}*
*{1}Fraunhofer IMS, Germany; {2}University of Duisburg-Essen, Germany*

**B2P-08-9**
**COMPRESSIVE SENSING BASED DATA-LOSS RECOVERY ENABLES ROBUST ESTIMATION OF DAMAGE INDEX IN ULTRASONIC STRUCTURAL HEALTH MONITORING**
*Shruti Sawant, Sauvik Banerjee, Siddharth Tallur*
*Indian Institute of Technology Bombay, India*

**B2P-08-10**
**TRANSFER LEARNING FOR NEURONAL NETWORKS DEPLOYED ON THE SENSORS EDGE**
*Phil Meier, Kris Rohrmann, Marvin Sandner, Marcus Prochaska*
*Ostfalia University of Applied Sciences, Germany*

**B2P-08-11**
**RADAR MICRO-DOPPLER-BASED ROTARY DRONE DETECTION USING PARAMETRIC SPECTRAL ESTIMATION METHODS**
*Andi Huang{1}, Bhashyam Balaji{2}, Sreeraman Rajan{1}, Pascale Sevigny{2}*
*{1}Carleton University, Canada; {2}DRDC, Canada*

**B2P-08-12**
**MAPPING AIR QUALITY IN IOT CITIES: CLOUD CALIBRATION AND AIR QUALITY INFERENCE OF SENSOR DATA**
*Jelle Hofman{1}, Martha E. Nikolaou{1}, Tien Huu Do{3}, Xuening Qin{2}, Esther Rodrigo{3}, Wilfried Philips{2}, Nikos Deligiannis{3}, Valerio Panzica La Manna{1}*
*{1}imec The Netherlands, Netherlands; {2}University Ghent, Belgium; {3}Vrije Universiteit Brussel, Belgium*

16:30 – 18:00

## B2P-09: SENSORS IN INDUSTRIAL PRACTICES II
## Session Chairs: Jorge Sá Silva, University of Coimbra & Loes Segerink, University of Twente

**B2P-09-1**
**WHERE IS MY DEER?-WILDLIFE TRACKING AND COUNTING VIA EDGE COMPUTING AND DEEP LEARNING**
*Bilal Arshad{2}, Johan Barthelemy{1}, Elliott Pilton{2}, Pascal Perez{1}*
*{1}SMART Infrastructure Facility, University of Wollongong, Australia; {2}Wize Dynamics Pty Ltd, Australia*

**B2P-09-2**
**ULTRASOUND-BASED SENSOR FOR NON-INVASIVELY DETECTING OBSTRUCTIONS WITHIN NATURAL GAS PIPELINE**
*Philip Stephanou{1}, David Xu{2}*
*{1}Atlas Sensors, United States; {2}Pacific Gas & Electric, United States*

**B2P-09-3**
**COMMERCIAL PRODUCTION OF LOW-K PZT FILM USING SPUTTERING METHOD**
*Mario Kiuchi{1}, Ryoma Miyake{1}, Shinya Yoshida{2}, Shuji Tanaka{2}, Tsuyoshi Takemoto{1}, Yukitaka Yamaguchi{1}, Kenji Komaki{1}*
*{1}Sumitomo Precision Products Co., Ltd., Japan; {2}Tohoku University, Japan*

**B2P-09-4**
**THE RESOLUTION OF ATAN2-FUNCTION**
*Jie Zhou{2}, Markus Dietrich{2}, Paul Walden{2}, Johannes Kolb{3}, Martin Doppelbauer{1}*
*{1}Karlsruhe Institute of Technology, Germany; {2}Schaeffler Automotive Buehl GmbH & Co. KG, Germany; {3}Schaeffler Technologies AG & Co. KG - SHARE at KIT, Karlsruhe, Germany*

16:30 – 18:00

## B2P-10: OPTICAL SENSORS IV
**Session Chair: Hengky Chandrahalim, The US Air Force Institute of Technology**

**B2P-10-1**
**NIGHT VISION OBSTACLE DETECTION AND AVOIDANCE BASED ON BIO-INSPIRED VISION SENSORS**
*Jawad Naveed Yasin{3}, Sherif A.S. Mohamed{3}, Mohammad-Hashem Haghbayan{3}, Jukka Heikkonen{3}, Hannu Tenhunen{2}, Muhammad Mehboob Yasin{1}, Juha Plosila{3}*
*{1}King Faisal University, Saudi Arabia; {2}KTH Royal Institute of Technology, Sweden; {3} University of Turku, Finland*

**B2P-10-2**
**FIBER OPTIC SENSOR BASED ON FLUORESCENCE QUENCHING FOR HEAVY METAL DETECTION**
*Yadira Fuentes-Rubio{1}, Rene Domínguez-Cruz{2}, Oscar Baldovino- Pantaleón{1}, Carlos Ruiz- Zamarreño{3}, Francisco Arregui{3}*
*{1}Autonomous University of Tamaulipas, Mexico; {2}Universidad Autónoma de Tamaulipas, Mexico; {3}Universidad Publica de Navarra, Spain*

**B2P-10-3**
**FAST FBG SENSOR INTERROGATION METHOD BASED ON SILICON MICRORING RESONATORS**
*Anna Giacobbe, Lorenzo Tozzetti, Fabrizio Di Pasquale, Stefano Faralli*
*Scuola Superiore Sant'Anna, Italy*

**B2P-10-4**
**CURRENT SENSOR BASED ON A FIBER BRAGG GRATING COATED BY ELECTROPLATED MAGNETOSTRICTIVE MATERIAL**
*Héctor García, Lorena Cebrián, Javier Madrigal, Salvador Sales*
*Universitat Politècnica de València, Spain*

**B2P-10-6**
**LOW-COST GESTURAL INTERACTION BASED ON MOTION ESTIMATION OF A PROJECTED DOT PATTERN**
*Heinrich Ruser{2}, André Kaltenbach{3}, Lars Mechold{3}, Felix Obée{1}, Felix Piela{1}*
*{1}August & Piela Konstruktiv GbR, Berlin, Germany; {2}Bundeswehr University Munich, Germany; {3}Laser Components GmbH, Olching, Germany*

**B2P-10-7**
**SIMULTANEOUS MEASUREMENT OF REFRACTIVE INDEX AND TEMPERATURE USING LMR ON PLANAR WAVEGUIDE**
*Omar Fuentes, Jesús M. Corres, Ismel Domínguez, Ignacio Del Villar, Ignacio Raúl Matías*
*Public University of Navarra, Spain*

**B2P-10-8**
**ENHANCED PERFORMANCE SHORT CAVITY BRILLOUIN FIBER RING LASER FOR HIGH-STABILITY BOTDA SENSING**
*Leonardo Rossi{1}, Diego Marini{1}, Filippo Bastianini{2}, Gabriele Bolognini{1}*
*{1}Consiglio Nazionale delle Ricerche, Italy; {2}Sestosensor srl, Italy*

**B2P-10-9**
**A BULK DRIVEN TRANSIMPEDANCE AMPLIFIER FOR PORTABLE SIPM BASED DETECTORS**
*Shahram Hatefi Hesari, Ava Hedayatipour, Mohammad Aminul Haque, Nicole McFarlane*
*University of Tennessee, Electrical Engineering and Computer Science Department, United States*

**B2P-10-10**
**COHERENT AND INCOHERENT REGIMES FOR MICROWAVE PHOTONICS FIBER SENSING**
*Demetrio Sartiano, Javier Madrigal, Salvador Sales*
*Universitat Politecnica de Valencia, Spain*

**B2P-10-11**
**FABRICATION AND CHARACTERIZATION OF ARC-INDUCED LONG PERIOD GRATINGS IN OPTICAL FIBERS WITH MICRO-CHANNELS**
*Anubhav Srivastava{2}, Flavio Esposito{2}, Joao M. B. Pereira{1}, Stefania Campopiano{2}, Agostino Iadicicco{2}*
*{1}RISE Acreo, Sweden; {2}University of Naples Parthenope, Italy*

**B2P-10-12**
**RHEUMATOID ARTHRITIS MIRNA BIOMARKER DETECTION BY MEANS OF LMR BASED FIBER-OPTIC BIOSENSOR**
*José Javier Imas{2}, Carlos Ruiz- Zamarreño{2}, Pablo Zubiate{2}, Javier Campión{1}, Lorena Sánchez-Martín{1}, Ignacio Raúl Matías{2}*
*{1}Making Genetics S.L., Spain; {2}Public University of Navarra (UPNA), Spain*

**B2P-10-13**
**OPTICAL FIBER REFRACTIVE INDEX SENSOR BASED ON THE SPR USING A MULTIPLE D-SHAPED AG NANOWIRE**
*Riadh A.Kadhim{3}, Al-Hemeary Nawar{1}, Abdul Kareem K.Abdul{4}, Liming Yuan{3}, Jiang Wu{2}*
*{1}Pazmany Peter Catholic University, Hungary; {2}University of Electronic Science and Technology of China (UESTC, China; {3}University of Electronic Science and Technology of China (UESTC), China; {4}University of Technology, Iraq*

**B2P-10-14**
**OPTICAL MEMS ACCELEROMETER BASED ON WAVEGUIDE BRAGG GRATING INTEGRATED WITH CRAB-LEG BEAM**
*Balasubramanian Malayappan{1}, Narayan Krishnaswamy{2}, Prasant Kumar Pattnaik{1}*
*{1}BITS-Pilani, Hyderabad Campus, India; {2}Sai Vidya Institute of Technology, Bengaluru, India, India*

**B2P-10-15**
**SEARCHING FOR GRAVITATIONAL WAVES WITH OPTICALLY LEVITATED NANOSENSORS**
*Eric Howard*
*Macquarie University, Australia*

16:30 – 18:00

## B2P-11: EMERGING SENSOR APPLICATIONS V
## Session Chair: Volker Nock, University of Canterbury

**B2P-11-1**
**THE IMPACT OF FIRST METATARSOPHALANGEAL ANGLE ON THE GAIT FEATURES MEASURED BY AN IN-SHOE MOTION SENSOR**
*Chenhui Huang{1}, Kenichiro Fukushi{1}, Zhenwei Wang{1}, Hiroshi Kajitani{1}, Hannah Pokka{2}, Hiroko Narasaki{2}, Fumiyuki Nihey{1}, Hiroaki Nakano{2}, Kentaro Nakahara{1}*
*{1}Biometrics Research Labs, NEC Corp., Japan; {2}Business Innovation Unit, NEC Corp., Japan*

**B2P-11-2**
**SURFACE EMG SIGNAL CLASSIFICATION FOR UNSUPERVISED MUSICAL KEYBOARD LEARNING APPLICATION**
*Sharmila Mani{2}, Vinay C K{1}, Pon Deepika{1}, Madhav Rao{1}*
*{1}International Institute of Information Technology Bangalore, India; {2}Samsung Research India, Bangalore, India*

**B2P-11-3**
**EVALUATION OF PERSONALLY WORN AND CEILING-BASED SENSORS IN CIRCADIAN RHYTHM MONITORING**
*Charikleia Papatsimpa*
*Eindhoven University of Technology, Netherlands*

**B2P-11-4**
**IMPEDANCE-OPTICAL DUAL-MODAL SENSOR AND IMAGE RECONSTRUCTION FOR CELL SPHEROIDS IMAGING**
*Zhe Liu, Xiaozhou Kang, Pierre Bagnaninchi, Yunjie Yang*
*The University of Edinburgh, United Kingdom*

**B2P-11-5**
**CONTACT FORCE ESTIMATION FROM RAW PHOTOPLETHYSMOGRAM SIGNAL**
*Pascal Fortin, Jeffrey Blum, Antoine Weill-Duflos, Jeremy Cooperstock*
*Shared Reality Lab, McGill University, Canada*

**B2P-11-6**
**MICROMETER-THIN SOI SENSORS FOR E-SKIN APPLICATIONS**
*Wei Peng{1}, Nicolas André{2}, Xi Zeng{2}, Iman Sabri Alirezaei{2}, Guoli Li{1}, Mohamed Bouterfa{2}, Laurent Francis{2}, Denis Flandre{2}*
*{1}Hunan University, China; {2}Université catholique de Louvain, Belgium*

**B2P-11-7**
**AN IOT BASED LOW-COST HEART RATE MEASUREMENT SYSTEM EMPLOYING PPG SENSORS**
*Lena Gohlke, Frederik Dreyer, Monica Pimiento Álvarez, Jens Anders*
*Institute of Smart Sensors, University of Stuttgart, Germany*

**B2P-11-8**
**A NOVEL APPROACH TO EEG NEUROFEEDBACK VIA REINFORCEMENT LEARNING**
*Aman Bhargava, Kyle O'Shaughnessy, Steve Mann*
*MannLab Canada, Canada*

**B2P-11-9**
**3D PRINTED WEARABLE EXOSKELETON HUMAN-MACHINE INTERFACING DEVICE**
*Radu Chirila{1}, Markellos Ntagios{2}, Ravinder Dahiya{1}*
*{1}University of Glasgow, United Kingdom; {2}University of Glasogow, United Kingdom*

**B2P-11-10**
**A MINIATURE WEARABLE MICROPHONE SENSOR FOR CARDIOPULMONARY MONITORING**
*Vivian Koh, Rex Tan, Yi Yang Ang*
*AEvice Health Pte Ltd, Singapore*

12:30 – 14:00

**C1L-01: ACTUATORS & SENSOR POWER SYSTEMS I**
**Session Chair: Behraad Bahreyni, Simon Fraser University**

12:30

**FUNCTIONAL METAMATERIALS ENABLED BY MICROSYSTEMS**
*Xin Zhang*
*Boston University, United States*

13:00

**EMBEDDED HAPTIC WAVEGUIDES TO IMPROVE TACTILE FEEDBACK: DESIGNING A CUSTOM 3D-PRINTED SURFACE TO ENHANCE SIGNAL MEDIATION**
*Ahmed Farooq{3}, Hong Tan{2}, Antoine Weill-Duflos{1}, Jeremy Cooperstock{1}, Roope Raisamo{3}*
*{1}McGill University, Canada; {2}Purdue University, United States; {3}Tampere University, Finland*

13:15

**TACTILE SENSOR ARRAY LADEN 3D-PRINTED SOFT ROBOTIC GRIPPER**
*Jacob Nichols Cook, Abhishek Sabarwal, Harley Clewer, William Navaraj*
*Nottingham Trent University, United Kingdom*

13:30

**BUBBLE-INDUCED VOLTAGE GENERATION ON GRAPHENE LAYER**
*Zhenyu Zhou, Shuxing Bao, Jingjin Shen, Rongqing Xu*
*Nanjing Univerisity of Posts and Telecommunications, China*

13:45

**MAGNETIC OPHTHALMIC REALIGNMENT SYSTEM FOR EXTRA-OCULAR MUSCLE LOSS TREATMENT**
*Vida Pashaei{1}, Michael S. Abrams{2}, Soumyajit Mandal{3}*
*{1}Case Western Reserve University, United States; {2}University Hospitals, United States; {3}University of Florida, United States*

12:30 – 14:00

**C1L-02: MICROFLUIDICS & BIOSENSORS II**
**Session Chairs: Giuseppe Barillaro, University of Pisa & Loes Segerink, University of Twente**

12:30

**AN AUTOMATED RAPID TEST FOR VIRAL NANOPARTICLES BASED ON SPATIOTEMPORAL DEEP LEARNING**
*Konstantin Wüstefeld, Frank Weichert*
*TU Dortmund University, Germany*

12:45

**TWO-PHOTON POLYMERIZED FLOW SENSOR INTEGRATED IN A MICROFLUIDIC CHANNEL WITH OPTOELECTRONIC READOUT**
*Sina Reede, Ingo Eichhorn, Martin Oellers, Andreas Schander, Michael Johannes Vellekoop*
*Institute for Microsensors, -actuators and -systems (IMSAS), University of Bremen, Germany*

13:00

**DEVELOPMENT OF A MICROFLUIDIC COLORECTAL CANCER CELL CULTURE SYSTEM WITH INTEGRATED OPTICAL SENSORS FOR RAPID PHAGE SELECTION**
*Pedro Condelipes{1}, Pedro Fontes{1,2}, Katerina Nikolaidou{1}, Vanda Marques{2}, Eduardo Brás{1,4}, Marta Afonso{2}, Cecília Rodrigues{2}, João Gonçalves{2}, Virginia Chu{1}, João Pedro Conde{1,3}*
*{1}Instituto de Engenharia de Sistemas e Computadores – Microsistemas e Nanotecnologias (INESC MN), Portugal; {2}Research Institute for Medicines (iMed. ULisboa), Faculty of Pharmacy, Universidade de Lisboa, Portugal; {3}Department of Bioengineering, Instituto Superior Técnico, Universidade de Lisboa, Portugal; {4}IBB – Institute for Bioengineering and Biosciences, Instituto Superior Técnico, Universidade de Lisboa, Portugal*

13:15

**FIBER OPTIC BIOSENSOR FOR INFLAMMATORY MARKERS BASED ON LONG PERIOD GRATING**
*Flavio Esposito{2}, Lucia Sansone{1}, Anubhav Srivastava{2}, Francesco Baldini{1}, Stefania Campopiano{2}, Francesco Chiavaioli{1}, Michele Giordano{1}, Ambra Giannetti{1}, Agostino Iadicicco{2}*
*{1}National Research Council of Italy, Italy; {2}University of Naples Parthenope, Italy*

13:30

**SHAPE EFFECTS OF PLASMONIC GOLD NANOPARTICLES FOR CIRCULATING TUMOR DNA SCREENING**
*Amogha Tadimety{1}, Ziqian Wu{1}, John Molinski{1}, Russell Beckerman{1}, Congran Jin{1}, Lauren Zhang{3}, Timothy Palinski{2}, John X.J. Zhang{1}*
*{1}Dartmouth College Thayer School of Engineering, United States; {2}NASA Glenn Research Center, United States; {3}The Lawrenceville School, United States*

13:45

**MICROSENSOR DEVICE FOR MINIMALLY INVASIVE MEASUREMENT OF MOISTURE STORAGE IN PLANTS SHOOTS**
*Fumiya Ino, Kazuma Ishida, Kyohei Terao, Hidekuni Takao, Fusao Shimokawa*
*Faculty of Engineering Kagawa University, Japan*

12:30 – 14:00

**C1L-04: SENSOR PHENOMENOLOGY II**
**Session Chairs: Ensieh Hosseini, University of Glasgow & Tao Li, University of Cincinnati**

12:30

**A COMPREHENSIVE MODELLING APPROACH FOR BIO-EDLC SYSTEMS**
*Roslyn Massey, Rana Amache, Siziwe Bebe, Ravi Prakash*
*Carleton University, Canada*

12:45

**TOWARDS DRIFT MODELING OF GRAPHENE-BASED GAS SENSORS USING STOCHASTIC SIMULATION TECHNIQUES**
*Sebastian Schober{1}, Cecilia Carbonelli{1}, Alexandra Roth{1}, Alexander Zoepfl{1}, Robert Wille{2}*
*{1}Infineon Technologies AG, Germany; {2}Institute for Integrated Circuits, Johannes Kepler University Linz, Austria*

13:00

**A PRELIMINARY MICROWAVE FREQUENCY CHARACTERIZATION OF A NAFION-BASED CHIPLESS SENSOR FOR HUMIDITY MONITORING**
*Giada Marchi{1}, Viviana Mulloni{1}, Mohammedhusen Manekiya{2}, Massimo Donelli{2}, Leandro Lorenzelli{1}*
*{1}Fondazione Bruno Kessler, Italy; {2}University of Trento, Italy*

13:15

**PIEZOELECTRIC MICROMIRRORS WITH GEOMETRIC AND MATERIAL NONLINEARITIES: EXPERIMENTAL STUDY AND NUMERICAL MODELING**
*Andrea Opreni{1}, Attilio Frangi{1}, Nicolò Boni{2}, Gianluca Mendicino{2}, Massimiliano Merli{2}, Roberto Carminati{2}*
*{1}Politecnico di Milano, Italy; {2}STMicroelectronics, Italy*

13:30

**INTERPOLATION BASED REDUCED ORDER MODELLING FOR NON-LINEARITIES IN MEMS**
*Giorgio Gobat, Attilio Frangi, Valentina Zega*
*Politecnico di Milano, Italy*

13:45

**THE ANALYSIS OF THE SUBHARMONIC EXCITATION IN A DISK MEMS GYROSCOPE**
*Kuo Lu, Qingsong Li, Dingbang Xiao, Xin Zhou, Kai Wu, Yi Xu, Jiangkun Sun, Tao Zhao, Xuezhong Wu*
*National University of Defense Technology, China*

12:30 – 14:00

**C1L-05: WEARABLE SENSORS FOR TELEMEDICINE**
**Session Chairs: Omer Oralkan, NC State University & Veena Misra, NC State University**

12:30

**SUBJECT-INDEPENDENT SLOW FALL DETECTION WITH WEARABLE SENSORS VIA DEEP LEARNING**
*Xiaoshuai Chen{1}, Shuo Jiang{2}, Benny Lo{1}*
*{1}Imperial College London, United Kingdom; {2}Shanghai Jiao Tong University, China*

12:45

**WEARABLE SWEAT RATE SENSORS**
*Murat Yokus, Talha Agcayazi, Matt Traenkle, Alper Bozkurt, Michael Daniele*
*North Carolina State University, United States*

13:00

**PORTABLE GAIT LAB: INSTANTANEOUS CENTRE OF MASS VELOCITY USING THREE INERTIAL MEASUREMENT UNITS**
*Mohamed Irfan Mohamed Refai{2}, Bert-Jan F. van Beijnum{2}, Jaap H. Buurke{1}, Peter H. Veltink{2}*
*{1}Roessingh Research and Development, Netherlands; {2}University of Twente, Netherlands*

13:15

**PRELIMINARY ASSESSMENT OF HUMAN BIOLOGICAL RESPONSES TO LOW-LEVEL OZONE**
*Alper Bozkurt{1}, Tahmid Latif{1}, Laura Gonzalez{2}, James Dieffenderfer{1}, Yuwei Liao{2}, Michelle Hernandez{3}, Veena Misra{1}, Edgar Lobaton{1}*
*{1}NC State University, United States; {2}SAS Institute Inc., United States; {3}University of North Carolina at Chapel Hill, United States*

12:30 – 14:00

**C1L-06: EMERGING TECHNOLOGIES FOR FLEXIBLE & PRINTED ENERGY AUTONOMOUS SENSING SYSTEMS I**
**Session Chairs: Almudena Rivadeneyra, University of Granada & Luisa Petti, Free University of Bolzano-Bozen**

12:30

**EMERGING THERMOELECTRIC GENERATORS BASED ON PRINTED AND FLEXIBLE ELECTRONICS TECHNOLOGY**
*Francisco Molina-Lopez*
*KU Leuven, Belgium*

13:00

**ELECTRONIC SKIN WITH ENERGY AUTONOMOUS PROXIMITY SENSING FOR HUMAN-ROBOT INTERACTION**
*Pablo Escobedo, Markellos Ntagios, Ravinder Dahiya*
*University of Glasgow, United Kingdom*

13:15

**ELECTRONIC NASAL POD: A 3D PRINTED DEVICE TO FILTER AND ELECTROCHEMICALLY DETECT POLLUTANTS**
*Avinash Kothuru, Sanket Goel*
*BITS Pilani, Hyderabad Campus, India*

13:30

**COPPER WIRE BASED ELECTRICAL CONTACTS FOR DIRECT INTERFACING OF STRETCHABLE SENSORS**
*Leonardo García-García{2}, Júlio Costa{2}, Pasindu Lugoda{2}, Daniel Roggen{2}, Niko Muenzenrieder{1}*
*{1}Free University of Bozen-Bolzano, Italy; {2}Sensor Technology Research Centre, University of Sussex, United Kingdom*

13:45

**LASER-FABRICATED FLEXIBLE NANOGRAPHENE-BASED SENSOR FOR PH DETECTION IN SALIVA**
*Biresaw Demelash Abera{3}, Francisco J Romero{2}, Inmaculada Ortiz-Gomez{1}, Luisa Petti{3}, Alfonso Salinas-Castillo{1}, Diego P Morales{2}, Paolo Lugli{3}, Noel Rodriguez{2}, Almudena Rivadeneyra{2}*
*{1}Department of Analytical Chemistry, University of Granada, Spain; {2}Department of Electronics and Computer Technology, University of Granada, Spain; {3}Faculty of Science and Technology - Free University of Bolzano, Italy*

12:30 – 14:00

## C1P-08: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES VII
**Session Chair: Francisco Falcone, UPNA**

**C1P-08-1**
**DEEP COMPLEX-VALUED NETWORK FOR EGO-VELOCITY ESTIMATION WITH MILLIMETER-WAVE RADAR**
*Hyun-Woong Cho, Sungdo Choi, Young-Rae Cho, Jongseok Kim*
*Samsung Advanced Institute of Technology, Korea*

**C1P-08-2**
**CHALLENGES ON THE APPLICABILITY OF ADAPTIVE RELEVANCE VECTOR MACHINE FOR IMAGE RECONSTRUCTION IN SOFT-FIELD TOMOGRAPHY**
*Daniel Ospina Acero{2}, Qussai Marashdeh{1}, Fernando Teixeira{2}*
*{1}Tech4Imaging LLC, United States; {2}The Ohio State University, United States*

**C1P-08-3**
**ENHANCEMENT OF OMNI-DIRECTIONAL EMAT SIGNAL USING A OPTIMIZED MAGNETIC CIRCUIT DESIGN**
*Zhe Wang, Zaifu Zhan, Shen Wang, Wei Zhao, Songling Huang*
*Tsinghua University, China*

**C1P-08-4**
**DEVELOPMENT OF MAGNETIC FOOD TEXTURE SENSOR WITH SPRING AND SLIDING MECHANISM**
*Kento Kusumi{2}, Hiroyuki Nakamoto{2}, Futoshi Kobayashi{2}, Yuya Nagahata{1}*
*{1}J-Oil Mills, Inc., Japan; {2}Kobe University, Japan*

**C1P-08-5**
**A 24MHZ RELAXATION OSCILLATOR USING SINGLE CURRENT MODE COMPARATOR WITH ±1.67% DRIFT FROM -40°C TO +175°C FOR AUTOMOTIVE SENSOR APPLICATION**
*Shenjie Wang{2}, Cesare Ghezzi{1}, Christian Camp{2}, Arnaud Laville{2}*
*{1}Meleixs, Switzerland; {2}Melexis, Switzerland*

**C1P-08-6**
**SIMULTANEOUS PRESSURE SENSORS MONITORING SYSTEM FOR HAND GESTURES RECOGNITION**
*Bilel Ben Atitallah{3}, Muhammed Bilal Abbasi{3}, Rim Barioul{3}, Dhouha Bouchaala{1}, Nabil Derbel{2}, Olfa Kanoun{3}*
*{1}Digital Researsh Center of Sfax, Tunisia; {2}National Engineering School of Sfax, Tunisia; {3}TU Chemnitz, Germany*

**C1P-08-7**
**UNCERTAINTY CHARACTERIZATION IN ACTIVE SENSOR SYSTEMS WITH DNN-BASED FEEDBACK CONTROL**
*Burhan Ahmad Mudassar, Priyabrata Saha, Saibal Mukhopadhyay*
*Georgia Institute of Technology, United States*

**C1P-08-8**
**UNSUPERVISED DOMAIN ADAPTATION FOR POSITION-INDEPENDENT IMU BASED GAIT ANALYSIS**
*Fangzhi Mu, Xiao Gu, Yao Guo, Benny Lo*
*Imperial College London, United Kingdom*

**C1P-08-9**
**RANDOM FOREST CLASSIFICATION OF FINGER MOVEMENTS USING ELECTROMYOGRAM (EMG) SIGNALS**
*Mücahit Fındık, Seyma Yılmaz, Mehmet Koseoglu*
*Hacettepe University, Turkey*

**C1P-08-10**
**A DRY ELECTRODE-BASED ECG SENSOR WITH MOTION ARTIFACTS CANCELLATION AND SIGNAL ANALYSIS FOR HEART IRREGULARITY DETECTION**
*Nishat Tarannum Tasneem{2}, Deepa Kota{2}, Ifana Mahbub{2}, Gayatri Mehta{2}, Kamesh Namuduri{2}, Ari Cedars{1}*
*{1}Johns Hopkins Medicine, United States; {2}University of North Texas, United States*

**C1P-08-11**
**BELIEF FUNCTION FUSION BASED SELF-CALIBRATION FOR NON-DISPERSIVE INFRARED GAS SENSOR**
*Yang You, Anran Xu, Tobias Oechtering*
*KTH Royal Institute of Technology, Sweden, Sweden*

**C1P-08-12**
**HYSTERESIS COMPENSATION OF 3D PRINTED SENSORS USING A POWER LAW MODEL FOR VARIOUS INPUT SIGNALS**
*Martijn Schouten, Dimitrios Kosmas, Gijs Krijnen*
*University of Twente, Netherlands*

12:30 – 14:00

**C1P-09: PACKAGING II**
**Session Chairs: Ravi Selvaganapathy, McMaster University & Eric MacDonald, University of Texas**

**C1P-09-1**
**3D PRINTED PACKAGING OF PHOTOVOLTAIC CELLS FOR ENERGY AUTONOMOUS EMBEDDED SENSORS**
*Markellos Ntagios, Pablo Escobedo, Ravinder Dahiya*
*University of Glasgow, United Kingdom*

12:30 – 14:00

**C1P-10: CHEMICAL, ELECTROCHEMICAL & GAS SENSORS IV**
**Session Chairs: Thomas Thundat, University of Buffalo & Marios Sophocleous, University of Cyprus**

**C1P-10-1**
**FET-BASED INTEGRATED CHARGE SENSOR FOR ORGAN-ON-CHIP APPLICATIONS**
*Hande Aydogmus{2}, Milica Dostanić{2}, Mojtaba Jahangiri{2}, Rajarshi Sinha{2}, William Fausto Quirós-Solano{1}, Massimo Mastrangeli{2}, Pasqualina Maria Sarro{2}*
*{1}BIOND Solutions BV, ECTM, Department of Microelectronics, TU Delft, Netherlands; {2} ECTM, Department of Microelectronics, TU Delft, Netherlands*

**C1P-10-2**
**2D LSPR GAS SENSOR WITH AU/AG CORE-SHELL STRUCTURE COATED BY FLUORESCENT DYES**
*Kohei Semasa, Fumihiro Sassa, Kenshi Hayashi*
*Kyushu University, Japan*

**C1P-10-3**
**A FLEXIBLE ELECTROCHEMICAL-PHYSIOLOGICAL EPIDERMAL HYBRID PATCH FOR CHRONIC DISEASE MANAGEMENT**
*Sanghyuk Yoon, Hyosang Yoon, Seokgyu Ko, Chani Park, Md Abu Zahed, Jaeyeong Park*
*Kwangwoon University, Korea*

**C1P-10-4**
**QUARTZ CRYSTAL MICROBALANCE SENSOR BASED ON PEPTIDE ANCHORED SINGLE-WALLED CARBON NANOTUBES FOR HIGHLY SELECTIVE TNT EXPLOSIVE DETECTION**
*Jin Wang{1}, Masayoshi Tanaka{2}, Mina Okochi{2}*
*{1}Okayama University, Japan; {2}Tokyo Institute of Technology, Japan*

**C1P-10-5**
**INVESTIGATION OF THE SELF-CALIBRATION FUNCTION FOR IROX-BASED PH SENSORS**
*Paul Marsh{2}, Fatemeh Mohseni{2}, J.-C. Chiao{1}, Hung Cao{2}*
*{1}Southern Methodist University, United States; {2}University of California Irvine, United States*

**C1P-10-6**
**IEEE P2520.1 – STANDARD FOR BASELINE PERFORMANCE OF ODOR ANALYSIS DEVICES & SYSTEMS**
*James A. Covington{1}, Susan S. Schiffman{2}, H. Troy Nagle{2}*
*{1} University fo Warwick, United Kingdom; North Carolina State University, United States*

12:30 – 14:00

## C1P-11: PHYSICAL SENSORS II
**Session Chair: Boris Stoeber, The University of British Columbia**

**C1P-11-1**
**MICROPOWER OBJECT RANGE AND BEARING SENSOR FOR SMART CONTACT LENSES**
*Chayanjit Ghosh{1}, Alex Mastrangelo{2}, Aishwaryadev Banerjee{1}, Hanseup Kim{1}, Carlos H. Mastrangelo{1}*
*{1}University of Utah, United States; {2}University of Washington, United States*

**C1P-11-2**
**POWER LED JUNCTION TEMPERATURE READOUT CIRCUIT BASED ON AN OFF-THE-SHELF LED DRIVER**
*Demetrio Iero, Massimo Merenda, Sonia Polimeni, Riccardo Carotenuto, Fortunato Pezzimenti, Sandro Rao, Francesco Giuseppe Della Corte*
*Mediterranea University of Reggio Calabria, Italy*

**C1P-11-3**
**ULTRA-LOW POWER STRESS SENSING BY LEAKAGE CURRENT OF P-N JUNCTIONS**
*Zhiqiang Feng, Xuefeng He, Junru Li, Shen Li, Zhengguo Shang*
*Chongqing University, Chile; Chongqing University, China*

**C1P-11-4**
**DISRUPTIVE FORCE SENSOR BASED ON LASER-BASED POWDER-BED-FUSION**
*Romol Chadda{2}, Johanna Probst{2}, Claas Hartmann{2}, Martin Link{2}, Markus Hessinger{1}, Eberhard Abele{2}, Matthias Weigold{2}, Mario Kupnik{2}*
*{1}Core Sensing, Germany; {2}Technische Universtät Darmstadt, Germany*

**C1P-11-5**
**MICROFABRICATED EDDY-CURRENT SENSORS FOR NON-DESTRUCTIVE TESTING OF THE MICRO GRINDING BURN**
*Isman Khazi, Andras Kovacs, Ali Zahedi, Ulrich Mescheder, Bahman Azarhoushang*
*Hochschule Furtwangen University, Germany*

**C1P-11-6**
**REAL-TIME DETECTION OF OIL VISCOSITY USING COPLANAR CAPACITIVE SENSORS**
*Mahdi Saleh{1}, Imad H. Elhajj{1}, Daniel Asmar{1}, Sally Antoun{2}*
*{1}American University of Beirut, Lebanon; {2}University of Balamand, Lebanon*

**C1P-11-7**
**ALL OPTICAL READOUT SCHEME FOR PHOTOLUMINESCENCE BASED MAGNETIC FIELD SENSORS**
*Ludwig Horsthemke{3}, Christian Bischoff{3}, Peter Glösekötter{3}, Bernd Burchard{2}, Robert Staacke{1}, Jan Meijer{1}*
*{1}Applied Quantum Systems Felix-Bloch Institute for Solid-State Physics, Leipzig University, Germany; {2}Elmos Semiconductor AG, Germany; {3}FH Münster, Germany*

**C1P-11-8**
**THE DUAL-CRYOGENIC CURRENT COMPERATOR (DCCC) AS A NEW PROTOTYPE CCC FOR BEAMLINE MONITORING**
*Max Stapelfeld{3}, Frank Schmidl{3}, Paul Seidel{3}, Sabine Stück{3}, Volker Tympel{2}, Thomas Stöhlker{1}, David Haider{1}, Marcus Schwickert{1}, Thomas Sieber{1}, Matthias Schmelz{5}, T. Schönau{4}, R. Stolz{4}*
*{1}GSI Helmholtz Center for Heavy Ion Research, Germany; {2}Helmholtz Institute Jena, Germany; {3}Institut fuer Festkoerperphysik (IFK) FSU Jena, Germany; {4}Leibniz Institute of Photonic Technology, Germany; {5}Leibniz Institute of Photonic Technology, L*

**C1P-11-9**
**MEMS BASED GRAVIMETRIC SENSOR FOR THE DETECTION OF ULTRA-FINE AEROSOL PARTICLES**
*Malar Chellasivalingam{2}, Laxmeesha Somappa{1}, Adam M. Boies{2}, Maryam Shojaei Baghini{1}, Ashwin A. Seshia{2}*
*{1}Indian Institute of Technology Bombay, India; {2}University of Cambridge, United Kingdom*

**C1P-11-10**
**EXTENSIVE VALIDATION OF A REAL-TIME TIME DERIVATIVE FILTER FOR QUANTIZED TEMPERATURE MEASUREMENTS**
*Alexander Kozlov, Ilya Tarygin*
*Lomonosov Moscow State University, Russia*

**C1P-11-11**
**HIGH FREQUENCY THIN-FILM PIEZOELECTRIC RESONANT MICRO-ACCELEROMETERS WITH CAPACITIVE MASS-SPRING TRANSDUCER**
*Ankesh Todi, Hakhamanesh Mansoorzare, Sina Moradian, Reza Abdolvand*
*University of Central Florida, United States*

**C1P-11-12**
**IN-SITU SUB-SURFACE STRAIN MEASUREMENT IN DEEP ROLLING PROCESSES**
*Daniel Gräbner, Walter Lang*
*University of Bremen, Germany*

**C1P-11-13**
**HIGH DYNAMIC RANGE DIGITAL FLUXGATE MAGNETOMETER**
*David Novotný, Vojtěch Petrucha*
*CTU FEE Prague, Czech Rep.*

**C1P-11-14**
**WEARABLE FLUIDIC STRAIN SENSOR FOR HUMAN MOTION SENSING**
*Chi Tran Nhu{3}, An Nguyen Ngoc{3}, Trinh Chu Duc{3}, Van Dau Thanh{2}, Tung Bui Thanh{3}, Chieu Le Van{1}*
*{1}Faculty of Environmental Science, University of Science, Vietnam National University, Hanoi, Vietna, Vietnam; {2}Griffith University, Australia; {3}Vietnam National University, Ha Noi - University of Engineering Technology, Vietnam*

**C1P-11-15**
**PACKAGED-INDUCED OFFSET DRIFT OF AN ULTRA-LOW PIEZORESISTIVE PRESSURE SENSOR**
*Fernando Alfaro*
*Achen University, Germany*

14:00 – 14:15

**BREAK**

14:15 – 14:30

**SENSOR COUNCIL AWARDS**

14:30 – 15:30

**KEYNOTE TALK 3**

15:30 – 16:30

**LUNCH // PANEL DISCUSSION**

16:30 – 18:00

**C2L-01: SENSOR SYSTEMS: SIGNALS, PROCESSING & INTERFACES IV**
**Session Chair: Behraad Bahreyni, Simon Fraser University**

**16:30**
**MAGNETIC LOCALIZATION OF WIRELESS SENSORS FOR INTERNALLY ILLUMINATED PHOTOREACTORS**
*David Demetz, Alexander Sutor*
*UMIT-Private University for Health Sciences, Medical Informatics and Technology, Austria*

**16:45**
**A PORTABLE POWER-EFFICIENT PM2.5 SENSOR SYSTEM**
*Chih-Chyau Yang, Yi-Jie Hsieh, Wei-Lin Lai, Chun-Yu Chen, Jin-Ju Chue, Chien-Ming Wu, Chun-Ming Huang*
*Taiwan Semiconductor Research Institute, Taiwan*

**17:00**
**A LOW NOISE CMOS SENSOR FRONTEND FOR A TMR-BASED BIOSENSING PLATFORM**
*Ayman Mohamed{2}, Matthias Schmid{2}, Asfand Tanwear{1}, Hadi Heidari{1}, Jens Anders{2}*
*{1}University of Glasgow, United Kingdom; {2}University of Stuttgart, Germany*

**17:15**
**DYNAMIC IMPEDANCE MATCHING NETWORK BASED ON REAL-TIME MEASUREMENT OF TRANSDUCER IMPEDANCE FOR HIGH-INTENSITY FOCUSED ULTRASOUND**
*Jinming Liu, Jingfeng Bai, Cong Yang, Yazhu Chen, Xiang Ji*
*Biomedical Instrument Institute, School of Biomedical Engineering, Shanghai Jiao Tong University, China*

**17:30**
**PIEZOELECTRIC MEMS VIBRATION SENSOR MODULE FOR MACHINING QUALITY PREDICTION**
*Shyam Trivedi, Ranjith Hosur Ganesh, Tung Shen, Po-Wen Huang, Sheng-Shian Li*
*National Tsing Hua University, Taiwan*

16:30 – 18:00

**C2L-02: PHYSICAL SENSORS: MAGNETIC & ELECTRIC DEVICES**
**Session Chair: Giacomo Langfelder, Politecnico di Milano**

16:30

**FIRST FOUNDRY THREE-DIMENSIONAL HALL EFFECT SENSOR FOR SYSTEM-ON-CHIP INTEGRATION**
*Eng Huat Toh, Yongshun Sun, Ping Zheng, Mathew Shajan, Patrick Cao, Mohd Nurul Islam, Jian-Yi Wong, Praveen Arikath, Ruchil Jain, Tam Lyn Tan, Elgin Quek*
*GLOBALFOUNDRIES, Singapore*

16:45

**A TUNABLE MAGNET-BASED TACTILE SENSOR FRAMEWORK**
*Evan Harber, Evan Schindewolf, Vickie Webster-Wood, Howie Choset, Lu Li*
*Carnegie Mellon University, United States*

17:00

**STABILIZED MAGNETIC VACUUM USING A ROTATING FLUXGATE SENSOR**
*Michal Janošek{1}, Michal Dressler{1}, Elda Saunderson{2}*
*{1}Czech Technical University in Prague, Czech Rep.; {2}South African National Space Agency, South Africa*

17:15

**SECURITY MONITORING SYSTEM USING MAGNETICALLY-ACTIVATED RFID TAGS**
*Cihan Asci, Wei Wang, Sameer Sonkusale*
*Tufts University, United States*

17:30

**MAGNETIC FIELD SENSOR BASED ON HYBRID OF MAGNETOSTRICTIVE AND PIEZOELECTRIC MATERIALS**
*Mohammad Akita Indianto, Masaya Toda, Takahito Ono*
*Graduate School of Engineering, Tohoku University, Japan*

17:45

**NON-CONTACT MEASUREMENT OF DC POTENTIALS WITH APPLICATIONS IN STATIC CHARGE IMAGING**
*Arash Pouryazdan{2}, Júlio Costa{2}, Filippo Spina{2}, Robert J Prance{2}, Helen Prance{2}, Niko Münzenrieder{1}*
*{1}Free University of Bozen-Bolzano, Italy; {2}University of Sussex, United Kingdom*

16:30 – 18:00

**C2L-04: BIORESORBABLE & BIODEGRADABLE SENSORS**
**Session Chairs: Ensieh Hosseini, University of Glasgow & Ravinder Dahiya, University of Glasgow**

16:30

**BIORESORBABLE AND BIODEGRADABLE ELECTRONICS AND PHOTONICS**
*Antonino Amedeo La Mattina, Stefano Mariani, Alessandro Paghi, Martina Corsi, Giuseppe Barillaro*
*University Of Pisa, Italy*

17:00

**BIODEGRADABLE, FLEXIBLE AND TRANSPARENT TACTILE PRESSURE SENSOR BASED ON RUBBER LEAF SKELETONS**
*Anastasia Koivikko, Vipul Sharma, Vilma Lampinen, Kyriacos Yiannacou, Veikko Sariola*
*Tampere University, Finland*

17:15

**BIODEGRADABLE AMINO ACID-BASED PRESSURE SENSOR**
*Ensieh Hosseini, Ravinder Dahiya*
*University of Glasgow, United Kingdom*

17:30

**DISPOSABLE AND FLEXIBLE SENSOR PATCH FOR A-AMYLASE DETECTION IN HUMAN BLOOD SERUM**
*Ravinder Dahiya{2}, Mitradip Bhattacharjee{1}, Pablo Escobedo{2}*
*{1}IISER Bhopal, India; {2}University of Glasgow, United Kingdom*

16:30 – 18:00

**C2L-05: OPTICAL SENSORS II**
**Session Chair: Minghong Yang, Wuhan University of Technology**

16:30

**FIBER BRAGG GRATING SENSORS FOR THERMOMETRY DURING GOLD NANORODS-MEDIATED PHOTOTHERMAL THERAPY IN TUMOR MODEL**
*Leonardo Bianchi{2}, Rachael Mooney{1}, Yvonne Cornejo{1}, Caitlyn Hyde{1}, Emiliano Schena{4}, Jacob Berlin{3}, Karen Aboody{1}, Paola Saccomandi{2}*
*{1}Department of Developmental & Stem Cell Biology, Beckman Research Institute at City of Hope, United States; {2}Department of Mechanical Engineering, Politecnico di Milano, Italy; {3}Department of Molecular Medicine, Beckman Research Institute at City of Hope, United States; {4}Università Campus Bio-Medico di Roma, Italy*

16:45

**4000 SERIAL FBG SENSORS INTERROGATED WITH A HYBRID CDM-WDM SYSTEM**
*Marek Götten{3,4}, 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} Universidad Politécnica de Madrid, Spain*

17:00

**EXPLOITING CHLOROPHYLL FLUORESCENSE FOR BUILDING ROBUST LOW-COST MOWING AREA DETECTORS**
*Nils Rottmann, Ralf Bruder, Achim Schweikard, Elmar Rueckert*
*University of Luebeck, Germany*

17:15

**FIBER OPTIC SENSORS FOR DISTRIBUTED AND QUASI-DISTRIBUTED TEMPERATURE MEASUREMENT**
*Sanzhar Korganbayev, Martina De Landro, Federica Morra, Alfredo Cidaga, Paola Saccomandi*
*Department of Mechanical Engineering, Politecnico di Milano, Italy*

17:30

**SILICON PHOTONICS ENABLED ON-CHIP OPTICAL READOUT OF PIEZOMEMS RESONATORS**
*Viphretuo Mere, Sudhanshu Tiwari, Aneesh Dash, Rakshitha Kallega, Akshay Naik, Rudra Pratap, Shankar Kumar Selvaraja*
*Indian Institute of Science, India*

16:30 – 18:00

**C2L-06: EMERGING SENSOR APPLICATIONS III**
**Session Chair: Pal Varga, Budapest University of Technology and Economics**

16:30

**STATIONARY LIDAR SENSORS FOR INDOOR QUADCOPTER LOCALIZATION**
*Marcell Rausch, Gabor Feher*
*Budapest University of Technology and Economics, Hungary*

16:45

**COMPARISON OF 2D LOCALIZATION USING RADAR AND LIDAR IN LONG CORRIDORS**
*Alan Zhang, Mohamed Atia*
*Carleton University, Canada*

17:00

**SENSOR SYSTEM AND SIGNAL PROCESSING FOR AUTOMATED BLADE COLLISION DETECTION ON WIND TURBINES**
*Kyle Clocker, Matthew Johnston*
*Oregon State University, United States*

17:15

**ASL RECOGNITION BASED ON KINEMATICS DERIVED FROM A MULTI-FREQUENCY RF SENSOR NETWORK**
*Sevgi Gurbuz{2}, Ali Gurbuz{1}, Evie Malaia{2}, Darrin Griffin{2}, Chris Crawford{2}, Emre Kurtoglu{2}, Mohammed Rahman{2}, Ridvan Aksu{2}, Robiulhossain Mdrafi{1}*
*{1}Mississippi State University, United States; {2}The University of Alabama, United States*

17:30

**NEAR-INFRARED, DEPTH, MATERIAL: TOWARDS A TRIMODAL TIME-OF-FLIGHT CAMERA**
*Miguel Heredia Conde{2}, Thomas Kerstein{1}, Bernd Buxbaum{1}, Otmar Loffeld{2}*
*{1}pmdtechnologies ag, Germany; {2}University of Siegen, Germany*

17:45

**AN ACCELEROMETER BASED EYEGLASS TO MONITOR FOOD INTAKE IN FREE-LIVING AND LAB ENVIRONMENT**
*Arun Arun, Sharmistha Bhadra*
*McGill University, Canada*

16:30 – 18:00

## C2P-08: ACTUATORS & SENSOR POWER SYSTEMS II
**Session Chair: Reza Abdolvand, University of Central Florida**

**C2P-08-1**
**4X4 FINGERTIP TACTILE MATRIX ACTUATOR WITH EDGE DETECTION SCANNING ROI SIMULATOR**
*Alexander Abad, Daniel Swarup, David Reid, Anuradha Ranasinghe*
*Liverpool Hope University, United Kingdom*

**C2P-08-2**
**WATER-BASED PRIMARY CELL FOR POWERING OF WIRELESS SENSORS**
*Dmitry Petrov, Ulrich Hilleringmann*
*Paderborn University, Germany*

**C2P-08-3**
**A BELL-INSPIRED PIEZOELECTRIC KINETIC ENERGY HARVESTER**
*Xuefeng He, Hongjiang Zhang, Senlin Jiang*
*Chongqing University, China*

**C2P-08-4**
**ROTOR-INDUCED AIRFLOW FOR ODOR SOURCE DETECTION ON NANO-QUADCOPTERS**
*Alexander Castro, Leo Peckerar, Pamela Abshire, Timothy Horiuchi*
*University of Maryland College Park, United States*

**C2P-08-5**
**OPTIMUM MPPT STRATEGY FOR LOW-POWER PENDULUM-TYPE WAVE ENERGY CONVERTERS**
*Matias Carandell, Daniel Mihai Toma, Joaquín del Río, Manel Gasulla*
*Universitat Politecnica de Catalunya, Spain*

16:30 – 18:00

## C2P-09: SENSORS FOR AGRIFOOD & CONNECTED FARMING III
**Session Chairs: Alper Bozkurt, North Carolina State University & Marios Sophocleous, University of Cyprus**

**C2P-09-1**
**FEASIBILITY STUDY OF WATER STRESS DETECTION IN PLANTS USING A HIGH-THROUGHPUT LOW-COST SYSTEM**
*Rafael Luiz Da Silva, Nathan Starliper, Dinesh Bhosale, Matthew Taggart, Rakshita Ranganath, Trupti Sarje, Michael Daniele, Alper Boskurt, Thomas Rufty, Edgar Lobaton*
*North Carolina State University, United States*

**C2P-09-2**
**A VERSATILE, STAND-ALONE SYSTEM FOR A SCREEN-PRINTED, SOIL-SENSING ARRAY FOR PRECISION AGRICULTURE**
*Marios Sophocleous, Andreas Karkotis, Julius Georgiou*
*University of Cyprus, Cyprus*

**C2P-09-3**
**TOWARDS SOLID-STATE, THICK-FILM K+ AND NA+ ION SENSORS FOR SOIL QUALITY ASSESSMENT**
*Marios Sophocleous{2}, Laura Contat-Rodrigo{1}, Eduardo García-Breijo{1}, Julius Georgiou{2}*
*{1}Universitat Politècnica de València, Spain; {2}University of Cyprus, Cyprus*

**C2P-09-4**
**LOW-COST SMART CAMERA SYSTEM FOR WATER STRESS DETECTION IN CROPS**
*Paula Ramos- Giraldo{1}, S. Chris Reberg-Horton{1}, Steven Mirsky{2}, Edgar Lobaton{1}, Anna M. Locke{2}, Esleyther Henriquez{1}, Ane Zuniga{1}, Artem Minin{1}*
*{1}NCSU, United States; {2}USDA-ARS, United States*

16:30 – 18:00

## C2P-10: EMERGING TECHNOLOGIES FOR FLEXIBLE & PRINTED ENERGY AUTONOMOUS SENSING SYSTEMS II

**Session Chairs: Luisa Petti, Free University of Bolzano-Bozen & Almudena Rivadeneyra, University of Granada**

### C2P-10-1
**SELECTIVE LASER SINTERING OF BLADE-COATED THERMOELECTRIC MATERIALS WITH TUNABLE THICKNESS**

*Yuan Tian, Kostadin Loskoski, Sebastian Meyers, Brecht Van Hooreweder, Francisco Molina-Lopez*
*KU Leuven, Belgium*

### C2P-10-2
**TEMPERATURE SENSING BY LASER REDUCED GRAPHENE OXIDE AT DIFFERENT LASER POWER LEVELS**

*Francisco J Romero{2}, Inmaculada Ortiz-Gomez{1}, Alfonso Salinas-Castillo{1}, Diego P Morales{2}, Noel Rodriguez{2}, Almudena Rivadeneyra{2}*
*{1}Department of Analytical Chemistry, University of Granada, Spain; {2}Department of Electronics and Computer Technology, University of Granada, Spain*

16:30 – 18:00

## C2P-11: WEARABLE SENSORS FOR REMOTE HEALTH MONITORING

**Session Chairs: Veena Misra, NC State University & Omer Oralkan, NC State University**

**C2P-11-1**
**WIRELESS SYNCHRONOUS CARBON NANOTUBE-PATCH MECHANOMYOGRAPHY OF LEG MUSCLES**
*Dedy Wicaksono{1}, James Soetjipto{1}, Fuad Ughi{1}, Aulia Iskandar{1}, Farida Santi{2}, Vitriana Biben{2}*
*{1}Swiss German University, Indonesia; {2}University of Padjadjaran, Indonesia*

**C2P-11-2**
**A LOW-COST LUNG MONITORING POINT-OF-CARE DEVICE BASED ON A FLEXIBLE PIEZORESISTIVE FLOW SENSOR**
*Uttariyo Saha, Amar Kamat, Debarun Sengupta, Bayu Jayawardhana, Ajay Giri Prakash Kottapalli*
*University of Groningen, Netherlands*

**C2P-11-3**
**A PRELIMINARY STUDY ON A NEW LIGHTWEIGHT AND FLEXIBLE SENSING SOCK FOR GAIT ANALYSIS**
*Nicola Carbonaro, Lucia Arcarisi, Francesco Di Rienzo, Antonio Virdis, Carlo Vallati, Alessandro Tognetti*
*University of Pisa, Italy*

**C2P-11-4**
**SENSORIZED FABRIC GLOVE AS GAME CONTROLLER FOR REHABILITATION**
*Joo Chuan Yeo, Sejal Ghate, Longteng Yu, Kang Du, Chwee Teck Lim*
*National University of Singapore, Singapore*

16:30 – 18:00

## C2P-12: SENSOR PHENOMENOLOGY III

**Session Chairs: Sheng-Shian Li, National Tsing Hua University & Sone Masato, Tokyo Institute of Technology**

**C2P-12-1**
**MICROELECTROMECHANICAL PHASE DETECTORS FOR PHASE-LOCKED LOOP APPLICATIONS**
*Israel Dunk, Hengky Chandrahalim*
*The US Air Force Institute of Technology, United States*

**C2P-12-2**
**MEASURING POWER USAGE AND SENSITIVITY TO MOVEMENT FOR EVENT-BASED CAMERAS**
*Christopher Voelkel{1}, Tyler Lovelly{2}, Andrew Pineda{2}, Peter McMahon-Crabtree{2}, Gabriel Mounce{2}*
*{1}New Mexico Institute of Mining and Technology, United States; {2}U.S. Air Force Research Laboratory, United States*

**C2P-12-3**
**COMPARABLE DATA EVALUATION METHOD FOR A RADIO-NUCLEAR SENSOR WHEN USED ON AN UAV**
*Claudia Rudolph, Benjamin Knoedler, Josef Heinskill*
*Fraunhofer FKIE, Germany*

**C2P-12-4**
**EFFECT OF EXCITATION SIGNAL FREQUENCY ON THE ELECTRICAL RESPONSE OF A MWCNT/HEC COMPOSITE BASED HUMIDITY SENSOR**
*Xingzhe Zhang{2}, Dinesh Maddipatla{2}, Arnesh Bose{2}, Binu Narakathu{2}, John Williams{1}, Michael Mitchell{1}, Massood Atashbar{2}*
*{1}The Boeing Company, United States; {2}Western Michigan University, United States*

**C2P-12-5**
**OPEN-ENDED-LINE REFLECTIVE-MODE PHASE-VARIATION SENSORS FOR DIELECTRIC CONSTANT MEASUREMENTS**
*Jonathan Muñoz-Enano{2}, Pau Casacuberta{2}, Lijuan Su{2}, Paris Vélez{2}, Marta Gil{1}, Ferran Martín{2}*
*{1}Universidad Politécnica de Madrid, Spain; {2}Universitat Autònoma de Barcelona, Spain*

**C2P-12-6**
**TRAJECTORY GENERATION OF FBG-SENSORIZED NEEDLES FOR INSERTIONS INTO MULTI-LAYER TISSUE**
*Dimitri Lezcano, Iulian Iordachita, Jin Seob Kim*
*Johns Hopkins University, United States*

**C2P-12-7**
**EMPIRICAL TEMPERATURE MODEL OF SELF-DIRECTED CHANNEL MEMRISTOR**
*Thanasin Bunnam{2}, Ahmed Soltan{3}, Danil Sokolov{2}, Oleg Maevsky{1}, Patrick Degenaar{2}, Alex Yakovlev{2}*
*{1}Nanodevices LTD, Russia; {2}Newcastle University, United Kingdom; {3}Nile University, Egypt*

**C2P-12-8**
**ELECTRO-MECHANICAL CO-OPTIMIZATION OF MEMS DEVICES IN PYTHON**
*Rui Amendoeira Esteves{1}, Chen Wang{1}, Joana Vaz Pinto{2}, Michael Kraft{1}*
*{1}KU Leuven, Belgium; {2}NOVA School of Science and Technology, Portugal*

**C2P-12-9**
**ON-DEMAND MEMS ACCELEROMETER DYNAMIC RESPONSE ACQUISITION AND OUTPUT DITHERING VIA SELF TEST PIN ACTUATION**
*Panos Ioakim, Iasonas Triantis*
*City, University of London, United Kingdom*

**C2P-12-10**
**TOWARDS AN OBJECTIVE AND PRECISE MOISTURE CONTENT MEASUREMENT OF TEXTILES USING A CHIPLESS RFID TAG-SENSOR**
*Fatemeh Babaeian{2}, Nemai Chandra Karmakar{2}, Zahra Komeily-Nia{1}, Alessandra Sutti{1}*
*{1}Deakin University, Australia; {2}Monash University, Australia*

**C2P-12-11**
**ANALYSIS OF PITOT TUBE AIRFLOW VELOCITY SENSOR BEHAVIOR IN BLOCKAGE SITUATIONS**
*Ata Golparvar{1}, Murat Kaya Yapici{2}*
*{1}EPFL, Switzerland; {2}Sabanci University, Turkey*

16:30 – 18:00

## C2P-13: SENSOR PHENOMENOLOGY IV (MODELING & EVALUTATION)
**Session Chair: Pal Varga, Budapest University of Technology and Economics**

**C2P-13-1**
**A HIGHLY-LINEAR, INTEGRATION-COMPATIBLE OUTPUT METRIC FOR AMPLITUDE-MODULATED RESONANT SENSORS BASED ON WEAKLY-COUPLED RESONATORS**
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**C2P-13-2**
**PHASE-LOCKED LOOP MODELLING BASED ON BROADBAND POWER COMBINER AND CAPACITIVE MEMS POWER SENSOR**
*Juzheng Han, Rushan Chen*
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**C2P-13-3**
**MODELLING OF A FLOW METER THROUGH MACHINE LEARNING**
*Bing Yan{1}, Jianyong Zhang{3}, Ruixue Cheng{3}, Chenhua Liu{2}*
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**C2P-13-4**
**EFFECT OF SPATIAL SENSITIVITY OF SENSOR ON PARTICULATE VELOCITY MEASUREMENT DERIVED BASED ON CROSS CORRELATION TECHNIQUES**
*Ruixue Cheng{2}, Jianyong Zhang{2}, Bin Zhou{1}*
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**C2P-13-5**
**COMPACT MODEL OF RING-CORE SENSING ELEMENT OF 2D FLUXGATE MAGNETOMETER**
*Laurent Malané{2}, Jean-Baptiste Kammerer{2}, Luc Hébrard{2}, Vinciane Chereau{1}*
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